

PROJECT MANUAL
INCLUDING CONSTRUCTION SPECIFICATIONS

for

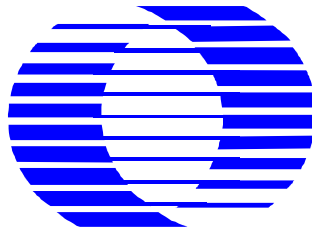
BP-S00195
TERMINAL C, PHASE 1X – AIRSIDE CONCOURSE

CONTRACT DOCUMENTS

Volume 3 OF 7
(Divisions 09-21)

ORLANDO INTERNATIONAL AIRPORT

Orlando, Florida 32827



GREATER ORLANDO AVIATION AUTHORITY

Documents Prepared and Submitted by:

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FINISH KEY
SECTION 09 00 01

Revision	SPEC. SECTION	KEY	ITEM	DESCRIPTION	REMARKS
	05 5813	MCC1	Metal Column Cover	Manufacturer: Gordon, Inc. Product: e-Connect System Color: Match paint P1 Finish: Powder coat, Gloss Top Trim: Aluminum 5052-H34 0.063" Thick	Location: GTF, LST, ASC Contact Information: Clint Husband 303.697.9498 ClintHusband@comcast.net
	05 7500	DM1	Decorative Formed Metal	Manufacturer: Rigidized Metals Product: 304 Stainless Steel Finish: Brushed No.4 Thickness: 20ga Installation: Horizontal	Location: RAC/GTF, LST, ASC Base and Trim Contact Information: Cindy Sawyer 303.257.3639 cindysawyer@rigidized.com
	05 7500	DM2	Decorative Formed Metal	Manufacturer: Rigidized Metals Product: Linen 304 Stainless Steel Finish: BA Thickness: 0.060" Installation: Vertical	Location: Ticketing Signage Trim, Air Columns, AED/FEC Pylons, FIDS Enclosure, Millwork Panels, CCC Contact Information: Cindy Sawyer 303.257.3639 cindysawyer@rigidized.com
2	06 4116	HW1	Casework Hardware	Refer to Spec section	
	06 4116	L1	Plastic Laminate for Architectural Cabinets	Manufacturer: Lamin-Art Product: Plastic Laminate Pattern: Solid; Vellum Finish Color: 9202-E Pearl White Vertical Orientation	Location: ASC Millwork Contact Information: Constance Foster 949.201.3127 cfoster@laminart.com
	06 4116	L2	Plastic Laminate for Architectural Cabinets	Manufacturer: Nevamar Product: Plastic Laminate Pattern: Textured Color: S-7040T Spa White	Location: Public RR vanity accessible panel Contact Information: Meghan Rawlings 407.832.5388 rawlinm@wilsonart.com
	06 4116	L3	Plastic Laminate for Architectural Cabinets	Manufacturer: LaminArt Product: Plastic Laminate Pattern: 3051-VT Natural Teak Color: Natural Teak Finish: Velva-Tex Installation: Vertical	Location: Gate Podiums Contact Information: Constance Foster 949.201.3127 cfoster@laminart.com
5	06 4116	L4	Plastic Laminate for Architectural Cabinets	Manufacturer: Nevamar Product: Plastic Laminate Pattern: Textured Color: S-7040T Spa White	Location: Public RR vanity accessible panel Contact Information: Meghan Rawlings 407.832.5388 rawlinm@wilsonart.com

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	06 4116	L21	Plastic Laminate for Architectural Cabinets	Manufacturer: Wilsonart Product: Plastic Laminate Pattern: 4911-38 Color: Soft Gold Mesh	Location: B.O.H. ASC Contact Information: Name: Meghan Rawlings Number: 407-832-5388 Email: rawlinm@wilsonart.com
3	06 4116	L22	Plastic Laminate for Architectural Cabinets	Manufacturer: Wilson Art Product: Plastic Laminate Pattern: 4887-38 Color: Tan Soapstone Finish: Fine Velvet	Location: B.O.H. Restrooms Contact Information: Name: Megan Rawlings Number: 407-832-5388 Email: rawlinm@wilsonart.com
	06 6400	FRP1	Fiber Reinforced Paneling	Manufacturer: Marlite Product: FRP - Standard Color: P151 Lite Grey Fire Rating - Class A Texture: Pebbled	Location: Janitor's Closets
	07 1900	SC1	Sealed Concrete		Reference spec sections: 07 1900 Water Repellent
	07 1613	PW1	Polymer Modified Cement Waterproofing	Manufacturer: Sika Corporation Product: SikaTop Seal 107 Color: Grey	Location: Flooring - Restroom Chases
	08 8000	IG2	Glazing	Manufacturer: S.A. Bendheim Ltd Product: Backpainted Glass Substrate: Vitro Architectural Glass Starphire Color: To match P1 Thickness: GANA per application Edge Treatment: Flat Polished	Location: ASC, backpaint at soffit and wall locations, ASC Domestic Arrivals Bridge Elevator Cladding Contact Information: Beth Hockett 720.775.6653 beth@archsale.com
	08 8113	G5	Decorative Glazing	Manufacturer: Vitro Architectural Glass Product: Starphire Color: Clear Thickness: GANA per application	Location: Decorative Metal Railing, Sterile Corridor Glazing and wall locations Contact Information: Dan Adams 206.409.4805 Deadams@vitro.com
	09 3013	T1	Porcelain Tile	Manufacturer: Stonepeak Series: Sussex Color: Pearl Finish: Matte Size: 12"x24" Grout Joint: 1/8"; Color: Mapei 77 - Frost Installation: Wall, Vertical, Stack pattern	Location: Public Restrooms Contact Information: Connie Mesko 303.249.4414 cmesko@crossvilleinc.com

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	09 3013	T2	Rectified Porcelain Tile	Manufacturer: Concept Surfaces Series: Stucture Color: Rif Marfil Finish: Textured Size: 12"x24" Grout Joint: 1/8"; Color: Mapei 01 - Alabaster Installation: Wall, Horizontal, Stack pattern; Re:Dwgs	Location: Multi-Fixture Public Restrooms Wet Wall Contact Information: Maria Kebschull 303.591.2208 mariak@conceptsurfaces.com
	09 3013	T3	Porcelain Tile	Manufacturer: Iris Series: Roads Color: White Purity (same shade and caliber to be used on project) Finish: Honed Size: 30"x60" Grout Joint: 1/8"; Color: Mapei 94 - Straw ~~Installation: Vertical; Re:Dwgs~~	Location: ASC Concourse Contact Information: Shannon Pooler 407.489.2314 spooler@specialtytile.com
	09 3013	T4	Porcelain Tile	Manufacturer: Iris Series: Roads Color: White Purity (same shade and caliber to be used on project) Finish: Honed Size: 15"x30" (Factory Cut, Match T3) Grout Joint: 1/8"; Color: Mapei 94 - Straw ~~Installation: Vertical; Re:Dwgs~~	Location: ASC Concourse Contact Information: Shannon Pooler 407.489.2314 spooler@specialtytile.com
	09 3013	T5	Porcelain Tile	Manufacturer: Stonepeak Series: Parkland Color: USG124D439 Shenandoah Pattern: Mosaic Size: 12"x24" Grout Joint: 1/8"; Color: Mapei 94 - Straw ~~Installation: Vertical; Re:Dwgs~~	Location: Drinking Fountains, ASC Restroom front Contact Information: Marcy Mynatt Trimble 615.337.0029 mtrinble@stnoepeakceramics.com
	09 3023	T6	Glass Mosaic Tile	Manufacturer: Trend Group Series/Product: Karma/ Metropolis Color: Opal Size: 12-1/4"x11-1/4" Grout Joint: 1/8"; Color: Mapei 94 - Straw Installation: Wall	Location: Public Restroom Feature Wall, Lavatory and Baby Changing Wall Contact Information: Phillip Chumley 903.452.0004 pchumley@stonesource.com

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1	09 3013	T21	Porcelain Tile	Manufacturer: Trinity Tile Series: Aragonite thru-color porcelain Color: Amber Size: 12" x 12" Finish: Matte Grout: Mapei, Epoxy, Navajo Brown # 35 - 1/8" wide Installation: Thin Set, Straight Bond	Location: Select BOH R/R Floors Contact Information: Robin Ritchey: 407.521.6655 rritchey@trinitysurfaces.com
	09 3013	T22	Ceramic Tile	Manufacturer: Dal Tile Series: Color Story Wall Color: Calm 0036 Finish: Matte Size: 6"x 6" (nom.) Grout: Mapei, Epoxy, Biscuit #14 - 1/4" wide Notes: Provide tile trim and accessories	Location: BOH R/R Walls Contact Information: Robin Ritchey: 407.521.6655 rritchey@trinitysurfaces.com
	09 3013	T23	Quarry Tile	Manufacturer: Metropolitan Ceramics Color: Puritan Gray Size: 8" x 8" (nom.) Finish: Matte Grout: Mapei, Epoxy, Gray#9 - 3/8" wide Notes: Provide matching 8" cove base	Location: Janitor's Closet Contact Information: Robin Ritchey: 407.521.6655 rritchey@trinitysurfaces.com
	09 5133	ACL1	Acoustical Metal Pan Ceiling	a. Manufacturer and Series: Armstrong World Industries, Inc. b. Product: Metal Works Torsion Spring 7211 c. Size: 24"x 96" d. Color: Custom to match P1 e. Finish: Polyester Paint, M15, Perforated f. Trim: 4" Typical at Cloud g. Grid System: Concealed, Slotted for Torsion Spring	Location: Public Restrooms Contact Information: Kelly Hedlund 303.349.2294 kshedlund@armstrongceilings.com
	09 5113	ACL2	Acoustical Panel Ceiling	a. Manufacturer and Series: Armstrong b. Style: Ultima Tegular #1951 c. Size: 24 in x 24 in x 3/4 in d. Material: Wet Formed Mineral Fiber e. Color: White f. Edge Detail: Beveled Tegular g. Grid System: Prelude XL 15/16"	Location: ASC Contact Information: Kelly Hedlund 303.349.2294 kshedlund@armstrongceilings.com

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	09 5113	ACL3	Acoustical Panel Ceiling	a. Manufacturer and Series: Armstrong b. Style: Ultima Health Zone c. Size: 24 in x 24 in x 3/4 in d. Material: Wet Formed Mineral Fiber e. Color: White f. Edge Detail: Beveled Tegalur g. Grid System: Clean Room – 15/16"	Location: Wet areas ASC Contact Information: Kelly Hedlund 303.349.2294 kshedlund@armstrongceilings.com
5	09 5113	ACL4	Acoustical Panel Ceiling	a. Manufacturer and Series: Armstrong b. Style: Optima Tegalur 3262PB c. Size: 24 in x 96 in X 1 in d. Material: Fiberglass e. Color: White f. Edge Detail: Beveled Tegalur g. Grid System: Silhouette 1/8" Reveal h. Trim: Axiom, color: White; 4" Typical at Flat Cloud; Custom at Sloped Notes: All tiles to have factory edge finishes, field verify all sizes other than standard to be "Made-to- order"	Location: ASC Contact Information: Kelly Hedlund 303.349.2294 kshedlund@armstrongceilings.com
	09 5113	ACL5	Acoustical Panel Ceiling	a. Manufacturer and Series: Armstrong b. Style: Optima Tegalur 1414 c. Size: 12 in x 96 in X 1 in d. Material: Fiberglass e. Color: White f. Edge Detail: Beveled Tegalur g. Grid System: Silhouette 1/8" Reveal h. Trim: Axiom, color: white	Location: Wet areas LST Contact Information: Kelly Hedlund 303.349.2294 kshedlund@armstrongceilings.com
	09 5133	ACL6	Acoustical Metal Pan Ceiling	a. Manufacturer and Series: Armstrong World Industries, Inc. b. Product: Metal Works Torsion Spring c. Size: 12"x96", Custom d. Color: Custom to match P1 e. Finish: Polyester Paint, M15, Perforated f. Trim: 4" Typical at Flat Cloud g. Grid System: Concealed, Slotted for Torsion Spring	Location: ASC Domestic Arrivals Bridge Contact Information: Kelly Hedlund 303.349.2294 kshedlund@armstrongceilings.com

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	09 5123	ACL7	Acoustical Panel Ceiling	a. Manufacturer and Series: Armstrong World Industries, Inc. b. Product: Duratile directly adhered, MN80377 c. Size: 12"x12"x3/4" d. Color: white e. 15/16" Tongue and Groove System attached with adhesive	Location: CBP security ceilings SCL1 and SCL3 Contact Information: Kelly Hedlund 303.349.2294 kshedlund@armstrongceilings.com
	09 5113	ACL22	Acoustical Panel Ceiling	a. Manufacturer and Series: Armstrong b. Style: Mesa #684 c. Size: 24 in x 48 in x 3/4 in d. Material: Wet Formed Mineral Fiber e. Color: White f. Edge Detail: Angled Tegral g. Grid System: Prelude XL – 15/16"	Location: BOH Office Areas Contact Information: Johnathan Elrod 407.803.3448 jelrod@armstrongceilings.com
	09 5113	ACL23	Acoustical Panel Ceiling	a. Manufacturer and Series: Armstrong b. Style: Ceramaguard c. Pattern: 605, Unperforated d. Size: 24"x48"x5/8" e. Material: Ceramic and Mineral Fiber f. Color: White g. Edge Detail: Square Edge h. Grid System: Prelude XL, Aluminum 15/16"	Location: BOH Service Areas Contact Information: Johnathan Elrod 407.803.3448 jelrod@armstrongceilings.com
5	09 6513	RB21	Resilient Base	Manufacturer: ArmstrongFlooring Commercial Product: Rubber Type: Cove Height: 4" Color: Desert	Location: BOH with Resilient Flooring Contact Information: William Wise 803.728.7077 wwise@armstrongflooring.com
5	09 6513	RB22	Resilient Base	Manufacturer: Armstrong Flooring Commercial Product: Rubber Type: Cove Height: 4" Color: Flagstone	Location: BOH with Carpet Contact Information: William Wise 803.728.7077 wwise@armstrongflooring.com

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	09 6519	RT1	Resilient Tile Flooring	Manufacturer: Patcraft Product: Admix 1347V Color: Sundial SMP 00130 Size: 36" x 36" ~~Seam: Heat Weld, provide matching rod~~	Location: Public Elevators Contact Information: Jamie Wenger 303.513.6351 ~~jamie.wenger@patcraft.com~~
	09 6519	RT21	Resilient Tile Flooring	Manufacturer: Armstrong Flooring Commercial Product: Striations BBT Color: Bisque Number: T3614 Size: 12" x 24" x 1/8"	Location: BOH Flooring Contact Information: Dave Price 813.285.6868 dprice@armstrong.com
	09 6519	RT24	Resilient Tile Flooring	Manufacturer: Johnsonite Series: Rubber Stair Treads and Risers Style: Square Color: 49 - Beige	Location: BOH Flooring - Stairs in Corridors Contact Information: Jan Wilhelm 440.708.5766 janet.wilhelm@tarkett.com
	09 6623	TF1	Resinous Matrix Terrazzo Flooring	Manufacturer: Terrazzo & Marble Supply Company Product: Terroxy Resin System TM16GG-327 Resin Color: Row House Tan 3806 Aggregate: 25% Georgia White #1,2; 40% China White #1,2; 25% Valders #1,2; 10% Mother of Pearl #2	Location: LST, ASC, GTF Contact Information: Chris Anderson 714.901.1400 canderson@tmsupply.com
	09 6623	TF2	Resinous Matrix Terrazzo Flooring	Manufacturer: Terrazzo & Marble Supply Company Product: Terroxy Resin System TM16GG-442 Resin Color: White Dove 5824 Aggregate: 25% Georgia White #1,2; 40% China White #1,2; 25% Valders #1,2; 10% Mother of Pearl #2	Location: LST, ASC, GTF, Accent Contact Information: Chris Anderson 714.901.1400 canderson@tmsupply.com
	09 6623	TF3	Resinous Matrix Terrazzo Flooring	Manufacturer: Terrazzo & Marble Supply Company Product: Terroxy Resin System TM16GG-484 Resin Color: Glacier Gray 39B-2T Aggregate: 25% Georgia White #1,2; 40% China White #1,2; 25% Valders #1,2; 10% Mother of Pearl #2	Location: LST, ASC, GTF, Accent Contact Information: Chris Anderson 714.901.1400 canderson@tmsupply.com
	09 6623	TF4	Resinous Matrix Terrazzo Flooring	Manufacturer: Terrazzo & Marble Supply Company Product: Terroxy Resin System TM16GG-386 Resin Color: Pepper Aggregate: 25% Georgia White #1,2; 40% China White #1,2; 25% Valders #1,2; 10% Mother of Pearl #2	Location: ASC Public Restroom Vestibules Contact Information: Chris Anderson 714.901.1400 canderson@tmsupply.com

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3	09 67 23	RF1	Decorative Flake Polymeric Floor Coating	Manufacturer: Sherwin Williams Product: Torginal Flake	Location: Public Restroom Flooring & Integral Base
	09 6723	RSF1	Resinous Flooring - SARA	Manufacturer: Benjamin Moore Product: 2 part Resinous Epoxy Gloss Level: Semi-Gloss w/ non-slip additive Color: Iute	Location: Service Animal Relief Areas Flooring
5	09 6813	CP21	Tile Carpet	Manufacturer: Shaw Commercial Flooring Pattern: Construct Tile ST104 Color: Sector 03585 Weight: 18 oz yd ² Tile Size: 24" x 24" Installation Method: Quarter Turn ~~Notes: Apply Releasable Adhesive~~	Location: B.O.H. LST, ASC Contact Information: Virna Mitchell 407.405.0422 virna.mitchell@shawinc.com
	09 6816	CP1	Sheet Carpet	Manufacturer: Mannington Collection: Great Expectations II Pattern: Deep Thoughts II Modular Color: Custom Fiber: 100% Invista Antron Type 6,6 Nylon Weight: 18ox/sq yd Size: 12' Wide Broadloom Primary Backing: 100% Synthetic Secondary Backing: Integra HP w Chemically Weldable Seams	Location: ASC Sterile Corridor, LSC Domestic Arrivals Bridge & Domestic Bag Claim Contact Information: Shannon White, IIDA District Manager Mannington Commercial Amtico e: shannon_white@mannington.com c: 720-492-3901 w: www.manningtoncommercial.com
	09 6816	CP2	Sheet Carpet	Manufacturer: Mannington Collection: Great Expectations II Pattern: Fresh Perspective Modular Color: Custom Fiber: 100% Invista Antron Type 6,6 Nylon Weight: 18ox/sq yd Size: 12' Wide Broadloom Primary Backing: 100% Synthetic Secondary Backing: Integra HP w Chemically Weldable Seams	Location: ASC Sterile Corridor Accent, ASC Holdrooms, LSC Domestic Arrivals Bridge & Tourbillon Opening Seating Contact Information: Shannon White, IIDA District Manager Mannington Commercial Amtico e: shannon_white@mannington.com c: 720-492-3901

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	09 6816	CP3	Sheet Carpet	Manufacturer: Mannington Collection: Great Expectations II Pattern: Fresh Perspective Modular Color: Custom Fiber: 100% Invista Antron Type 6,6 Nylon Weight: 180x/sq yd Size: 12' Wide Broadloom Primary Backing: 100% Synthetic Secondary Backing: Integra HP w Chemically	Location: ASC Holdroom Accent, LSC Domestic Bag Claim Accent Contact Information: Shannon White, IIDA District Manager Mannington Commercial Amtico e: shannon_white@mannington.com c: 720-492-3901 w: www.manningtoncommercial.com
	09 7513	ST1	Quartz Based Stone Wall Facing	Manufacturer: DuPont Product: Zodiaq Color: Calacatta Natura Size: As Indicated Installation: Vertical	Location: ASC, LST, RAC, Public Restrooms Contact Information: Emily Harding Hallmark Building Supply 720.979.0354 eharding@hllmark.com
	09 7800	MWC17	Metal Framed Wall Paneling	Manufacturer: WALL PANEL SYSTEMS Product: Mirror Metals Material:316 STAINLESS STEEL Finish: # 8 Non-directional True Polished Mirror Thickness: 1.5 mm Size: 4'-0" x 10'-0" Installation: WPS COMPLETE RECESSED REVEAL SYSTEM BUTT JOINT	Location: Windows of Orlando Contact Information: Chuck McCoy(877) 333-4977 cmccoy@wallpanelsystems.net
	09 7800	MWC19	Metal Framed Wall Paneling	Manufacturer: WALL PANEL SYSTEMS Product: Mirror Metals Material:316 Stainless Steel Thickness: 1.5 mm Size: 4'-0" x 10" Finish: # 8 Non-directional True Polished Mirror Installation: WPS – ES 500 Concealed Fastening System	Location: Windows of Orlando floor
	09 9123	P1	Interior Paint	Manufacturer: Benjamin Moore Color: OC-17 White Dove Sheen:Eggshell Walls, Flat Ceilings	Contact Information: Constance Green 201.912.2829 connie.green@benjaminmoore.com
	09 9123	P2	Interior Paint	Manufacturer: Benjamin Moore Color: OC-17 White Dove Sheen:Eggshell	Contact Information: Constance Green 201.912.2829 connie.green@benjaminmoore.com

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	09 9123	P3	Interior Paint	Manufacturer: Benjamin Moore Color: Jute AF-80 Sheen:Eggshell	Contact Information: Constance Green 201.912.2829 connie.green@benjaminmoore.com
	09 9123	P4	Interior Paint	Manufacturer: Sherwin Williams Color: Midnight SW 6264 Sheen:Eggshell	Contact Information: Christopher Olden CSI, CDT 407.694.7994 chris.m.olden@sherwin.com
5	09 9123	P5	Interior Paint	Manufacturer: Benjamin Moore Color: West Chester Tan 246 Sheen: Eggshell	Location: CBP BOH Offices and Teams Rooms Only Contact Information: Constance Green 201.912.2829 connie.green@benjaminmoore.com
5	09 9123	P6	Interior Paint	Manufacturer: Benjamin Moore Color: New York State of Mind 805 Sheen: Eggshell	Location: CBP BOH Select Offices and Team Rooms only Contact Information: Constance Green 201.912.2829
5	09 9123	P7	Interior Paint	Manufacturer: Benjamin Moore Color: Coastal Paradise 655 Sheen: Eggshell	Location: CBP BOH Break Area Only Contact Information: Constance Green 201.912.2829 connie.green@benjaminmoore.com
	09 9600	HPC1	High Performance Coating	Manufacturer: Benjamin Moore Product: High Performance Interior Latex Gloss Level: Semi-Gloss Color: White Dove OC-17	Location: RAC,GTF, LST, ASC, Select HM Doors & Frames Contact Information: Constance Green 201.912.2829 connie.green@benjaminmoore.com
	09 9600	HPC2	High Performance Coating	Manufacturer: Benjamin Moore Product: High Performance Interior Latex Gloss Level: Semi-Gloss Color: OC-17 White Dove	Location: RAC,GTF, LST, ASC, Glass Elevator Framing Contact Information: Constance Green 201.912.2829 connie.green@benjaminmoore.com

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	09 9600	HPC3	High Performance Coating	Manufacturer: Benjamin Moore Product: High Performance Interior Latex Gloss Level: Semi-Gloss Color: Jute AF-80	Location:LST, ASC HM Doors & Frames UNO Contact Information: Constance Green 201.912.2829 connie.green@benjaminmoore.com
	09 9600	HPC4	High Performance Coating	Manufacturer: Benjamin Moore Product: High Performance Interior Latex Gloss Level: Semi-Gloss Color: 2138-60 Gray Cashmere	Location: RAC,GTF, LST, ASC, Stairwell Handrails, Select HM Doors & Frames Contact Information: Constance Green 201.912.2829 connie.green@benjaminmoore.com
	09 9600	HPC5	High Performance Coating	Manufacturer: Sherwin Williams Product: 2 part Epoxy Paint Gloss Level: Semi-Gloss w/ non slip additive Color: To match P2	Location: Flooring - Glass Elevator Pit Floor Contact Information: Christopher Olden CSI, CDT 407.694.7994 chris.m.older@sherwin.com
3	09 9600	HPC21	High Performance Coating	Manufacturer: Sherwin Williams Product: 2 part Epoxy Paint Gloss Level: Semi-Gloss w/ non slip additive Color: Pewter Cast, 7673	Location: Flooring - Mechanical Rooms - Field Contact Information: Christopher Olden CSI, CDT 407.694.7994 chris.m.older@sherwin.com
3	09 9600	HPC22	High Performance Coating	Manufacturer: Sherwin Williams Product: 2 part Epoxy Paint Gloss Level: Semi-Gloss w/ non-slip additive Color:Red Door, 2910	Location: Flooring - Mechanical Rooms - Platform Contact Information: Christopher Olden CSI, CDT 407.694.7994 chris.m.older@sherwin.com
	09 7513	ST1	Quartz Based Stone Wall Facing	Manufacturer: American Reserve Product: One Quartz Surfaces Color: OQ47 Patriotic Calacatta Size: As Indicated Installation: Vertical	Location: ASC Public Restrooms Millwork Pilasters Contact Information: Laura Pollard 407.861.4474 laura.pollard@daltile.com
	10 2113	TC1	Solid Surface Toilet Compartment	Manufacturer: Bobrick Series: Sierra Series 1090 Material: Solid Color Reinforced Composite Color: Desert Beige (SC02)	Location: Public Restrooms Contact Information: 847.760.0543 DGenerali@PrivacyPlusPartitions.com
	10 1720	TC21	Solid Color Reinforced Composite Toilet Compartments	Manufacturer: Bobrick Product:2090, Floor Mtd., Overhead Braced Type: Sierra Color:SC02 - Desert Beige	Location: BOH Restrooms Contact Information: 847.760.0543 DGenerali@PrivacyPlusPartitions.com

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	10 2600	WP1	Wall and Door Protection - Corner Guard	Material: Type 304 Stainless Steel Finish: Satin, No. 4 Wing Size: 2" x 48" with Crimped Edge <u>Mounting: Adhesive</u>	Location: Wall Corners, Maintenance Storage, Control Room, Tenant Storage, Non-passenger Elevator Lobby,
	10 2600	WP2	Wall and Door Protection - Stainless Steel Wainscot	Material: Type 304 Stainless Steel Sheet Finish: Directional Satin, No. 4 Diamond Plate Thickness: Minimum 0.0781 inch <u>Mounting: Adhesive</u>	Location: Wheelchair Storage, Baggage Carts, Lift Storage,
	10 2600	WP3	Wall and Door Protection - Corner Guard	Material: Type 304 Stainless Steel Finish: Satin, No. 4 Wing Size: 3.5" x 3.5" 90Degree angle <u>Mounting: Flush mount</u>	Location: ASC Public areas
	12 3623.13	LC1	Plastic Laminate Countertop	Manufacturer: Lamin-Art Product: Plastic Laminate Pattern: Solid; Vellum Finish Color: 9202-E Pearl White	Location: BOH
	12 3661.16	SSM2	Solid Surface Countertop	Manufacturer: DuPont Product: 3/4" Corian Color: Bisque	Location: Restroom Vanity Sinks (Bowls)
4	12 3661.16	SSM3	Solid Surface Countertop	Manufacturer: Formica Classics Product: 1/2" Corian Color: Luna Sand (757)	Location: Information Desk Countertops
	12 3661.16	SSM21	Solid Surface Countertop	Manufacturer: DuPont Product: 1/2" Corian Color: Antarctica	Location: BOH Countertops
3	12 3661.16	SSM22	Solid Surface Countertop	Manufacturer: DuPont Product: 1/2" Corian Color: Granola	Location: BOH Restroom Countertops
	12 3661.19	QC1	Quartz Agglomerate Countertop	Manufacturer: One Quartz Surfaces Product: At One With Nature Color: White Ice NQ90 Thickness: 2cm; mitered corners Finish: Polished	Location: ASC Gate Podiums Contact Information: Laura Pollard 407.861.4474 Laura.pollard@daltile.com
	12 3661.19	QC2	Quartz Agglomerate Countertop	Manufacturer: One Quartz Surfaces Product: At One With Nature Color: Mesa Dune NQ89 Thickness: 2cm; mitered corners Finish: Polished	Location: ASC Public Restrooms Countertops Contact Information: Laura Pollard 407.861.4474 Laura.pollard@daltile.com

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Revision	SPEC. SECTION	KEY	ITEM	DESCRIPTION	REMARKS
	12 3661.19	QC3	Quartz Agglomerate Countertop	Manufacturer: American Reserve Product: One Quartz Surfaces Color: QQ47 Patriotic Calacatta Size: As Indicated ~~Installation: Vertical~~	Location: ASC Public Restrooms Millwork Contact Information: Laura Pollard 407.861.4474 ~~Laura.pollard@daltile.com~~
	14 2100	ECF1	Custom Elevator Cab Finishes	Manufacturer: GAGE Architectural Products Product: Gagecarve C1001 Miami (Nickel) Color: Nickel Thickness: 3.18 - 4.06mm Finish: Anodized	Location: RAC, LST, ASC Solid Elevators; Central Panel Contact Information: Karen Sandmire 608.269.7447 ksandmire@gagecorp.net
	14 2100	ECF2	Custom Elevator Cab Finishes	Manufacturer: Vitro Architectural Glass Product: Starphire Color: Clear Thickness: Per Elevator Manufacturer	Location: RAC, GTF, LST, ASC Glass Elevators Contact Information: Don Adams 206.409.4805 ~~deadams@vitro.com~~
	14 2400	ECF3	Service Elevator Flooring and Wall Panels	Material: Aluminum Sheet Finish: Directional Satin, No. 4 Diamond Plate Thickness: Minimum 0.125 inch ~~Mounting: Adhesive~~	Location: ASC, LST, GTF Service Elevator Flooring and Wall Panels
	14 2100	ECF21	Custom Elevator Cab Finishes	Manufacturer: Rigidized Metals Material: Stainless Steel Pattern: 6SL Material: 304 SS Finish: Satin #4 ~~Thickness: Per Elevator Manufacturer~~	Location: PKG Solid Elevators Cab Panels Contact Information: Brian Whalen 716.849.4707 Brianwhalen@rigidized.com
	32 18 13.A	STS1	Synthetic Turf Surface - SARA	Manufacturer: ForeverLawn Product: K9Grass Lite Indoor Base: AirGrid 2 Color: To match Benjamin Moore Jute AF-80 Dimension: 70mm ~~Installation: Horizontal and Vertical~~	Location: SARA Contact Information: Home Office 866.992.7876

General Notes:

1. Flooring material changes shall occur at the centerline of the door unless noted otherwise.
2. All exposed metal in public areas shall be painted to match (P1).

SECTION 09 21 16.23 - GYPSUM BOARD SHAFT WALL ASSEMBLIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes gypsum board shaft wall assemblies.

1.2 ACTION SUBMITTALS

- A. Product Data: For each component of gypsum board shaft wall assembly.
- B. Sustainable Design Documentation Submittals: Refer to section 01 81 13.14 "Sustainable Design Requirements – LEED V4 BD+C".
 - 1. Product Data: Documentation for Leadership Extraction Practices in the following:
 - a. Leadership Extraction Practices for Recycled Content
 - 2. Product Certificates: Provide the following:
 - a. Environmental Product Declarations (EPD's)
 - b. Corporate Sustainability Reporting (CSR's)
 - c. Health Product Declarations (HPD's)

1.3 DELIVERY, STORAGE, AND HANDLING

- A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and support them on risers on a flat platform to prevent sagging.

1.4 FIELD CONDITIONS

- A. Environmental Limitations: Comply with gypsum-shaftliner-board manufacturer's written instructions.
- B. Do not install finish panels until installation areas are enclosed and conditioned.
- C. Do not install panels that are wet, moisture damaged, or mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, and irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

- B. STC-Rated Assemblies: Provide materials and construction identical to those of assemblies tested according to ASTM E 90 and classified according to ASTM E 413 by a testing and inspecting agency.
- C. Recycled Content of Steel Products: Refer to section 01 81 13.14 "Sustainable Design Requirements – LEED V4 BD+C" for recycled content requirements.

2.2 GYPSUM BOARD SHAFT WALL ASSEMBLIES

- A. Fire-Resistance Rating: As indicated.
- B. STC Rating: As indicated.
- C. Gypsum Shaftliner Board:
 - 1. Health Product Declaration: Provide Health Product Declaration (HPD) with full disclosure of known hazards in compliance with the Health Product Declaration Open Standard
 - 2. Environmental Product Disclosure: Provide an Environmental Product Declarations (EPD) that conforms with one of the following:
 - a. Product specific declarations in accordance with ISO 1404
 - b. Environmental Product Declarations conforming to ISO 14025, 14040, 14044 and EN 15804 or ISO 21930
 - c. Industry Wide Product Specific Type III EPD Third Party Certification
 - 3. Corporate Sustainability Report: Provide third-party verified Corporate Sustainability Report (CPD) including impacts of extraction operations and activities associated with the manufacturer's product and product's supply chain conforming the following:
 - a. Global Reporting Initiative (GRI) Sustainability report
 - b. Organization for Economic Co-operation and Development (OOECD) Guidelines for Multinational Enterprises.
 - c. U.N. Global Compact: Communication of Progress
 - d. ISO 26000: 2010 Guidance on Social Responsibility
 - e. USGBC Approved Program: Other approved programs meeting the CSR criteria.
 - 4. Type X: ASTM C 1396/C 1396M; manufacturer's proprietary fire-resistive liner panels with paper faces, 1-inch-thick, with double beveled long edges. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. CertainTeed Corporation.
 - b. National Gypsum Company.
 - c. United States Gypsum Company.
- D. Non-Load-Bearing Steel Framing, General: Complying with ASTM C 645 requirements for metal unless otherwise indicated and complying with requirements for fire-resistance-rated assembly indicated.
 - 1. Recycled Content: Postconsumer recycled content plus one-half of pre-consumer recycled content not less than 25 percent.

- a. Refer to Section 01 81 13.14 "Sustainable Design Requirements - LEED v4 BD+C" for additional information and requirements for recycled content.
- E. Studs: Manufacturer's standard profile for repetitive, corner, and end members as follows:
 - 1. Depth: As indicated.
 - 2. Minimum Base-Metal Thickness: As indicated 0.030 inch.
- F. Runner Tracks: Manufacturer's standard J-profile track with manufacturer's standard long-leg length, but at least 2 inches long and matching studs in depth.
 - 1. Minimum Base-Metal Thickness: Matching steel studs.
- G. Firestop Tracks: Top runner manufactured to allow partition heads to expand and contract with movement of the structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.
- H. Elevator-Hoistway-Entrance Struts: Manufacturer's standard J-profile jamb strut with long-leg length of 3 inches, matching studs in depth, and not less than 0.033 inch thick.
- I. Finish Panels: Gypsum board as specified in Section 09 29 00 "Gypsum Board."
- J. Sound Attenuation Blankets: As specified in 07 2100 "Thermal Insulation"

2.3 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with shaft wall manufacturer's written instructions.
- B. Trim Accessories: Cornerbead, edge trim, and control joints of material and shapes as specified in Section 09 29 00 "Gypsum Board" that comply with gypsum board shaft wall assembly manufacturer's written instructions for application indicated.
- C. Steel Drill Screws: ASTM C 1002 unless otherwise indicated.
- D. Track Fasteners: Power-driven fasteners of size and material required to withstand loading conditions imposed on shaft wall assemblies without exceeding allowable design stress of track, fasteners, or structural substrates in which anchors are embedded.
 - 1. Expansion Anchors: Fabricated from corrosion-resistant materials, with allowable load or strength design capacities calculated according to ICC-ES AC193 and ACI 318 greater than or equal to the design load, as determined by testing per ASTM E 488/E 488M conducted by a qualified testing agency.
 - 2. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with allowable load capacities calculated according to ICC-ES AC70, greater than or equal to the

design load, as determined by testing per ASTM E 1190 conducted by a qualified testing agency.

- E. Reinforcing: Galvanized-steel reinforcing strips with 0.033-inch minimum thickness of base metal (uncoated).
- F. Acoustical Sealant: Section 07 92 19 "Acoustical Joint Sealants."
- G. Gypsum Board Cants:
 - 1. Gypsum Board Panels: As specified in Section 09 29 00 "Gypsum Board," Type X, 1/2- or 5/8-inch panels.
 - 2. Adhesive: Laminating adhesive as specified in Section 09 29 00 "Gypsum Board."
 - 3. Non-Load-Bearing Steel Framing: As specified in Section 09 22 16 "Non-Structural Metal Framing."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, or mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Sprayed Fire-Resistive Materials: Coordinate with gypsum board shaft wall assemblies so both elements of Work remain complete and undamaged. Patch or replace sprayed fire-resistive materials removed or damaged during installation of shaft wall assemblies to comply with requirements specified in Section 07 81 00 "Applied Fireproofing."
- B. After sprayed fire-resistive materials are applied, remove only to extent necessary for installation of gypsum board shaft wall assemblies and without reducing the fire-resistive material thickness below that which is required to obtain fire-resistance rating indicated. Protect remaining fire-resistive materials from damage.

3.3 INSTALLATION

- A. General: Install gypsum board shaft wall assemblies to comply with requirements of fire-resistance-rated assemblies indicated and manufacturer's written installation instructions.
- B. Refer to Section 01 35 46 "Indoor Air Quality Management" for air quality standards.

- C. Do not bridge building expansion joints with shaft wall assemblies; frame both sides of expansion joints with furring and other support.
- D. Install supplementary framing in gypsum board shaft wall assemblies around openings and as required for blocking, bracing, and support of gravity and pullout loads of fixtures, equipment, services, heavy trim, furnishings, wall-mounted door stops, and similar items that cannot be supported directly by shaft wall assembly framing.
 - 1. Elevator Hoistway: At elevator hoistway-entrance door frames, provide jamb struts on each side of door frame.
 - 2. Reinforcing: Provide where items attach directly to shaft wall assembly as indicated on Drawings; accurately position and secure behind at least one layer of face panel.
- E. Penetrations: At penetrations in shaft wall, maintain fire-resistance rating of shaft wall assembly by installing supplementary steel framing around perimeter of penetration and fire protection behind boxes containing wiring devices, elevator call buttons and floor indicators, and similar items.
- F. Isolate perimeter of gypsum panels from building structure to prevent cracking of panels while maintaining continuity of fire-rated construction.
- G. Firestop Tracks: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.
- H. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect while maintaining fire-resistance rating of gypsum board shaft wall assemblies.
- I. Sound-Rated Shaft Wall Assemblies: Seal gypsum board shaft walls with acoustical sealant at perimeter of each assembly where it abuts other work and at joints and penetrations within each assembly.
- J. Gypsum Board Cants: At projections into shaft exceeding 4 inches, install gypsum board cants covering tops of projections.
 - 1. Slope cant panels at least 75 degrees from horizontal. Set base edge of panels in adhesive and secure top edges to shaft walls at 24 inches o.c. with screws fastened to shaft wall framing.
 - 2. Where non-load-bearing steel framing is required to support gypsum board cants, install framing at 24 inches o.c. and extend studs from the projection to shaft wall framing.
- K. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

3.4 PROTECTION AND CLEANING

- A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

- B. Remove and replace panels that are wet, moisture damaged, or mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, and irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.
- C. Remove all debris and particulate from framing assemblies using vacuum or other device capable of fine particulate removal. Channel spaces shall be dry and free from dirt prior to installation of insulation and finish materials.
 - 1. Refer to Section 01 35 46 "Indoor Air Quality Management" and Section 01 74 23 "Final Cleaning" for additional requirements.

END OF SECTION 09 21 16.23

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Non-load-bearing steel framing systems for interior partitions.
2. Suspension systems for interior ceilings and soffits.
3. Grid suspension systems for gypsum board ceilings.

B. Related Requirements:

1. Section 05 40 00 "Cold-Formed Metal Framing" for exterior and interior load-bearing and exterior non-load-bearing wall studs; floor joists; roof rafters and ceiling joists; and roof trusses.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Sustainable Design Documentation Submittals: Refer to section 01 81 13.14 "Sustainable Design Requirements – LEED V4 BD+C".

1. Product Data: Documentation for Leadership Extraction Practices in the following:
 - a. Leadership Extraction Practices for Recycled Content
2. Product Certificates: Provide the following:
 - a. Environmental Product Declarations (EPD's)

1.3 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of code-compliance certification for studs and tracks.

B. Evaluation Reports: For firestop tracks, from ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction.

1.4 QUALITY ASSURANCE

A. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of the Certified Steel Stud Association.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 119 by an independent testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated on Drawings, according

to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

- C. Horizontal Deflection: For wall assemblies, limited to 1/240 of the wall height based on horizontal loading of 5 lbf/sq. ft..

2.2 FRAMING SYSTEMS

- A. Framing Members, General: Comply with ASTM C 754 for conditions indicated.
 - 1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal unless otherwise indicated.
 - 2. Protective Coating: ASTM A 653/A 653M, G40, hot-dip galvanized unless otherwise indicated.
- B. Sustainability Requirements
 - 1. Environmental Product Disclosure: Provide an Environmental Product Declarations (EPD) that conforms with one of the following:
 - a. Product specific declarations in accordance with ISO 1404
 - b. Environmental Product Declarations conforming to ISO 14025, 14040, 14044 and EN 15804 or ISO 21930
 - c. Industry Wide Product Specific Type III EPD Third Party Certification
 - 2. Recycled Content of Steel Products: Provide products with a post and pre-consumer recycled content of no less than 35% combined. Refer to section 01 81 13.14 "Sustainable Design Requirements – LEED V4 BD+C" for recycled content requirements.
- C. Studs and Tracks: ASTM C 645.
 - 1. Steel Studs and Tracks:
 - a. Minimum Base-Metal Thickness: As required by performance requirements for horizontal deflection and acoustical performance.
 - b. Depth: As indicated on Drawings.
- D. Slip-Type Head Joints: Where indicated, provide the following:
 - 1. Deflection Track: Steel sheet top track manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.
- E. Firestop Tracks: Top track manufactured to allow partition heads to expand and contract with movement of structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.
- F. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.
 - 1. Minimum Base-Metal Thickness: As indicated on Drawings.
- G. Hat-Shaped, Rigid Furring Channels: ASTM C 645.
 - 1. Minimum Base-Metal Thickness: 0.0329 inch.
 - 2. Depth: As indicated on Drawings.

- H. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches, wall attachment flange of 7/8 inch, minimum uncoated-metal thickness of 0.0179 inch, and depth required to fit insulation thickness indicated.
- I. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 50 percent.
 - 1. Refer to Section 01 81 13.14 "Sustainable Design Requirements - LEED v4 BD+C" for additional information and requirements for recycled content.
- J. Environmental Product Disclosure: Provide an Environmental Product Declarations (EPD) that conforms with one of the following:
 - 1. Product specific declarations in accordance with ISO 1404
 - 2. Environmental Product Declarations conforming to ISO 14025, 14040, 14044 and EN 15804 or ISO 21930
 - 3. Industry Wide Product Specific Type III EPD Third Party Certification
- K. Corporate Sustainability Report: Provide third-party verified Corporate Sustainability Report (CPD) including impacts of extraction operations and activities associated with the manufacturer's product and product's supply chain conforming the following:
 - 1. Global Reporting Initiative (GRI) Sustainability report
 - 2. Organization for Economic Co-operation and Development (OOECD) Guidelines for Multinational Enterprises.
 - 3. U.N. Global Compact: Communication of Progress
 - 4. ISO 26000: 2010 Guidance on Social Responsibility
 - 5. USGBC Approved Program: Other approved programs meeting the CSR criteria.

2.3 SUSPENSION SYSTEMS

- A. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch-diameter wire, or double strand of 0.048-inch-diameter wire.
- B. Hanger Attachments to Concrete:
 - 1. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01 as appropriate for the substrate.
 - a. Uses: Securing hangers to structure.
 - b. Type: Torque-controlled, expansion anchor.
 - c. Material for Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, unless otherwise indicated.
 - d. Material for Exterior or Interior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.
 - e. Recycled Content of Steel Products: Provide products with a post and pre-consumer recycled content of no less than 35% combined. Refer to section 01 81 13.14 "Sustainable Design Requirements – LEED V4 BD+C" for recycled content requirements.
 - 2. Power-Actuated Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

- C. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.16 inch in diameter.
- D. Fiberglass Pad Wire-Tie Hanger: The ceiling isolation hanger shall consist of a one-inch (1") thick, pre-compressed, molded fiberglass isolator. The fiberglass isolator shall be encased in an anti-short-circuit, reinforced steel bracket which will accommodate up to #8 suspension wire or a 1/4" bolt or screw. The hanger bracket shall be zinc-plated, reinforced steel and shall carry a five (5) times maximum rated load overload without failure.
 - 1. Basis-of-Design: Provide Kinetics Noise Control, Inc., Kinetics AF or comparable approved product by the following manufacturers.
 - a. Mason Industries, Inc.
 - b. PAC International, Inc.
- E. Carrying Channels (Main Runners): Cold-rolled, commercial-steel sheet with a base-metal thickness of 0.0538 inch and minimum 1/2-inch-wide flanges.
 - 1. Depth: 2-1/2 inches.
- F. Grid Suspension System for Gypsum Board Ceilings: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Armstrong World Industries, Inc; Drywall Grid Systems.
 - b. United States Gypsum Company; Drywall Suspension System.
 - c. Approved Substitution.
- G. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 50 percent.
 - 1. Refer to Section 01 81 13.14 "Sustainable Design Requirements - LEED v4 BD+C" for additional information and requirements for recycled content.
- H. Environmental Product Disclosure: Provide an Environmental Product Declarations (EPD) that conforms with one of the following:
 - 1. Product specific declarations in accordance with ISO 1404
 - 2. Environmental Product Declarations conforming to ISO 14025, 14040, 14044 and EN 15804 or ISO 21930
 - 3. Industry Wide Product Specific Type III EPD Third Party Certification

2.4 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards.
 - 1. Fasteners for Steel Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.
- B. Isolation Strip at Exterior Walls: Provide one of the following:
 - 1. Asphalt-Saturated Organic Felt: ASTM D 226/D 226M, Type I (No. 15 asphalt felt), nonperforated.
 - 2. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit steel stud size.

3.1 EXAMINATION

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.
 - 1. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.
- B. Coordination with Sprayed Fire-Resistive Materials:
 - 1. Before sprayed fire-resistive materials are applied, attach offset anchor plates or ceiling tracks to surfaces indicated to receive sprayed fire-resistive materials. Where offset anchor plates are required, provide continuous plates fastened to building structure not more than 24 inches o.c.
 - 2. After sprayed fire-resistive materials are applied, remove them only to extent necessary for installation of non-load-bearing steel framing. Do not reduce thickness of fire-resistive materials below that are required for fire-resistance ratings indicated. Protect adjacent fire-resistive materials from damage.

3.3 INSTALLATION, GENERAL

- A. Installation Standard: ASTM C 754.
 - 1. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.
- B. Install framing and accessories plumb, square, and true to line, with connections securely fastened.
- C. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.
- D. Install bracing at terminations in assemblies.
- E. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.4 INSTALLING FRAMED ASSEMBLIES

- A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
 - 1. Single-Layer Application: As required by horizontal deflection performance requirements unless otherwise indicated.

2. Multilayer Application: As required by horizontal deflection performance requirements unless otherwise indicated.
3. Tile Backing Panels: As required by horizontal deflection performance requirements unless otherwise indicated.
- B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.
- C. Install studs so flanges within framing system point in same direction.
- D. Install tracks at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts that penetrate partitions above ceiling.
 1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
 2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install track section (for cripple studs) at head and secure to jamb studs.
 - a. Install two studs at each jamb unless otherwise indicated.
 - b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint in finished assembly.
 - c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.
 3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
 4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.
 - a. Firestop Track: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.
 5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.
 6. Curved Partitions:
 - a. Bend track to uniform curve and locate straight lengths so they are tangent to arcs.
 - b. Begin and end each arc with a stud, and space intermediate studs equally along arcs. On straight lengths of no fewer than two studs at ends of arcs, place studs 6 inches o.c.
- E. Direct Furring:
 1. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
- F. Z-Shaped Furring Members:
 1. Erect insulation, specified in Section 07 21 00 "Thermal Insulation," vertically and hold in place with Z-shaped furring members spaced 24 inches o.c.

2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
 3. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than 12 inches from corner and cut insulation to fit.
- G. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

3.5 INSTALLING CEILING SUSPENSION SYSTEMS

- A. Install suspension system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
1. Hangers: 48 inches o.c.
 2. Carrying Channels (Main Runners): 48 inches o.c.
 3. Furring Channels (Furring Members): 16 inches o.c.
- B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.
- C. Suspend hangers from building structure as follows:
1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.
 - a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.
 - a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.
 3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
 4. Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
 5. Do not attach hangers to steel roof deck.
 6. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
 7. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
 8. Do not connect or suspend steel framing from ducts, pipes, or conduit.

- D. Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.
- E. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

3.6 CLEANING AND PROTECTION

- A. Remove all debris and particulate from framing assemblies using vacuum or other device capable of fine particulate removal. Channel spaces shall be dry and free from dirt prior to installation of insulation and finish materials.

END OF SECTION 09 22 16

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections (including all sustainability requirements), apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Exterior vertical plasterwork (stucco).
 - 2. Exterior horizontal and nonvertical plasterwork (stucco).
 - 3. Interior vertical plasterwork.
 - 4. Interior horizontal and nonvertical plasterwork.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Sustainable Design Documentation Submittals: Refer to section 01 81 13.14 "Sustainable Design Requirements – LEED V4 BD+C".
 - 1. Product Data: Documentation for Leadership Extraction Practices in the following:
 - a. Leadership Extraction Practices for Recycled Content
 - 2. Product Certificates: Provide the following:
 - a. Environmental Product Declarations (EPD's)
 - b. Corporate Sustainability Reporting (CSR's)
- C. Shop Drawings: Show locations and installation of control and expansion joints, including plans, elevations, sections, details of components, and attachments to other work.
- D. Samples: For each type of factory-prepared finish coat and for each color and texture specified.
- E. Samples for Initial Selection: For each type of factory-prepared finish coat and for each color and texture specified.
- F. Samples for Verification: For each type of factory-prepared finish coat and for each color and texture specified, 12 by 12 inches, and prepared on rigid backing.

1.5 QUALITY ASSURANCE

- A. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Build mockups for each substrate and finish texture indicated for cement plastering, including accessories.
2. Refer to Section 01 43 39 "Visual Mock-Up Requirements" for additional requirements.
3. For interior plasterwork, simulate finished lighting conditions for review of mockups.
4. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
5. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store materials inside under cover, and keep them dry and protected against damage from weather, moisture, direct sunlight, surface contamination, corrosion, construction traffic, and other causes.

1.7 FIELD CONDITIONS

- A. Comply with ASTM C 926 requirements.
- B. Exterior Plasterwork:
 1. Apply and cure plaster to prevent plaster drying out during curing period. Use procedures required by climatic conditions, including moist curing, providing coverings, and providing barriers to deflect sunlight and wind.
 2. Apply plaster when ambient temperature is greater than 40 deg F.
 3. Protect plaster coats from freezing for not less than 48 hours after set of plaster coat has occurred.
- C. Interior Plasterwork: Maintain room temperatures at greater than 40 deg F for at least 48 hours before plaster application, and continuously during and after application.
 1. Avoid conditions that result in plaster drying out during curing period. Distribute heat evenly; prevent concentrated or uneven heat on plaster.
 2. Ventilate building spaces as required to remove water in excess of that required for hydrating plaster in a manner that prevents drafts of air from contacting surfaces during plaster application and until plaster is dry.
- D. Factory-Prepared Finishes: Comply with manufacturer's written recommendations for environmental conditions for applying finishes.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance Ratings: Where indicated, provide cement plaster assemblies identical to those of assemblies tested for fire resistance according to ASTM E 119 by a qualified testing agency.

- A. Expanded-Metal Lath: ASTM C 847, cold-rolled carbon-steel sheet with ASTM A 653/A 653M, G60, hot-dip galvanized-zinc coating.
 - 1. 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:
 - a. Alabama Metal Industries Company; a Gibraltar Industries company.
 - b. CEMCO; California Expanded Metal Products Co.
 - c. ClarkDietrich Building Systems.
 - d. MarinoWARE.
 - e. Phillips Manufacturing Co.
 - 2. Recycled Content: Postconsumer recycled content plus one-half of pre-consumer recycled content not less than 25 percent.
 - a. Refer to Section 01 81 13.14 "Sustainable Design Requirements - LEED v4 BD+C" for additional information and requirements for recycled content.
 - 3. Diamond-Mesh Lath: V-Groove Self-furring, 2.5 lb/sq. yd.
- B. Wire-Fabric Lath:
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Structa Wire Corp.; Mega Lath or a comparable product by one of the following:
 - a. Davis Wire; a Heico Wire Group company.
 - b. K-Lath; a Tree Island Steel Ltd. company.
 - 2. Welded-Wire Lath: ASTM C933; self-furring, 1.95 lb/sq. yd. with ASTM A 641/A 641M, hot-dip galvanized-zinc coating
- C. Paper Backing: FS UU-B-790a, Type I, Grade D, Style 2 vapor-permeable paper.

2.3 ACCESSORIES

- A. General: Comply with ASTM C 1063, and coordinate depth of trim and accessories with thicknesses and number of plaster coats required.
- B. Accessories:
 - 1. 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:
 - a. Alabama Metal Industries Company; a Gibraltar Industries company.
 - b. CEMCO; California Expanded Metal Products Co.
 - c. ClarkDietrich Building Systems.
 - d. MarinoWARE.
 - e. Phillips Manufacturing Co.
 - 2. Foundation Weep Screed: Fabricated from hot-dip galvanized-steel sheet, ASTM A 653/A 653M, G60 zinc coating or rigid PVC, ASTM D 1784 / D 4216.
 - 3. Cornerite: Fabricated from metal lath.
 - 4. External- (Outside-) Corner Reinforcement: Fabricated from metal lath.
 - 5. Corner Beads: Fabricated from zinc.
 - a. Smallnose cornerbead with expanded flanges; use unless otherwise indicated.

- b. Smallnose cornerbead with perforated flanges; use on curved corners.
- c. Smallnose cornerbead with expanded flanges reinforced by perforated stiffening rib; use on columns and for finishing unit masonry corners.
- d. Bullnose cornerbead, radius 3/4 inch minimum, with expanded flanges; use at locations indicated on Drawings.
- 6. Casing Beads: Fabricated from zinc or PVC; square-edged style; with expanded flanges.
- 7. Control Joints: Fabricated from zinc or PVC; one-piece-type, folded pair of unperforated screeds in M-shaped configuration; with perforated flanges and removable protective tape on plaster face of control joint.
- 8. Expansion Joints: Fabricated from zinc or PVC; folded pair of unperforated screeds in M-shaped configuration; with expanded flanges.
- 9. Two-Piece Expansion Joints: Fabricated from zinc or PVC; formed to produce slip-joint and square-edged reveal that is adjustable from 1/4 to 5/8-inch-wide; with perforated flanges.

2.4 MISCELLANEOUS MATERIALS

- A. Water for Mixing and Finishing Plaster: Potable and free of substances capable of affecting plaster set or of damaging plaster, lath, or accessories.
- B. Fiber for Base Coat: Alkaline-resistant glass or polypropylene fibers, 1/2 inch long, free of contaminants, manufactured for use in cement plaster.
- C. Fasteners for Attaching Metal Lath to Substrates: ASTM C 1063.
 - 1. Stub Nails are not permitted.
- D. Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, not less than 0.0475-inch diameter unless otherwise indicated.

2.5 PLASTER MATERIALS

- A. Cement: Use on of the following:
 - 1. Portland Cement: ASTM C 150/C 150M, Type I.
 - a. Color for Finish Coats: White.
 - 2. Stucco Cement: ASTM C 1328 Plastic Cement or ASTM C 91 Masonry Cement.
 - a. Color for Finish Coats: White.
- B. Colorants for Job-Mixed Finish Coats: Colorfast mineral pigments that produce finish plaster color to match Architect's sample.
- C. Lime: ASTM C 206, Type S; or ASTM C 207, Type S.
- D. Sand Aggregate: ASTM C 897.
 - 1. Color for Job-Mixed Finish Coats: White.
- E. Bonding Agent Admixture: Use one of the following:
 - 1. Sika Corporation; SikaLatex R.
 - 2. Lambert Corporation; 932 Link.
- F. Acrylic-Based Finish Coatings: Factory-mixed acrylic-emulsion coating systems formulated with colorfast mineral pigments and fine aggregates; for use over cement

plaster base coats. Include manufacturer's recommended primers and sealing topcoats for acrylic-based finishes.

1. 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:
 - a. El Rey Stucco Solutions; a Parex USA, Inc. brand.
 - b. Finestone, BASF Corp.
 - c. Omega Products International, Inc.
 - d. SonoWall, BASF Corp.
 - e. Sto Corp.
 2. Color: Match Architect's sample.
- G. Recycled Content: Postconsumer recycled content plus one-half of pre-consumer recycled content not less than 25 percent.
1. Refer to Section 01 81 13.14 "Sustainable Design Requirements - LEED v4 BD+C" for additional information and requirements for recycled content.

2.6 PLASTER MIXES

- A. General: Comply with ASTM C 926 for applications indicated.
1. Fiber Content: Add fiber to base-coat mixes after ingredients have mixed at least two minutes. Comply with fiber manufacturer's written instructions for fiber quantities in mixes, but do not exceed 1 lb of fiber/cu. yd. of cementitious materials.
- B. Base-Coat Mixes for Use over Metal Lath: Scratch and brown coats for three-coat plasterwork as follows:
1. Portland Cement Mixes:
 - a. Scratch Coat: For cementitious material, mix 1 part portland cement and 0 to 3/4 parts lime. Use 2-1/2 to 4 parts aggregate per part of cementitious material.
 - b. Brown Coat: For cementitious material, mix 1 part portland cement and 0 to 3/4 parts lime. Use 3 to 5 parts aggregate per part of cementitious material, but not less than volume of aggregate used in scratch coat.
 2. Stucco Cement Mixes:
 - a. Scratch Coat: For cementitious material, mix 1 part stucco cement with 2-1/2 to 4 parts aggregate.
 - b. Brown Coat: For cementitious material, mix 1 part stucco cement with 3 to 5 parts aggregate, but not less than volume of aggregate used in scratch coat.
- C. Factory-Prepared Finish-Coat Mixes: For ready-mixed finish-coat plasters, comply with manufacturer's written instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

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

3.2 PREPARATION

- A. Protect adjacent work from soiling, spattering, moisture deterioration, and other harmful effects caused by plastering.
- B. Prepare smooth, solid substrates for plaster according to ASTM C 926.

3.3 INSTALLING METAL LATH

- A. Metal Lath: Install according to ASTM C 1063.

3.4 INSTALLING ACCESSORIES

- A. Install according to ASTM C 1063 and at locations indicated on Drawings or as required to accommodate field as-built conditions or structural considerations.
- B. Reinforcement for External (Outside) Corners:
1. Install lath-type, external-corner reinforcement at exterior locations.
 2. Install cornerbead at interior locations.
- C. Control Joints: Locate as approved by Architect for visual effect and as follows:
1. As required to delineate plasterwork into areas (panels) of the following maximum sizes:
 - a. Vertical Surfaces: 144 sq. ft.
 - b. Horizontal and Other Nonvertical Surfaces: 100 sq. ft.
 2. At distances between control joints of not greater than 18 feet o.c.
 3. As required to delineate plasterwork into areas (panels) with length-to-width ratios of not greater than 2-1/2:1.
 4. Where control joints occur in surface of construction directly behind plaster.
 5. Where plasterwork areas change dimensions, to delineate rectangular-shaped areas (panels) and to relieve the stress that occurs at the corner formed by the dimension change.

3.5 PLASTER APPLICATION

- A. General: Comply with ASTM C 926.
1. Do not deviate more than plus or minus 1/4 inch in 10 feet from a true plane in finished plaster surfaces when measured by a 10-foot straightedge placed on surface.
 2. Finish plaster flush with frames and other built-in items or accessories that act as a plaster ground unless otherwise indicated. Where casing bead does not terminate plaster at metal frame, cut base coat free from metal frame before plaster sets and groove finish coat at junctures with metal.
 3. Provide plaster surfaces that are ready to receive field-applied finishes indicated.
- B. Walls; Base-Coat Mixes:
1. Portland Cement Mixes for Use over Expanded Metal Lath: For scratch and brown coats, for three-coat plasterwork with 3/4-inch total thickness.

2. Stucco Cement Mixes for Use over Wire Fabric Lath: For scratch and brown coats, for three-coat plasterwork with 7/8-inch total thickness.

- C. Plaster Finish Coats: Apply to provide float finish to match Architect's sample.

3.6 PLASTER REPAIRS

- A. Repair or replace work to eliminate cracks, dents, blisters, buckles, crazing and check cracking, dry outs, efflorescence, sweat outs, and similar defects and where bond to substrate has failed.

3.7 FIELD QUALITY CONTROL

- A. Installer shall provide field quality control by certified staff and shall provide the following reports and checklists.
 1. BECx shall provide initial BECx checklists. Contractor shall provide weekly updates verifying all locations have been inspected and are free of installation defects and damage.
 - a. BECx Checklists shall include specific locations of the work and specific location and description of any repairs.
 - b. BECx checklist shall be completed in its entirety and shall be provided weekly to the Construction Manager, Architect, and Owner.
 2. Provide field inspection reports within 5 working days of inspection.

3.8 CLEANING AND PROTECTION

- A. Remove temporary protection and enclosure of other work after plastering is complete. Promptly remove plaster from door frames, windows, and other surfaces not indicated to be plastered. Repair floors, walls, and other surfaces stained, marred, or otherwise damaged during plastering.
- B. Refer to Section 01 35 46 "Indoor Air Quality Management" and Section 01 74 23 "Final Cleaning" for additional requirements.

END OF SECTION 09 24 00

SECTION 09 27 13 - GLASS-FIBER-REINFORCED GYPSUM FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes factory-fabricated, glass-fiber-reinforced gypsum fabrications for interior applications.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, weights, dimensions of individual components and profiles, and finishes.
- B. Sustainable Design Documentation Submittals: Refer to section 01 81 13.14 "Sustainable Design Requirements – LEED V4 BD+C".
 - 1. Product Data: For Leadership Extraction Practices in the following:
 - a. Leadership Extraction Practices for Recycled Content
 - 2. Product Data: Documentation for Low Emitting Materials
 - a. Low Emitting Materials for Adhesives and Sealants
 - 3. Product Certificates: Provide the following:
 - a. Environmental Product Declarations (EPD's)
 - b. Corporate Sustainability Reporting (CSR's)
 - c. Health Product Declarations (HPD's)
- C. Shop Drawings:
 - 1. Include plans, elevations, sections, and attachment details.
 - 2. Detail fabrication and assembly of glass-fiber-reinforced gypsum fabrications.
 - 3. Indicate requirements for joint treatment.
 - 4. Indicate location of control joints.
- D. Samples: For each exposed product and for each color and texture specified.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Comply with ASTM C1467/C1467M.

- A. Environmental Conditions:
 - 1. Comply with ASTM C1467/C1467M.
 - 2. Do not deliver or install glass-fiber-reinforced gypsum fabrications until building is enclosed, wet-work is complete, and HVAC system is operating and continuously maintaining temperature and relative humidity at levels intended for building occupants.
- B. Conditioning: Acclimatize glass-fiber-reinforced gypsum fabrications to ambient temperature and humidity of spaces in which they will be installed. Remove packaging and move units into installation spaces not less than 48 hours before installing them.

PART 2 - PRODUCTS

2.1 GLASS-FIBER-REINFORCED GYPSUM FABRICATIONS

- A. Fabrications: Molded, glass-fiber-reinforced gypsum units complying with ASTM C1381/C1381M.
 - 1. 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:
 - a. Formglas Products Ltd.
 - b. GRG Technologies, LLC.
 - c. Plasterform Inc.
 - d. Plastrglas, Incorporated.
- B. Embedments: As standard with glass-fiber-reinforced gypsum fabrication manufacturer and as required for reinforcement and for anchorage to substrates and framing.
- C. Finish: Smooth for paint finish.

2.2 AUXILIARY MATERIALS

- A. Adhesives: As recommended in glass-fiber-reinforced gypsum fabrication manufacturer's written instructions.
 - 1. Provide manufacture statements that confirm that the product used meets the California Department of Public Health (CDPH) Standard Method v1.1 2010 using the applicable exposure scenario.
 - 2. Refer to Section 01 81 13.14 "Sustainable Design Requirements - LEED v4 BD+C" for additional requirements.
- B. Steel Drill Screws: ASTM C1002, unless otherwise indicated.
 - 1. Screws complying with ASTM C954 for fastening glass-fiber-reinforced gypsum fabrications to steel members from 0.033 to 0.112 inch thick.
- C. Joint-Treatment Materials: ASTM C475/C475M.

- D. Control Joints: ASTM C1047, one-piece control joint with V-shaped slot and removable strip covering the slot opening.
 - 1. Material: Rolled zinc.
- E. Tie Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.062-inch-diameter wire, or double strand of 0.048-inch-diameter wire.

2.3 FABRICATION

- A. Fabricate glass-fiber-reinforced gypsum units in factory to comply with ASTM C1381/C1381M, with smooth-finished surfaces; repair hollows, voids, scratches, and other surface imperfections. Fabricate units in lengths and sizes that will minimize number of joints between abutting units.
- B. Embedments: Incorporate embedments into units to develop the full strength of glass-fiber-reinforced gypsum fabrications. Cover embedments with not less than 3/16-inch thickness of glass-fiber-reinforced gypsum composite.
- C. Connection Hardware: Designed and fabricated to support and connect glass-fiber-reinforced gypsum fabrications to hangers, support framing, and substrates.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with ASTM C1467/C1467M.
- B. Install glass-fiber-reinforced gypsum fabrications level, plumb, true, and aligned with adjacent materials. Use concealed shims where required for alignment.
- C. Attach glass-fiber-reinforced gypsum fabrications to framing and substrates with steel drill screws unless otherwise indicated. Do not use pneumatic staple guns. Countersink screw heads below adjoining finished surface.
 - 1. Predrill fastener holes in units. Clean fastener holes to remove dirt and oil.
 - 2. Locate fasteners not less than 5/16 inch from edges or ends of units.
- D. Suspended Systems: Attach suspended glass-fiber-reinforced gypsum fabrications to structure with tie wire at each attachment point indicated on approved Shop Drawings. Comply with requirements for hangers specified in Section 09 22 16 "Non-Structural Metal Framing."
- E. Where glass-fiber-reinforced gypsum fabrications are joined to form composite units, join fabrications with adhesive. Band or brace units together until adhesive cures.
- F. Install control joints between glass-fiber-reinforced gypsum fabrications where indicated.

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GLASS-FIBER-REINFORCED GYPSUM FABRICATIONS

SECTION 09 27 13

- G. Use joint-treatment materials to finish glass-fiber-reinforced gypsum fabrications to produce surfaces ready to receive primers and paint finishes specified in Section 09 91 23 "Interior Painting."
1. Finish glass-fiber-reinforced gypsum fabrications according to ASTM C840 for Level 4 and to match surface texture of units.
 2. Repair hollows, voids, scratches, and other surface imperfections on units.

END OF SECTION 09 27 13

SECTION 09 29 00 - GYPSUM BOARD

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections (including all sustainability requirements), apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Interior gypsum board.
 - 2. Tile backing panels.
- B. Related Requirements:
 - 1. Section 06 16 00 "Sheathing" for gypsum sheathing for exterior walls.
 - 2. Section 09 21 16.23 "Gypsum Board Shaft Wall Assemblies" for metal shaft-wall framing, gypsum shaft liners, and other components of shaft-wall assemblies.
 - 3. Section 09 22 16 "Non-Structural Metal Framing" for non-structural steel framing and suspension systems that support gypsum board panels.
 - 4. Section 09 30 13 "Ceramic Tiling" for cementitious backer units installed as substrates for ceramic tile.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Sustainable Design Documentation Submittals: Refer to section 01 81 13.14 "Sustainable Design Requirements – LEED V4 BD+C".
 - 1. Product Data: For Leadership Extraction Practices in the following:
 - a. Leadership Extraction Practices for Recycled Content
 - 2. Product Data: Documentation for Low Emitting Materials
 - a. Low Emitting Materials for Adhesives and Sealants
 - 3. Product Certificates: Provide the following:
 - a. Environmental Product Declarations (EPD's)
 - b. Corporate Sustainability Reporting (CSR's)
 - c. Health Product Declarations (HPD's)

1.4 QUALITY ASSURANCE

- A. Mockups: Build mockups demonstrate aesthetic effects and to set quality standards for materials and execution. Refer to Section 01 43 39 "Visual Mock-Up Requirements" for additional requirements.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.6 FIELD CONDITIONS

- A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written instructions, whichever are more stringent.
- B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned. In installation areas protected from weather but not yet conditioned, paper-faced panels may be replaced with mold resistant gypsum panels.
- C. Do not install panels that are wet, moisture damaged, and mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.
- B. *STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.*

2.2 GYPSUM BOARD, GENERAL

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of pre-consumer recycled content not less than 25 percent.
 - 1. Refer to Section 01 81 13.14 "Sustainable Design Requirements - LEED v4 BD+C" for additional information and requirements for recycled content.
- B. Health Product Declaration: Provide Health Product Declaration (HPD) with full disclosure of known hazards in compliance with the Health Product Declaration Open Standard
- C. Environmental Product Disclosure: Provide an Environmental Product Declarations (EPD) that conforms with one of the following:
 - 1. Product specific declarations in accordance with ISO 1404

2. Environmental Product Declarations conforming to ISO 14025, 14040, 14044 and EN 15804 or ISO 21930
3. Industry Wide Product Specific Type III EPD Third Party Certification
- D. Corporate Sustainability Report: Provide third-party verified Corporate Sustainability Report (CPD) including impacts of extraction operations and activities associated with the manufacturer's product and product's supply chain conforming the following:
 1. Global Reporting Initiative (GRI) Sustainability report
 2. Organization for Economic Co-operation and Development (OOECD) Guidelines for Multinational Enterprises.
 3. U.N. Global Compact: Communication of Progress
 4. ISO 26000: 2010 Guidance on Social Responsibility
 5. USGBC Approved Program: Other approved programs meeting the CSR criteria.
- E. Low Emitting ceilings and walls
 1. Provide manufacture statements that confirm that the product used meets the California Department of Public Health (CDPH) Standard Method v1.1 2010 using the applicable exposure scenario.
 2. Refer to Section 01 81 13.14 "Sustainable Design Requirements - LEED v4 BD+C" for additional requirements.
- F. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.3 INTERIOR GYPSUM BOARD

- A. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 1. CertainTeed Corporation.
 2. National Gypsum Company.
 3. United States Gypsum Company.
- B. Gypsum Wallboard: ASTM C 1396/C 1396M.
 1. Thickness: 5/8 inch.
 2. Long Edges: Tapered.
- C. Gypsum Board, Type X: ASTM C 1396/C 1396M.
 1. Thickness: 5/8 inch.
 2. Long Edges: Tapered.
- D. Flexible Gypsum Board: ASTM C 1396/C 1396M. Manufactured to bend to fit radii and to be more flexible than standard regular-type gypsum board of same thickness.
 1. Thickness: 1/4 inch.
 2. Long Edges: Tapered.
- E. Gypsum Ceiling Board: ASTM C 1396/C 1396M.

1. Thickness: 5/8 inch.
 2. Long Edges: Tapered.
- F. Abuse-Resistant Gypsum Board: ASTM C 1396/C 1396M gypsum board, tested according to ASTM C 1629/C 1629M.
1. Core: 5/8 inch, Type X.
 2. Surface Abrasion: ASTM C 1629/C 1629M, meets or exceeds Level 3 requirements.
 3. Indentation: ASTM C 1629/C 1629M, meets or exceeds Level 3 requirements.
 4. Soft-Body Impact: ASTM C 1629/C 1629M, meets or exceeds Level 3 requirements.
 5. Long Edges: Tapered.
 6. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.
- G. Mold-Resistant Gypsum Board: ASTM C 1396/C 1396M. With moisture- and mold-resistant core and paper surfaces.
1. Core: 5/8-inch, Type X.
 2. Long Edges: Tapered.
 3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.4 SPECIALTY GYPSUM BOARD

- A. Acoustically Enhanced Gypsum Board: ASTM C 1396/C 1396M. Multilayer products constructed of two layers of gypsum boards sandwiching a viscoelastic sound-absorbing polymer core.
1. Basis of Design: National Gypsum Company, Gold Bond SoundBreak XP Gypsum Board.
 2. Core: As indicated.
 3. Long Edges: Tapered.
- B. Sound Attenuating, Type X Gypsum Board: Laminated noise-reducing gypsum board consisting of two layers of dense gypsum board encased in smooth, moisture and mold resistant paper facings laminated together with a viscoelastic polymer compound. Meeting ASTM C1766 and ASTM C1396.
1. Basis of Design: CertainTeed SilentFX® QuickCut Gypsum Board
 2. Type and Thickness: Type X, 5/8 inch (15.9 mm) thick where indicated and as otherwise required to meet fire rating for specific element
 3. Size: 48 by not less than 96 inches (1220 by not less than 2440 mm).
 4. Surface Paper: 100% recycled moisture and mold resistant paper on face, back and long edges.
 5. Mold Resistance Rating: Score of 10 (best possible) tested in accordance with ASTM D3273
 6. Abuse-Resistance per ASTM C1629: Surface Abrasion – Level 2, Soft Body Impact – Level 1

2.5 TILE BACKING PANELS

- A. Cementitious Backer Units: ANSI A118.9 and ASTM C 1288 or ASTM C 1325, with manufacturer's standard edges.
 - 1. 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:
 - a. CertainTeed Corporation.
 - b. National Gypsum Company.
 - c. United States Gypsum Company.
 - 2. Thickness: 5/8 inch.
 - 3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.6 TRIM ACCESSORIES

- A. Interior Trim: ASTM C 1047.
 - 1. Material: Zinc Alloy.
 - 2. Shapes:
 - a. Cornerbead.
 - b. Bullnose bead.
 - c. LC-Bead: J-shaped; exposed long flange receives joint compound.
 - d. L-Bead: L-shaped; exposed long flange receives joint compound.
 - e. U-Bead: J-shaped; exposed short flange does not receive joint compound.
 - f. Expansion (control) joint.
 - g. Curved-Edge Cornerbead: With notched or flexible flanges.
- B. Aluminum Trim: Extruded accessories of profiles and dimensions indicated.
 - 1. Manufacturers: Subject to compliance with requirements, including Environmental Product Disclosures, and Leadership Extraction Practices. Recycled material content shall be not less than 25% found in Section 01 81 13.14, provide products by one of the following:
 - a. Fry Reglet Corporation.
 - b. Gordon, Inc.
 - c. Pittcon Industries.
 - 2. Aluminum: Alloy and temper with not less than the strength and durability properties of ASTM B 221, Alloy 6063-T5.
 - 3. Finish: Corrosion-resistant primer compatible with joint compound and finish materials specified.

2.7 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C 475/C 475M.
- B. Joint Tape:
 - 1. Interior Gypsum Board: Paper.
 - 2. Tile Backing Panels: As recommended by panel manufacturer.

- C. Joint Compound for Interior Gypsum Board: For each coat, use formulation that is compatible with other compounds applied on previous or for successive coats.
 - 1. Low Emitting ceilings and walls
 - a. Provide manufacture statements that confirm that the product used meets the California Department of Public Health (CDPH) Standard Method v1.1 2010 using the applicable exposure scenario.
 - b. Refer to Section 01 81 13.14 "Sustainable Design Requirements - LEED v4 BD+C" for additional requirements.
- D. Joint Compound for Tile Backing Panels:
 - 1. Cementitious Backer Units: As recommended by backer unit manufacturer.
 - 2. Low Emitting ceilings and walls
 - a. Provide manufacture statements that confirm that the product used meets the California Department of Public Health (CDPH) Standard Method v1.1 2010 using the applicable exposure scenario.
 - b. Refer to Section 01 81 13.14 "Sustainable Design Requirements - LEED v4 BD+C" for additional requirements.

2.8 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.
- B. Steel Drill Screws: ASTM C 1002 unless otherwise indicated.
 - 1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
 - 2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.
- C. Sound Attenuation Batts: Refer to Section 07 21 00 "Thermal Insulation"
- D. Acoustical Joint Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
 - 1. Acoustical joint sealant shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers" and additional low emitting requirements in Section 01 81 13.14 "Sustainable Design Requirements - LEED v4 BD+C".
 - 2. Products: Subject to compliance with requirements, including VOC and CDPH requirements found in Section 01 81 13.14, provide one of the following:
 - a. Pecora Corporation; AC-20 FTR.
 - b. USG Corporation; SHEETROCK Acoustical Sealant.
 - c. Approved Substitution.
- E. High-strength expanded metal mesh security barrier

1. Material: Type II, Class 1 – carbon steel mesh complying with ASTM F1267 and ASTM A1011, 10 gauge, 3/4-inch diamond.
2. Sheet Size: 48-inch x 96-inch
3. Basis-of-Design Product: Subject to compliance with requirements, provide ClarkDietrich Building Systems, (BM75) Barrier Mesh or comparable product meeting all requirements including sustainability requirements by one of the following manufacturers.
 - a. Alabama Metal Industries Corporation
 - b. Metalex, a Jason Company
 - c. Niles Fence & Security Products, LLC,

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and substrates including welded hollow-metal frames and support framing, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLYING AND FINISHING PANELS, GENERAL

- A. Comply with ASTM C 840.
- B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.
- D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- E. Form control and expansion joints with space between edges of adjoining gypsum panels.
- F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
 1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.

2. Fit gypsum panels around ducts, pipes, and conduits.
 3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch-wide joints to install sealant.
- G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide 1/4- to 1/2-inch-wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.
- I. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written instructions for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.
- J. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.3 APPLYING INTERIOR GYPSUM BOARD

- A. Install interior gypsum board in the following locations:
1. Wallboard Type: As indicated on Drawings.
 2. Type X: As indicated on Drawings or where required for fire-resistance-rated assembly.
 3. Flexible Type: As indicated on Drawings.
 4. Ceiling Type: Ceiling surfaces.
 5. Abuse-Resistant Type: As indicated on Drawings.
 6. Mold-Resistant Type: As indicated on Drawings.
- B. Single-Layer Application:
1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
 2. On partitions/walls, apply gypsum panels horizontally (perpendicular to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
 - a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
 - b. At stairwells and other high walls, install panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.
 3. On furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
 4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

C. Multilayer Application:

1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints one framing member, 16 inches minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
2. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
3. Fastening Methods: Fasten base layers and face layers separately to supports with screws or as indicated by UL design.

D. Laminating to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturer's written instructions and temporarily brace or fasten gypsum panels until fastening adhesive has set.

E. Curved Surfaces:

1. Install panels horizontally (perpendicular to supports) and unbroken, to extent possible, across curved surface plus 12-inch-long straight sections at ends of curves and tangent to them.
2. For double-layer construction, fasten base layer to studs with screws 16 inches o.c. Center gypsum board face layer over joints in base layer, and fasten to studs with screws spaced 12 inches o.c.

3.4 APPLYING TILE BACKING PANELS

- A. Cementitious Backer Units: ANSI A108.11, at locations indicated to receive tile.
- B. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

3.5 INSTALLING TRIM ACCESSORIES

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- B. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect for visual effect.
- C. Interior Trim: Install in the following locations:
 1. Cornerbead: Use at outside corners unless otherwise indicated.
 2. U-Bead: Use at exposed panel edges.
 3. Curved-Edge Cornerbead: Use at curved openings.
- D. Aluminum Trim: Install in locations indicated on Drawings.

3.6 FINISHING GYPSUM BOARD

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
 - 1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
 - 2. Level 5: All exposed surfaces unless indicated otherwise.
- E. Cementitious Backer Units: Finish according to manufacturer's written instructions.

3.7 CLEANING AND PROTECTION

- A. Remove all debris and particulate from wall assemblies using vacuum or other device capable of fine particulate removal. Refer to Section 01 35 46 "Indoor Air Quality Management" for additional requirements.
- B. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.
- C. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- D. Remove and replace panels that are wet, moisture damaged, and mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 09 29 00

SECTION 09 30 13 - CERAMIC TILING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections (including all sustainability requirements), apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Porcelain tile.
 - 2. Waterproof membrane.
 - 3. Metal edge strips.
- B. Related Requirements:
 - 1. Section 07 92 00 "Joint Sealants" for sealing of expansion, contraction, control, and isolation joints in tile surfaces.
 - 2. Section 09 00 01 "Finish Key" for finish selections.
 - 3. Section 09 29 00 "Gypsum Board" for cementitious backer units.
 - 4. Section 09 30 23 "Glass Tiling."

1.3 DEFINITIONS

- A. General: Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.
- B. ANSI A108 Series: ANSI A108.01, ANSI A108.02, ANSI A108.1A, ANSI A108.1B, ANSI A108.1C, ANSI A108.4, ANSI A108.5, ANSI A108.6, ANSI A108.8, ANSI A108.9, ANSI A108.10, ANSI A108.11, ANSI A108.12, ANSI A108.13, ANSI A108.14, ANSI A108.15, ANSI A108.16, and ANSI A108.17, which are contained in its "Specifications for Installation of Ceramic Tile."
- C. Module Size: Actual tile size plus joint width indicated.
- D. Face Size: Actual tile size, excluding spacer lugs.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review requirements in ANSI A108.01 for substrates and for preparation by other trades.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.

- B. Sustainable Design Documentation Submittals: Refer to section 01 81 13.14 "Sustainable Design Requirements – LEED V4 BD+C".
 - 1. Product Data: Documentation for Low Emitting Materials
 - a. Low Emitting Materials for Paints and Coatings
 - b. Low Emitting Materials for Adhesives and Sealants
 - c. Low Emitting Materials for Flooring
 - 2. Product Certificates: Provide the following:
 - a. Environmental Product Declarations (EPD's)
- C. Shop Drawings: Show locations of each type of tile and tile pattern. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.
- D. Samples for Initial Selection: For tile, grout, and accessories involving color selection.
- E. Samples for Verification:
 - 1. Full-size units of each type and composition of tile and for each color and finish required.
 - 2. Full-size units of each type of trim and accessory.
 - 3. Metal edge strips in 6-inch lengths.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Master Grade Certificates: For each shipment, type, and composition of tile, signed by tile manufacturer and Installer.
- C. Product Certificates: For each type of product.
- D. Product Test Reports: For tile-setting and -grouting products.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Tile and Trim Units: Furnish quantity of full-size units equal to 10 percent of amount installed for each type, composition, color, pattern, and size indicated.
 - 2. Grout: Furnish quantity of grout equal to 3 percent of amount installed for each type, composition, and color indicated.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications:
 - 1. Installer employs Ceramic Tile Education Foundation Certified Installers or installers recognized by the U.S. Department of Labor as Journeyman Tile Layers.

2. For large-format tile, installer shall be certified by tile manufacturer.
- B. Mockups: Build mockups as indicated in Section 01 43 39 "Visual Mock-up Requirements".

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.
- B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.
- D. Store liquid materials in unopened containers and protected from freezing.

1.10 FIELD CONDITIONS

- A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations for Tile: Obtain tile of each type and color or finish from single source or producer.
 1. Obtain tile of each type and color or finish from same production run and of consistent quality in appearance and physical properties for each contiguous area.
- B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from single manufacturer and each aggregate from single source or producer.
 1. Obtain setting and grouting materials, except for unmodified Portland cement and aggregate, from single manufacturer.
- C. Source Limitations for Other Products: Obtain each of the following products specified in this Section from a single manufacturer:
 1. Waterproof membrane.
 2. Crack isolation membrane.
 3. Metal edge strips.

2.2 PRODUCTS, GENERAL

- A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.
- B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCNA installation methods specified in tile installation schedules, and other requirements specified.
- C. Factory Blending: For tile exhibiting color variations within ranges, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.

2.3 TILE PRODUCTS

- A. Basis-of-Design Product – Porcelain Tile: Subject to compliance with requirements, provide Porcelain Tile types as indicated in Section 09 00 01 “Finish Key” or comparable approved product meeting all requirements including sustainability requirements.
 - 1. Refer to Sections 01 2500 “Substitution Procedures” and 01 6000 “Product Requirements” for comparable product requirements.
- B. Basis-of-Design Product – Rectified Porcelain Tile: Subject to compliance with requirements, provide Rectified Porcelain Tile types as indicated in Section 09 00 01 “Finish Key” or comparable approved product meeting all requirements including sustainability requirements.
 - 1. Refer to Sections 01 2500 “Substitution Procedures” and 01 6000 “Product Requirements” for comparable product requirements.
- C. Basis-of-Design Product – Large Format Porcelain Tile: Subject to compliance with requirements, provide Large Format Porcelain Tile types as indicated in Section 09 00 01 “Finish Key” or comparable approved product meeting all requirements including sustainability requirements.
 - 1. Refer to Sections 01 2500 “Substitution Procedures” and 01 6000 “Product Requirements” for comparable product requirements.
- D. Basis-of-Design Product – Ceramic Tile: Subject to compliance with requirements, provide Ceramic Tile types as indicated in Section 09 00 01 “Finish Key” or comparable approved product meeting all requirements including sustainability requirements.
 - 1. Refer to Sections 01 2500 “Substitution Procedures” and 01 6000 “Product Requirements” for comparable product requirements.
- E. Basis-of-Design Product – Quarry Tile: Subject to compliance with requirements, provide Quarry Tile types as indicated in Section 09 00 01 “Finish Key” or comparable approved product meeting all requirements including sustainability requirements.

1. Refer to Sections 01 2500 "Substitution Procedures" and 01 6000 "Product Requirements" for comparable product requirements.

2.4 WATERPROOF MEMBRANE

- A. General: Manufacturer's standard product that complies with ANSI A118.10 and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.
- B. Fluid-Applied Membrane: Liquid-latex rubber or elastomeric polymer.
 1. Products: Subject to compliance with requirements, provide one of the following or comparable approved product meeting all requirements including sustainability requirements.
 - a. LATICRETE International, Inc.; Laticrete Hydro Ban.
 - b. MAPEI Corporation; Mapelastic AquaDefense.
- C. Health Product Declaration: Provide Health Product Declaration (HPD) with full disclosure of known hazards in compliance with the Health Product Declaration Open Standard
- D. Low Emitting Paints & Coatings
 1. Provide manufacture statements that confirm that the product used meets the California Department of Public Health (CDPH) Standard Method v1.1 2010 using the applicable exposure scenario.
 2. Refer to Section 01 81 13.14 "Sustainable Design Requirements - LEED v4 BD+C" for additional requirements.

2.5 SETTING MATERIALS

- A. Modified Dry-Set Mortar (Thinset): ANSI A118.4.
 1. Products: Subject to compliance with requirements, provide one of the following or comparable approved product meeting all requirements including sustainability requirements.
 - a. LATICRETE International, Inc.; 253 Gold
 - b. MAPEI Corporation; Ultralite Mortar
 2. Provide prepackaged, dry-mortar mix combined with liquid-latex additive at Project site.
 3. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.4.
- B. Medium-Bed, Modified Dry-Set Mortar: Comply with requirements in ANSI A118.4. Provide product that is approved by manufacturer for application thickness of 5/8 inch (16 mm).
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following or comparable approved product meeting all requirements including sustainability requirements.
 - a. LATICRETE International, Inc.
 - b. MAPEI Corporation

- C. Health Product Declaration: Provide Health Product Declaration (HPD) with full disclosure of known hazards in compliance with the Health Product Declaration Open Standard
- D. Low Emitting Flooring
 - 1. Provide manufacture statements that confirm that the product used meets the California Department of Public Health (CDPH) Standard Method v1.1 2010 using the applicable exposure scenario.
 - 2. Refer to Section 01 81 13.14 "Sustainable Design Requirements - LEED v4 BD+C" for additional requirements.

2.6 GROUT MATERIALS

- A. Water-Cleanable Epoxy Grout: ANSI A118.3.
 - 1. Products: Subject to compliance with requirements, provide one of the following or comparable approved product meeting all requirements including sustainability requirements.
 - a. LATICRETE International, Inc.; SPECTRALOCK PRO Premium Grout
 - b. MAPEI Corporation; Kerapoxy
- B. Health Product Declaration: Provide Health Product Declaration (HPD) with full disclosure of known hazards in compliance with the Health Product Declaration Open Standard
- C. Low Emitting Flooring
 - 1. Provide manufacture statements that confirm that the product used meets the California Department of Public Health (CDPH) Standard Method v1.1 2010 using the applicable exposure scenario.
 - 2. Refer to Section 01 81 13.14 "Sustainable Design Requirements - LEED v4 BD+C" for additional requirements.

2.7 MISCELLANEOUS MATERIALS

- A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.
- B. Metal Edge Strips: Angle or L-shaped, height to match tile and setting-bed thickness, metallic or combination of metal and PVC or neoprene base, designed specifically for flooring applications; stainless-steel, ASTM A 666, 300 Series exposed-edge material.
 - 1. Basis of Design: Provide Schluter Systems, Schluter-JOLLY or approved substitution
 - a. Material and Finish: ACGB - Brushed Chrome Anodized Aluminum
 - b. Provide radius profile where installed on radiused wall.
- C. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

- D. Low Emitting Flooring
 - 1. Provide manufacture statements that confirm that the product used meets the California Department of Public Health (CDPH) Standard Method v1.1 2010 using the applicable exposure scenario.
 - 2. Refer to Section 01 81 13.14 "Sustainable Design Requirements - LEED v4 BD+C" for additional requirements.

2.8 MIXING MORTARS AND GROUT

- A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.
- B. Add materials, water, and additives in accurate proportions.
- C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
 - 1. Verify that substrates for setting tile are firm; dry; clean; free of coatings that are incompatible with tile-setting materials, including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
 - 2. Verify that concrete substrates for tile floors installed with thinset mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.
 - a. Verify that surfaces that received a steel trowel finish have been mechanically scarified.
 - b. Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.
 - 3. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
 - 4. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.
- B. Manufacturer shall provide written approval of substrate condition prior to installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with thinset mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.
- B. Where indicated, prepare substrates to receive waterproofing by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 inch per foot toward drains.
- C. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.3 CERAMIC TILE INSTALLATION

- A. Comply with TCNA's "Handbook for Ceramic, Glass, and Stone Tile Installation" for TCNA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 series "Specifications for Installation of Ceramic Tile" that are referenced in TCNA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.
 - 1. For the following installations, follow procedures in the ANSI A108 series of tile installation standards for providing 95 percent mortar coverage:
 - a. Exterior tile floors.
 - b. Tile floors in wet areas.
 - c. Tile floors consisting of tiles 8 by 8 inches or larger.
 - d. Tile floors consisting of rib-backed tiles.
- B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
- D. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.
- E. Where accent tile differs in thickness from field tile, vary setting-bed thickness so that tiles are flush.
- F. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.

1. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.
 2. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.
- G. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:
1. Ceramic Mosaic Tile: 1/8 inch.
- H. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.
- I. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.
1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.
 2. Refer to Section 07 92 00 "Joint Sealants" for sealant requirements.
- J. Metal Edge Strips: Install at locations indicated.

3.4 WATERPROOFING INSTALLATION

- A. Install waterproofing to comply with ANSI A108.13 and manufacturer's written instructions to produce waterproof membrane of uniform thickness that is bonded securely to substrate.
- B. Allow waterproofing to cure and verify by testing that it is watertight before installing tile or setting materials over it.

3.5 ADJUSTING AND CLEANING

- A. Remove and replace tile that is damaged or that does not match adjoining tile. Provide new matching units, installed as specified and in a manner to eliminate evidence of replacement.
- B. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
1. Remove grout residue from tile as soon as possible.
 2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.
 3. Refer to Section 01 35 46 "Indoor Air Quality Management" and Section 01 74 23 "Final Cleaning" for additional requirements.

3.6 PROTECTION

- A. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.
- B. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.
- C. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

3.7 INTERIOR CERAMIC TILE INSTALLATION SCHEDULE

- A. Interior Floor Installations, Concrete Subfloor:
 - 1. Ceramic Tile Installation: TCNA F131; water-cleanable, tile-setting epoxy; epoxy grout.
- B. Interior Wall Installations, Wood or Metal Studs or Furring:
 - 1. Ceramic Tile Installation: TCNA W244C or TCNA W244F; thinset mortar on cementitious backer units or fiber-cement backer board.

END OF SECTION 09 30 13

SECTION 09 30 23 - GLASS TILING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections (including all sustainability requirements), apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Glass tile.
 - 2. Waterproof membrane.
 - 3. Metal Edge Strips.
- B. Related Requirements:
 - 1. Section 07 92 00 "Joint Sealants" for sealing of expansion, contraction, control, and isolation joints in tile surfaces.
 - 2. Section 09 00 01 "Finish Key" for finish selections.
 - 3. Section 09 29 00 "Gypsum Board" for cementitious backer units.
 - 4. Section 09 30 13 "Ceramic Tiling"

1.3 DEFINITIONS

- A. General: Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.2 apply to Work of this Section unless otherwise specified.
- B. ANSI A108 Series: ANSI A108.01, ANSI A108.02, ANSI A108.1A, ANSI A108.1B, ANSI A108.1C, ANSI A108.4, ANSI A108.5, ANSI A108.6, ANSI A108.8, ANSI A108.9, ANSI A108.10, ANSI A108.11, ANSI A108.12, ANSI A108.13, ANSI A108.14, ANSI A108.15, ANSI A108.16, and ANSI A108.17, which are contained in its "Specifications for Installation of Ceramic Tile."
- C. Module Size: Actual tile size plus joint width indicated.
- D. Face Size: Actual tile size, excluding spacer lugs.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review requirements in ANSI A108.01 for substrates and for preparation by other trades.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Sustainable Design Documentation Submittals: Refer to section 01 81 13.14 "Sustainable Design Requirements – LEED V4 BD+C".

1. Product Data: Documentation for Low Emitting Materials
 - a. Low Emitting Materials for Paints and Coatings
 - b. Low Emitting Materials for Adhesives and Sealants
2. Product Certificates: Provide the following:
 - a. Environmental Product Declarations (EPD's)
- C. Shop Drawings: Show locations of each type of tile and tile pattern. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.
- D. Samples for Initial Selection: For tile, grout, and accessories involving color selection.
- E. Samples for Verification:
 1. Full-size units of each type and composition of tile and for each color and finish required. For glass mosaic tile in color blend patterns, provide full sheets of each color blend.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Master Grade Certificates: For each shipment, type, and composition of tile, signed by tile manufacturer and Installer.
- C. Product Certificates: For each type of product.
- D. Product Test Reports: For tile-setting and -grouting products.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. Tile Units: Furnish quantity of full-size units equal to 10 percent of amount installed for each type, composition, color, pattern, and size indicated.
 2. Grout: Furnish quantity of grout equal to 3 percent of amount installed for each type, composition, and color indicated.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications:
 1. Installer employs Ceramic Tile Education Foundation Certified Installers or installers recognized by the U.S. Department of Labor as Journeyman Tile Layers.
- B. Mockups: Build mockups as indicated in Section 01 43 39 "Visual Mock-up Requirements".
 1. Build mockup of glass tile installation.
 2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.2 for labeling tile packages.
- B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.
- D. Store liquid materials in unopened containers and protected from freezing.

1.10 FIELD CONDITIONS

- A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations for Tile: Obtain tile of each type and color or finish from single source or producer.
 - 1. Obtain tile of each type and color or finish from same production run and of consistent quality in appearance and physical properties for each contiguous area.
- B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from single manufacturer and each aggregate from single source or producer.
 - 1. Obtain setting and grouting materials, except for unmodified Portland cement and aggregate, from single manufacturer.
- C. Source Limitations for Other Products: Obtain each of the following products specified in this Section from a single manufacturer:
 - 1. Waterproof membrane.
 - 2. Joint sealants.

2.2 PRODUCTS, GENERAL

- A. ANSI Glass Tile Standard: Provide glass tile that complies with ANSI A137.2 for types and other characteristics indicated.
 - 1. Provide tile complying with Standard grade requirements unless otherwise indicated.
- B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards

referenced by TCNA installation methods specified in tile installation schedules, and other requirements specified.

- C. Factory Blending: For tile exhibiting color variations within ranges, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.
- D. Mounting: For factory-mounted tile, provide back- or edge-mounted tile assemblies as standard with manufacturer unless otherwise indicated.
 - 1. Where tile is indicated for installation in wet areas, do not use back- or edge-mounted tile assemblies unless tile manufacturer specifies in writing that this type of mounting is suitable for installation indicated and has a record of successful in-service performance.

2.3 TILE PRODUCTS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Mosaic Glass Tile as indicated in Section 09 00 01 "Finish Key" or comparable approved product meeting all requirements including sustainability requirements.
 - 1. Refer to Sections 01 2500 "Substitution Procedures" and 01 6000 "Product Requirements" for comparable product requirements.

2.4 WATERPROOF MEMBRANE

- A. General: Manufacturer's standard product that complies with ANSI A118.10 and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.
- B. Fluid-Applied Membrane: Liquid-latex rubber or elastomeric polymer.
 - 1. Products: Subject to compliance with requirements, provide one of the following or comparable approved product meeting all requirements including sustainability requirements.
 - a. LATICRETE International, Inc.; Laticrete Hydro Ban.
 - b. MAPEI Corporation; Mapelastic AquaDefense.
- C. Health Product Declaration: Provide Health Product Declaration (HPD) with full disclosure of known hazards in compliance with the Health Product Declaration Open Standard
- D. Low Emitting Paints & Coatings
 - 1. Provide manufacture statements that confirm that the product used meets the California Department of Public Health (CDPH) Standard Method v1.1 2010 using the applicable exposure scenario.
 - 2. Refer to Section 01 81 13.14 "Sustainable Design Requirements - LEED v4 BD+C" for additional requirements.

2.5 SETTING MATERIALS

- A. Modified Dry-Set Mortar (Thinset): ANSI A118.4.

1. 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:
 - a. C-Cure.
 - b. LATICRETE SUPERCAP, LLC.
 - c. MAPEI Corporation.
2. Provide prepackaged, dry-mortar mix combined with liquid-latex additive at Project site.
3. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.4.

2.6 GROUT MATERIALS

- A. Water-Cleanable Epoxy Grout: ANSI A118.3, with a VOC content as indicated in Section 01 81 13.14 "Sustainable Design Requirements - LEED v4 BD+C".
 1. 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:
 - a. C-Cure.
 - b. LATICRETE SUPERCAP, LLC.
 - c. MAPEI Corporation.

2.7 MISCELLANEOUS MATERIALS

- A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.
- B. Metal Edge Strips: Angle or L-shaped, height to match tile and setting-bed thickness; stainless-steel, ASTM A 666, 300 Series exposed-edge material.
- C. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

2.8 MIXING MORTARS AND GROUT

- A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.
- B. Add materials, water, and additives in accurate proportions.
- C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
 - 1. Verify that substrates for setting tile are firm; dry; clean; free of coatings that are incompatible with tile-setting materials, including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
 - 2. Verify that concrete substrates for tile floors installed with thinset mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.
 - a. Verify that surfaces that received a steel trowel finish have been mechanically scarified.
 - b. Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.
 - 3. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
 - 4. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Where indicated, prepare substrates to receive waterproofing by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 inch per foot toward drains.
- B. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.3 GLASS TILE INSTALLATION

- A. Comply with TCNA's "Handbook for Ceramic, Glass, and Stone Tile Installation" for TCNA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 series "Specifications for Installation of Ceramic Tile" that are referenced in TCNA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.
- B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

- C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
- D. Where accent tile differs in thickness from field tile, vary setting-bed thickness so that tiles are flush.
- E. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.
 - 1. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so joints between sheets are not apparent in finished work.
- F. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:
 - 1. Mosaic Glass Tile: 1/16 inch.
- G. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.
 - 1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.
- H. Metal Edge Strips: Install at locations indicated.
- I. Grout Sealer: Apply grout sealer to grout joints according to grout-sealer manufacturer's written instructions. As soon as grout sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.

3.4 WATERPROOFING INSTALLATION

- A. Install waterproofing to comply with ANSI A108.13 and manufacturer's written instructions to produce waterproof membrane of uniform thickness that is bonded securely to substrate.
- B. Allow waterproofing to cure and verify by testing that it is watertight before installing tile or setting materials over it.

3.5 CLEANING AND PROTECTING

- A. Cleaning: On completion of placement and grouting, clean all tile surfaces so they are free of foreign matter.
 - 1. Remove grout residue from tile as soon as possible.
 - 2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples

of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.

3. Remove temporary protective coating by method recommended by coating manufacturer and that is acceptable to tile and grout manufacturer. Trap and remove coating to prevent drain clogging.
- B. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls.
- C. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.
- D. Refer to Section 01 35 46 "Indoor Air Quality Management" and Section 01 74 23 "Final Cleaning" for additional requirements

3.6 INTERIOR GLASS TILE INSTALLATION SCHEDULE

- A. Interior Wall Installations, Wood or Metal Studs or Furring:
 1. Glass Tile Installation: TCNA W221 and ANSI A108.14; cement mortar bed (thickset) on solid backing.

END OF SECTION 09 30 23

SECTION 09 51 13 - ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections (including all sustainability requirements), apply to this Section.

1.2 SUMMARY

- A. Section includes acoustical panels and exposed suspension systems for interior ceilings.
- B. Products furnished, but not installed under this Section, include anchors, clips, and other ceiling attachment devices to be cast in concrete.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Sustainable Design Documentation Submittals: Refer to section 01 81 13.14 "Sustainable Design Requirements – LEED V4 BD+C".
 - 1. Product Data: Documentation for Leadership Extraction Practices in the following:
 - a. Extended Producer Responsibility
 - b. Leadership Extraction Practices for Recycled Content
 - 2. Product Certificates: Provide the following:
 - a. Environmental Product Declarations (EPD's)
 - b. Corporate Sustainability Reporting (CSR's)
- C. Samples: For each exposed product and for each color and texture specified, 6 inches in size.
- D. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of sizes indicated below:
 - 1. Acoustical Panels: Set of 6-inch-square samples of each type, color, pattern, and texture.
 - 2. Exposed Suspension-System Members, Moldings, and Trim: Set of 6-inch-long Samples of each type, finish, and color.

1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
 - 1. Ceiling suspension-system members.
 - 2. Structural members to which suspension systems will be attached.

3. Method of attaching hangers to building structure.
 - a. Furnish layouts for cast-in-place anchors, clips, and other ceiling attachment devices whose installation is specified in other Sections.
 4. Carrying channels or other supplemental support for hanger-wire attachment where conditions do not permit installation of hanger wires at required spacing.
 5. Size and location of initial access modules for acoustical panels.
 6. Items penetrating finished ceiling and ceiling-mounted items including the following:
 - a. Lighting fixtures.
 - b. Diffusers.
 - c. Grilles.
 - d. Speakers.
 - e. Sprinklers.
 - f. Access panels.
 - g. Perimeter moldings.
 7. Show operation of hinged and sliding components covered by or adjacent to acoustical panels.
 8. Minimum Drawing Scale: 1/8 inch = 1 foot.
- B. Qualification Data: For testing agency.
- C. Product Test Reports: For each acoustical panel ceiling, for tests performed by manufacturer and witnessed by a qualified testing agency.
- D. Evaluation Reports: For each acoustical panel ceiling suspension system and anchor and fastener type, from ICC-ES.
- E. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For finishes to include in maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Acoustical Ceiling Units: Full-size panels equal to 2 percent of quantity installed.
 2. Suspension-System Components: Quantity of each exposed component equal to 2 percent of quantity installed.
 3. Hold-Down Clips: Equal to 2 percent of quantity installed.

1.8 QUALITY ASSURANCE

- A. Mockups: Build mockups to verify selections made under Sample submittals. Refer to Section 01 43 39 "Visual Mock-up Requirements" for requirements.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver acoustical panels, suspension-system components, and accessories to Project site and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.
- B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.

1.10 FIELD CONDITIONS

- A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
 - 1. Pressurized Plenums: Operate ventilation system for not less than 48 hours before beginning acoustical panel ceiling installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain each type of acoustical ceiling panel and its supporting suspension system from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: Class B according to ASTM E 1264.
 - 2. Smoke-Developed Index: 450 or less.
- B. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Indicate design designations from UL or from the listings of another qualified testing agency.
- C. Sustainability Requirements:
 - 1. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of pre-consumer recycled content not less than 50 percent.
 - a. Refer to Section 01 81 13.14 "Sustainable Design Requirements - LEED v4 BD+C" for additional information and requirements for recycled content.
 - 2. Environmental Product Disclosure: Provide an Environmental Product Declarations (EPD) that conforms with one of the following:
 - a. Product specific declarations in accordance with ISO 1404
 - b. Environmental Product Declarations conforming to ISO 14025, 14040, 14044 and EN 15804 or ISO 21930
 - c. Industry Wide Product Specific Type III EPD Third Party Certification

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Acoustical Panel Ceiling types as indicated in Section 09 00 01 "Finish Key" or comparable approved product meeting all requirements including sustainability requirements.
 - 1. Refer to Sections 01 2500 "Substitution Procedures" and 01 6000 "Product Requirements" for comparable product requirements.
- B. Acoustical Panel Standard: Provide manufacturer's standard panels according to ASTM E 1264 and designated by type, form, pattern, acoustical rating, and light reflectance unless otherwise indicated.

2.4 METAL SUSPENSION SYSTEM

- A. Metal Suspension-System Standard: Provide manufacturer's standard, direct-hung, metal suspension system and accessories according to ASTM C 635/C 635M and designated by type, structural classification, and finish indicated.
 - 1. High-Humidity Finish: Where indicated, provide coating tested and classified for "severe environment performance" according to ASTM C 635/C 635M.

2.5 ACCESSORIES

- A. Attachment Devices: Size for five times the design load indicated in ASTM C 635/C 635M, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.
 - 1. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing according to ASTM E 1190, conducted by a qualified testing and inspecting agency.
- B. Wire Hangers, Braces, and Ties: Provide wires as follows:
 - 1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
 - 2. Size: Wire diameter sufficient for its stress at three times hanger design load (ASTM C 635/C 635M, Table 1, "Direct Hung") will be less than yield stress of wire, but not less than 0.106-inch-diameter wire.
- C. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.
- D. Flat Hangers: Mild steel, zinc coated or protected with rust-inhibitive paint.
- E. Angle Hangers: Angles with legs not less than 7/8 inch wide; formed with 0.04-inch-thick, galvanized-steel sheet complying with ASTM A 653/A 653M, G90 coating designation; with bolted connections and 5/16-inch-diameter bolts.
- F. Hold-Down Clips: Manufacturer's standard hold-down.

2.6 ACOUSTICAL SEALANT

- A. Acoustical Sealant: As specified in Section 07 92 19 "Acoustical Joint Sealants."

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.
- B. Examine acoustical panels before installation. Reject acoustical panels that are wet, moisture damaged, or mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders unless otherwise indicated, and comply with layout shown on reflected ceiling plans.
- B. Layout openings for penetrations centered on the penetrating items.

3.3 INSTALLATION

- A. Install acoustical panel ceilings according to ASTM C 636/C 636M and manufacturer's written instructions.
- B. Suspend ceiling hangers from building's structural members and as follows:
 - 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
 - 2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
 - 3. Secure wire hangers to ceiling-suspension members and to supports above with a minimum of three tight turns. Connect hangers directly to structure or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
 - 4. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both the structure to which hangers are attached and the type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
 - 5. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.

6. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
 7. Do not attach hangers to steel deck tabs.
 8. Do not attach hangers to steel roof deck. Attach hangers to structural members.
 9. Space hangers not more than 48 inches o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
 10. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.
- C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.
- D. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- E. Install acoustical panels with undamaged edges and fit accurately into suspension-system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide precise fit.
1. Arrange directionally patterned acoustical panels as follows:
 - a. As indicated on reflected ceiling plans.
 2. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension-system runners and moldings.
 3. For reveal-edged panels on suspension-system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.
 4. For reveal-edged panels on suspension-system members with box-shaped flanges, install panels with reveal surfaces in firm contact with suspension-system surfaces and panel faces flush with bottom face of runners.
 5. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.
 6. Install hold-down clips in areas indicated; space according to panel manufacturer's written instructions unless otherwise indicated.

3.4 ERECTION TOLERANCES

- A. Suspended Ceilings: Install main and cross runners level to a tolerance of 1/8 inch in 12 feet, non-cumulative.

3.5 FIELD QUALITY CONTROL

- A. Special Inspections: Construction Manager will engage a qualified special inspector to perform the following special inspections:
1. Periodic inspection during the installation of suspended ceiling grids according to ASCE/SEI 7.

- B. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- C. Perform the following tests and inspections of completed installations of acoustical panel ceiling hangers and anchors and fasteners in successive stages and when installation of ceiling suspension systems on each floor has reached 20 percent completion, but no panels have been installed. Do not proceed with installations of acoustical panel ceiling hangers for the next area until test results for previously completed installations of acoustical panel ceiling hangers show compliance with requirements.
 - 1. Within each test area, testing agency will select one of every 10 power-actuated fasteners and postinstalled anchors used to attach hangers to concrete and will test them for 200 lbf of tension; it will also select one of every two postinstalled anchors used to attach bracing wires to concrete and will test them for 440 lbf of tension.
 - 2. When testing discovers fasteners and anchors that do not comply with requirements, testing agency will test those anchors not previously tested until 20 pass consecutively and then will resume initial testing frequency.
- D. Acoustical panel ceiling hangers, anchors, and fasteners will be considered defective if they do not pass tests and inspections.
- E. Prepare test and inspection reports.

3.6 CLEANING

- A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension-system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage.
 - 1. Refer to Section 01 74 23 "Final Cleaning" for additional cleaning requirements.
- B. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 09 51 13

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections (including all sustainability requirements), apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Acoustical tiles for interior ceilings.
 - 2. Direct attachment of tiles to substrates with adhesive.
- B. Related Requirements:
 - 1. Section 09 51 13 "Acoustical Panel Ceilings" for ceilings consisting of mineral-base and glass-fiber-base acoustical panels and exposed suspension systems.
 - 2. Section 09 51 33 "Acoustical Metal Pan Ceilings" for ceilings consisting of metal-pan units with exposed and concealed suspension systems.
- C. Products furnished, but not installed under this Section, include anchors, clips, and other ceiling attachment devices to be cast in concrete.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Sustainable Design Documentation Submittals: Refer to section 01 81 13.14 "Sustainable Design Requirements – LEED V4 BD+C".
 - 1. Product Data: Documentation for Leadership Extraction Practices in the following:
 - a. Extended Producer Responsibility
 - b. Leadership Extraction Practices for Recycled Content
 - 2. Product Data: Documentation for Low Emitting Materials
 - a. Low Emitting Materials for Adhesives and Sealants
 - 3. Product Certificates: Provide the following:
 - a. Environmental Product Declarations (EPD's)
 - b. Corporate Sustainability Reporting (CSR's)
- C. Samples: For each exposed product and for each color and texture specified, 6 inches in size.
- D. Samples for Initial Selection: For components with factory-applied finishes.

- E. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of sizes indicated below:

1. Acoustical Tiles: Set of full-size Samples of each type, color, pattern, and texture.
2. Exposed Moldings and Trim: Set of 6-inch- long Samples of each type and color.

1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
1. Items penetrating finished ceiling and ceiling-mounted items including the following:
 - a. Lighting fixtures.
 - b. Diffusers.
 - c. Grilles.
 - d. Speakers.
 - e. Sprinklers.
 - f. Access panels.
 - g. Perimeter moldings.
 2. Minimum Drawing Scale: 1/8 inch = 1 foot.
- B. Qualification Data: For testing agency.
- C. Product Test Reports: For each acoustical tile ceiling, for tests performed by manufacturer and witnessed by a qualified testing agency.
- D. Evaluation Reports: For each acoustical tile ceiling suspension system, from ICC-ES.
- E. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For finishes to include in maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Acoustical Ceiling Units: Full-size tiles equal to 2 percent of quantity installed.

1.8 QUALITY ASSURANCE

- A. Mockups: Build mockups to verify selections made under Sample submittals. Refer to Section 01 43 39 "Visual Mock-up Requirements" for requirements.

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

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver acoustical tiles, suspension-system components, and accessories to Project site and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.
- B. Before installing acoustical tiles, permit them to reach room temperature and a stabilized moisture content.

1.10 FIELD CONDITIONS

- A. Environmental Limitations: Do not install acoustical tile ceilings until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
 1. Pressurized Plenums: Operate ventilation system for not less than 48 hours before beginning acoustical tile ceiling installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations:
 1. Suspended Acoustical Tile Ceilings: Obtain each type of acoustical ceiling tile and its suspension system from single source from single manufacturer.
 2. Directly Attached Acoustical Tile Ceilings: Obtain each type of acoustical ceiling tile from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of pre-consumer recycled content not less than 25 percent.
 1. Refer to Section 01 81 13.14 "Sustainable Design Requirements - LEED v4 BD+C" for additional information and requirements for recycled content.
- B. Environmental Product Disclosure: Provide an Environmental Product Declarations (EPD) that conforms with one of the following:
 1. Product specific declarations in accordance with ISO 1404
 2. Environmental Product Declarations conforming to ISO 14025, 14040, 14044 and EN 15804 or ISO 21930
 3. Industry Wide Product Specific Type III EPD Third Party Certification
- C. Corporate Sustainability Report: Provide third-party verified Corporate Sustainability Report (CPD) including impacts of extraction operations and activities associated with the manufacturer's product and product's supply chain conforming the following:
 1. Global Reporting Initiative (GRI) Sustainability report

2. Organization for Economic Co-operation and Development (OOECD) Guidelines for Multinational Enterprises.
 3. U.N. Global Compact: Communication of Progress
 4. ISO 26000: 2010 Guidance on Social Responsibility
 5. USGBC Approved Program: Other approved programs meeting the CSR criteria.
- D. Low Emitting Adhesives and Sealants
1. Provide manufacture statements that confirm that the product used meets the California Department of Public Health (CDPH) Standard Method v1.1 2010 using the applicable exposure scenario.
 2. Refer to Section 01 81 13.14 "Sustainable Design Requirements - LEED v4 BD+C" for additional requirements.
- E. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
1. Flame-Spread Index: Class B according to ASTM E 1264.
 2. Smoke-Developed Index: 450 or less.

2.3 ACOUSTICAL TILES

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Acoustical Tile Ceiling types as indicated in Section 09 00 01 "Finish Key" or comparable approved product meeting all requirements including sustainability requirements.
1. Refer to Sections 01 2500 "Substitution Procedures" and 01 6000 "Product Requirements" for comparable product requirements.
- B. Acoustical Tile Standard: Provide manufacturer's standard tiles of configuration indicated that comply with ASTM E 1264 classifications as designated by type, form, pattern, acoustical rating, and light reflectance unless otherwise indicated.
- C. Color: As indicated by manufacturer's designation.
- D. Light Reflectance (LR): Not less than As indicated by manufacturer's designation.
- E. Ceiling Attenuation Class (CAC): Not less than As indicated by manufacturer's designation.
- F. Noise Reduction Coefficient (NRC): Not less than As indicated by manufacturer's designation.
- G. Articulation Class (AC): Not less than As indicated by manufacturer's designation.

2.4 METAL EDGE MOLDINGS AND TRIM

- A. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations complying with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for of suspension-system runners.

1. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.
2. Finish: Painted in color as selected from manufacturer's full range.

2.5 ACOUSTICAL SEALANT

- A. Acoustical Sealant: As specified in Section 07 92 19 "Acoustical Joint Sealants."

2.6 MISCELLANEOUS MATERIALS

- A. Acoustical Tile Adhesive: Type recommended in writing by acoustical tile manufacturer, bearing UL label for Class 0-25 flame spread.
 1. Provide manufacture statements that confirm that the product used meets the California Department of Public Health (CDPH) Standard Method v1.1 2010 using the applicable exposure scenario.
 2. Refer to Section 01 81 13.14 "Sustainable Design Requirements - LEED v4 BD+C" for additional requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, including structural framing and substrates to which acoustical tile ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine acoustical tiles before installation. Reject acoustical tiles that are wet, moisture damaged, or mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Testing Substrates: Before adhesively bonding tiles to wet-placed substrates such as cast-in-place concrete or plaster, test and verify that moisture level is below tile manufacturer's recommended limits.
- B. Measure each ceiling area and establish layout of acoustical tiles to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width tiles at borders unless otherwise indicated, and comply with layout shown on reflected ceiling plans.
- C. Layout openings for penetrations centered on the penetrating items.

3.3 INSTALLATION OF DIRECTLY ATTACHED ACOUSTICAL TILE CEILINGS

- A. Adhesive Installation: Install acoustical tile by bonding to substrate, using acoustical tile adhesive and procedure recommended in writing by tile manufacturer and as follows:
 1. Wipe and prime ceiling.

2. Remove loose dust from backs of tiles by brushing.
 3. Install splines in joints between tiles and maintain bottom surface to a uniform level. Shim tile or correct substrate as required to maintain levelness.
 4. Maintain tight butt joints, aligned in both directions and coordinated with ceiling fixtures.
- B. Install edge moldings and trim of type indicated at perimeter of acoustical tile ceiling area and where necessary to conceal edges of acoustical units.
- C. Arrange directionally patterned acoustical tiles as indicated on Drawings.

3.4 ERECTION TOLERANCES

- A. Directly Attached Ceilings: Install bottom surface of tiles to a tolerance of 1/8 inch in 12 feet and not exceeding 1/4 inch cumulatively.
- B. Moldings and Trim: Install moldings and trim to substrate and level with ceiling suspension system to a tolerance of 1/8 inch in 12 feet, non-cumulative.

3.5 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:
1. Periodic inspection during the installation of suspended ceiling grids according to ASCE/SEI 7.
- B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

3.6 ADJUSTING

- A. Clean exposed surfaces of acoustical tile ceilings, including trim and edge moldings. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage.
1. Refer to Section 01 35 46 "Indoor Air Quality" and Section 01 74 23 "Final Cleaning" for additional requirements.
- B. Remove and replace tiles and other ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 09 51 23

SECTION 09 51 33 - ACOUSTICAL METAL PAN CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections (including all sustainability requirements), apply to this Section.

1.2 SUMMARY

- A. Section includes acoustical metal pans and associated suspension system for interior ceilings.
- B. Related Requirements:
 - 1. Section 09 51 13 "Acoustical Panel Ceilings" for ceilings consisting of mineral-base and glass-fiber-base acoustical panels and exposed suspension systems.
- C. Products furnished, but not installed, under this Section include anchors, clips, and other ceiling attachment devices to be cast in concrete.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Sustainable Design Documentation Submittals: Refer to section 01 81 13.14 "Sustainable Design Requirements – LEED V4 BD+C".
 - 1. Product Data: Documentation for Leadership Extraction Practices in the following:
 - a. Leadership Extraction Practices for Recycled Content
 - 2. Product Certificates: Provide the following:
 - a. Environmental Product Declarations (EPD's)
- C. Samples: For each exposed product and for each color and texture specified, 6 inches in size.
- D. Samples for Initial Selection: For units with factory-applied finishes.
- E. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of size indicated below:
 - 1. Metal Pans: Set of 6-inch-square Samples of each type, finish, color, pattern, and texture. Show pan edge profile.
 - 2. Exposed Suspension-System Members, Moldings, and Trim: Set of 6-inch-long Samples of each type, finish, and color.

3. Sound Absorber: Sample of each type matching size of Sample metal pan.

1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
 1. Suspended ceiling components.
 2. Structural members to which suspension systems will be attached.
 3. Size and location of access modules for acoustical panels.
 4. Items penetrating finished ceiling including the following:
 - a. Lighting fixtures.
 - b. Air outlets and inlets.
 - c. Speakers.
 - d. Sprinklers.
 - e. Access panels.
 5. Perimeter moldings.
- B. Qualification Data: For testing agency.
- C. Product Test Reports: For each acoustical metal pan ceiling, for tests performed by manufacturer and witnessed by a qualified testing agency.
- D. Evaluation Reports: For each acoustical metal pan ceiling suspension system.
- E. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For finishes to include in maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. Acoustical Metal Pans: Full-size units equal to 2 percent of quantity installed.
 2. Suspension-System Components: Quantity of each grid, exposed molding, and trim equal to 2 percent of quantity installed.
 3. Hold-Down Clips: Equal to 2 percent of quantity installed.

1.8 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to NVLAP for testing indicated.
- B. Mockups: Build mockups to comply with Section 01 43 39 (Visual Mock-Up Requirements".
 1. Build mockup of typical ceiling area as shown on Drawings.
 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver acoustical metal pans, suspension-system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they are protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.
- B. Handle acoustical metal pans, suspension-system components, and accessories carefully to avoid damaging units and finishes in any way.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: Comply with ASTM E 1264 for Class A materials.
 - 2. Smoke-Developed Index: 50 or less.

2.2 ACOUSTICAL METAL PANS, GENERAL

- A. Source Limitations: Obtain each type of acoustical metal ceiling pan and supporting suspension system from single source from single manufacturer.
- B. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of pre-consumer recycled content not less than 50 percent.
 - 1. Refer to Section 01 81 13.14 "Sustainable Design Requirements - LEED v4 BD+C" for additional information and requirements for recycled content.
- C. Environmental Product Disclosure: Provide an Environmental Product Declarations (EPD) that conforms with one of the following:
 - 1. Product specific declarations in accordance with ISO 1404
 - 2. Environmental Product Declarations conforming to ISO 14025, 14040, 14044 and EN 15804 or ISO 21930
 - 3. Industry Wide Product Specific Type III EPD Third Party Certification
- D. Acoustical Panel Standard: Provide manufacturer's standard pans of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances unless otherwise indicated.
 - 1. Mounting Method for Measuring NRC: Type E-400; plenum mounting in which face of test specimen is 15-3/4 inches away from test surface according to ASTM E 795.
- E. Sheet Metal Characteristics: For metal components exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, roughness, stains, or discolorations.

1. Aluminum Sheet: Rolled aluminum sheet, complying with ASTM B 209; alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.
- F. Sound-Absorbent Pads: Provide width and length to completely fill concealed surface of pan, with surface-burning characteristics for flame-spread index of 25 or less and smoke-developed index of 50 or less, as determined by testing according to ASTM E 84, and to comply with the following requirements:
 1. Unwrapped, Glass-Fiber Insulation: Black coated, unfaced, complying with ASTM C 553, Type I, Type II, or Type III; not less than 1-lb/cu. ft. (16-kg/cu. m) density; treated to be nondusting; 1 inch (25 mm) thick.
 2. Spacer Grids: Provide manufacturer's standard aluminum grid units that provide an air cushion between metal pans and insulation pads and that act to improve sound absorption.

2.3 ALUMINUM PANS FOR ACOUSTICAL METAL PAN CEILING

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Acoustical Metal Pan Ceiling types as indicated in Section 09 00 01 "Finish Key" or comparable approved product meeting all requirements including sustainability requirements.
 1. Refer to Sections 01 2500 "Substitution Procedures" and 01 6000 "Product Requirements" for comparable product requirements.
- B. Classification: Units complying with ASTM E 1264 for types described as perforated aluminum facing (pan) units with sound-absorbent fabric backing.
 1. Pattern: Specified by product designation.
- C. Pan Fabrication: Manufacturer's standard units of size, profile, and edge treatment indicated, formed from metal indicated and finished to comply with requirements indicated.
 1. Lay-in Pans: Formed to set in exposed suspension grid.
 2. Torsion-Spring-Hinged Pans: Designed to be securely retained in preslotted, exposed suspension grid by torsion springs provided by manufacturer.
- D. Pan Thickness: Not less than 0.040 inch.
- E. Pan Edge Detail: Manufacturer's standard edge detail.
- F. Pan Joint Detail: Butt.
- G. Pan Size: As indicated in Section 09 00 01 "Finish Key".
- H. Pan Face Finish: As indicated in Section 09 00 01 "Finish Key"..
- I. LR: Not less than 0.77.
- J. NRC: Not less than 0.70.

2.4 METAL SUSPENSION SYSTEMS, GENERAL

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of pre-consumer recycled content not less than 25 percent.
 - 1. Refer to Section 01 81 13.14 "Sustainable Design Requirements - LEED v4 BD+C" for additional information and requirements for recycled content.
- B. Metal Suspension System Standard: Provide manufacturer's standard metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable ASTM C 635/C 635M requirements.
- C. Suspension Systems: Provide systems complete with carriers, runners, splice sections, connector clips, alignment clips, leveling clips, hangers, molding, trim, retention clips, load-resisting struts, and other suspension components required to support ceiling units and other ceiling-supported construction.
- D. Attachment Devices: Size for 5 times the design load indicated in ASTM C 635/C 635M, Table 1, Direct Hung, unless otherwise indicated. Comply with seismic design requirements.
 - 1. Anchors in Concrete: Anchors of type and material indicated below, with holes or loops for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to 5 times that imposed by ceiling construction, as determined by testing according to ASTM E 488 or ASTM E 1512 as applicable, conducted by a qualified testing and inspecting agency.
 - a. Type: Postinstalled expansion anchors.
 - b. Corrosion Protection: Carbon-steel components zinc plated to comply with ASTM B 633, Class Fe/Zn 5 (0.005 mm) for Class SC 1 service condition.
 - c. Corrosion Protection: Stainless-steel components complying with ASTM F 593 and ASTM F 594, Group 1 Alloy 304 or 316 for bolts; Alloy 304 or 316 for anchor.
 - 2. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated, and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing according to ASTM E 1190, conducted by a qualified testing and inspecting agency.
- E. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:
 - 1. Stainless-Steel Wire: ASTM A 580/A 580M, Type 304, nonmagnetic.
 - 2. Size: Select wire diameter so its stress at 3 times the hanger design load indicated in ASTM C 635/C 635M, Table 1, Direct Hung, is less than yield stress of wire, but provide not less than 0.106-inch-diameter wire.
- F. Angle Hangers: Angles with legs not less than 7/8-inch-wide; formed with 0.04-inch-thick, galvanized-steel sheet complying with ASTM A 653/A 653M, G90 coating designation; with bolted connections and 5/16-inch-diameter bolts.

- G. Exposed Metal Edge Moldings and Trim: Provide exposed members as indicated, to conceal edges of and penetrations through ceiling, to conceal edges of pans and runners, for fixture trim and adapters, for fasciae at changes in ceiling height, and for other conditions; of metal and finish matching acoustical metal pan ceiling units unless otherwise indicated.
 - 1. For Circular Penetrations of Ceiling: Fabricate edge moldings to diameter required to fit penetration exactly.
 - H. Fiberglass Pad Wire-Tie Hanger: The ceiling isolation hanger shall consist of a one-inch (1") thick, pre-compressed, molded fiberglass isolator. The fiberglass isolator shall be encased in an anti-short-circuit, reinforced steel bracket which will accommodate up to #8 suspension wire or a 1/4" bolt or screw. The hanger bracket shall be zinc-plated, reinforced steel and shall carry a five (5) times maximum rated load overload without failure.
 - 1. Basis-of-Design: Provide Kinetics Noise Control, Inc., Kinetics AF or comparable approved product by the following manufacturers.
 - a. Mason Industries, Inc.
 - b. PAC International, Inc.
- 2.5 DIRECT-HUNG, STANDARD-GRID, METAL SUSPENSION SYSTEM FOR ACOUSTICAL METAL PAN CEILING
- A. Basis-of-Design Product: Subject to compliance with requirements, provide Acoustical Metal Pan Ceiling ACL1 as indicated in Section 09 00 01 "Finish Key" or comparable approved product meeting all requirements including sustainability requirements.
 - 1. Refer to Sections 01 2500 "Substitution Procedures" and 01 6000 "Product Requirements" for comparable product requirements.
 - B. Suspension System for Torsion-Spring-Hinged Metal Pans: Provide runners with factory-cut slots fabricated to accept torsion-spring-hinged attachment.

2.6 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. High-Humidity Finish: Comply with ASTM C 635/C 635M requirements for "Coating Classification for Severe Environment Performance" where high-humidity finishes are indicated.

2.7 ALUMINUM FINISHES

- A. Color-Coated Finish: Manufacturer's standard baked paint complying with coating manufacturer's written instructions for surface preparation, pretreatment, application, baking, and minimum dry film thickness.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, including structural framing to which acoustical metal pan ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical metal pan ceilings.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Measure each ceiling area and establish layout of acoustical metal pans to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width pans at borders, and comply with layout shown on reflected ceiling plans and coordination drawings.

3.3 INSTALLATION

- A. Suspend ceiling hangers from building's structural members and as follows:
 - 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
 - 2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 - 3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
 - 4. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that do not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
 - 5. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both structure to which hangers are attached and hanger type involved. Install hangers in a manner that does not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.

6. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
 7. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
 8. Do not attach hangers to steel deck tabs.
 9. Do not attach hangers to steel roof deck. Attach hangers to structural members.
 10. Space hangers not more than 48 inches o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
 11. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
- B. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.
- C. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical metal pans.
1. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet. Miter corners accurately and connect securely.
 2. Do not use exposed fasteners, including pop rivets, on moldings and trim.
- D. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- E. Cut acoustical metal pan units for accurate fit at borders and at interruptions and penetrations by other work through ceilings. Stiffen edges of cut units as required to eliminate evidence of buckling or variations in flatness exceeding referenced standards for stretcher-leveled metal sheet.
- F. Install acoustical metal pans in coordination with suspension system and exposed moldings and trim. Comply with installation tolerances according to CISCA's "Metal Ceilings Technical Guidelines."
1. For torsion-spring-hinged pans, position pans according to manufacturer's written instructions.
 2. Align joints in adjacent courses to form uniform, straight joints parallel to room axis in both directions unless otherwise indicated.
 3. Fit adjoining units to form flush, tight joints.
 4. Install directionally patterned or textured metal pans in directions indicated.
 5. Install sound-absorbent fabric layers in, and bond to, perforated metal pans.

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Perform the following tests and inspections of completed installations of acoustical metal panel ceiling hangers, anchors, and fasteners in successive stages. Do not proceed with installations of acoustical metal panel ceiling hangers for the next area until test results for previously completed installations show compliance with requirements.
 - 1. Extent of Each Test Area: When installation of ceiling suspension systems on each floor has reached 20 percent completion but no panels have been installed.
 - a. Within each test area, testing agency selects one of every 10 power-actuated fasteners and postinstalled anchors used to attach hangers to concrete and tests them for 200 lbs. of tension; it also selects one of every two postinstalled anchors used to attach bracing wires to concrete and tests them for 440 lbs. of tension.
 - b. When tested fasteners and anchors do not comply with requirements, testing agency tests those fasteners and anchors not previously tested until 20 pass consecutively and then resumes initial testing frequency.
- C. Acoustical metal panel ceiling hangers, anchors, and fasteners will be considered defective if they do not pass tests and inspections.
- D. Prepare test and inspection reports.

3.5 CLEANING

- A. Clean exposed surfaces of acoustical metal pan ceilings, including trim and edge moldings, after removing strippable, temporary protective covering, if any. Comply with manufacturer's written instructions for stripping of temporary protective covering, cleaning, and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage, including dented and bent units.
 - 1. Refer to Section 01 74 23 "Final Cleaning" for additional cleaning requirements.

END OF SECTION 09 51 33

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes Metal Baffle Ceiling System.

1.3 COORDINATION

- A. Coordinate layout and installation metal baffle ceiling system with other construction that penetrates ceilings, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples for Initial Selection: For components with factory-applied color and other decorative finishes.
- C. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of size indicated below:
 - 1. Metal Baffle: 12-inch-long Samples of each type and color.
 - 2. Suspension System Members: 12-inch-long Sample of each type.
- D. Sustainable Design Documentation Submittals: Refer to section 01 8113.14 "Sustainable Design Requirements – LEED V4 BD+C".
 - 1. Product Data: Documentation for Leadership Extraction Practices in the following:
 - a. Leadership Extraction Practices for Recycled Content
 - 2. Product Certificates: Provide the following:
 - a. Environmental Product Declarations (EPD's)

1.6 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
 - 1. Linear pattern.
 - 2. Ceiling suspension members.
 - 3. Method of attaching hangers to building structure.
 - a. Furnish layouts for cast-in-place anchors, clips, and other ceiling attachment devices whose installation is specified in other Sections.
 - 4. Minimum Drawing Scale: 1/8 inch = 1 foot.

1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For finishes to include in maintenance manuals.

1.8 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Installer Qualifications: Company specializing in performing Work of this section with minimum three years documented experience.
- C. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship. Refer to Section 01 4339 "Visual Mock-up Requirements" for additional requirements.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver metal baffles, suspension system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they are protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.
- B. Handle metal baffles, suspension system components, and accessories carefully to avoid damaging units and finishes in any way.

1.10 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install metal baffle ceilings until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

PART 2 - PRODUCTS

2.1 METAL BAFFLE CEILINGS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Metal Baffle Ceiling Type CL1 and Type CL21as indicated in Section 09 0001 "Finish Key" or comparable approved product meeting all requirements including sustainability requirements.
 - 1. Refer to Sections 01 2500 "Substitution Procedures" and 01 6000 "Product Requirements" for comparable product requirements.
- B. Suspension System: Provide system compatible with metal baffle ceiling as indicated in Section 09 0001 "Finish Key".
- C. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of pre-consumer recycled content not less than 25 percent.
 - 1. Refer to Section 01 8113.14 "Sustainable Design Requirements - LEED v4 BD+C" for additional information and requirements for recycled content.
- D. Environmental Product Disclosure: Provide an Environmental Product Declarations (EPD) that conforms with one of the following:
 - 1. Product specific declarations in accordance with ISO 1404
 - 2. Environmental Product Declarations conforming to ISO 14025, 14040, 14044 and EN 15804 or ISO 21930
 - 3. Industry Wide Product Specific Type III EPD Third Party Certification

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, including structural framing and substrates to which linear metal ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of linear metal ceilings.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Measure each ceiling area and establish layout of linear metal pans to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width pans at borders, and comply with layout shown on reflected ceiling plans and on Coordination Drawings.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install suspension system in accordance with ASTM C 636 and as supplemented in this section.
- C. Measure each ceiling area and establish layout of panels to balance border widths at opposite edges of each ceiling.
- D. Suspend ceiling hangers from building's structural members, plumb and free from contact with insulation or other objects within ceiling plenum. Splay hangers only where required and to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
- E. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers, use trapezes or equivalent devices. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
- F. Do not support ceilings directly from permanent metal forms or floor deck; anchor into concrete slabs.
- G. Do not attach hangers to steel deck tabs.
- H. Install edge moldings and trim of type specified at perimeter of open cell ceiling area and where necessary to conceal edges of panels. Miter corners accurately and connect securely.
- I. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

3.4 ERECTION TOLERANCES

- A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet (3 mm in 3 m).
- B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

3.5 PROTECTION AND CLEANING

- A. Protect installed products until completion of project.
- B. Clean adjacent surfaces and remove unused materials and debris from site.
- C. Clean panels by vacuuming, brushing, or washing with water. Allow panels to dry after washing, before replacing.
- D. Remove and reinstall improperly installed material.
- E. Remove damaged ceiling panels, replace with undamaged ceiling panels.
- F. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 09 54 33

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections (including all sustainability requirements), apply to this Section.

1.2 SUMMARY

- A. Section includes rigid, open-frame, suspended grids and suspension systems for ceilings.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Sustainable Design Documentation Submittals: Refer to section 01 81 13.14 "Sustainable Design Requirements – LEED V4 BD+C".
 - 1. Product Data: Documentation for Leadership Extraction Practices in the following:
 - a. Leadership Extraction Practices for Recycled Content
 - 2. Product Certificates: Provide the following:
 - a. Environmental Product Declarations (EPD's)
- C. Samples: For each exposed product and for each color and texture specified, 6 inches in size.
- D. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of sizes indicated below:
 - 1. Cell Grids: Set of full-size module Samples of each type, finish, and color.

1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
 - 1. Lighting fixtures.
 - 2. Air outlets and inlets.
 - 3. Speakers.
 - 4. Sprinklers.
- B. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For finishes to include in maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Suspended Decorative Grids: Quantity of each suspended decorative grid component, exposed molding, and trim equal to 2 percent of quantity installed.

1.8 QUALITY ASSURANCE

- A. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution. Refer to Section 01 43 39 "Visual Mock-ups" for additional information.
 - 1. Build mockup of typical ceiling area as shown on Drawings.
 - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver suspended decorative grid components to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they are protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.
- B. Handle suspended decorative grids and accessories to avoid damaging units and finishes.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: 25 or less.
 - 2. Smoke-Developed Index: 50 or less.

2.2 SUSPENDED DECORATIVE GRIDS, GENERAL

- A. Recycled Content of Steel Products: Refer to Section 01 81 13.14 "Sustainable Design Requirements - LEED v4 BD+C" for recycled content requirements.
- B. Sheet Metal: Selected for surface flatness, smoothness, and freedom from surface blemishes where exposed to view in finished unit. Do not use materials whose exposed surfaces exhibit pitting, seam marks, roller marks, variations in flatness exceeding those permitted by referenced standards for stretcher-leveled metal sheet, stains, discolorations, or other imperfections.
- C. Grid Fabrication: Components are formed from metal indicated. Manufacturer's standard units of size, shape, and profile indicated; finished to comply with requirements indicated.
- D. Cover Profiles and Trim: Provide manufacturer's standard cover profiles and trim for exposed members, and as indicated or required, for edges of grids, at changes in

ceiling height, and for other conditions, of same metal and finish as suspended decorative grids.

- E. Metal Suspension-System Standard: Provide ceiling manufacturer's standard metal suspension systems of types and finishes indicated that comply with applicable ASTM C 635/C 635M requirements. Provide systems complete with runners or beams, splice sections, connector clips, alignment clips, leveling clips, hangers, molding, trim, web covers, load-resisting struts, fixture filler pans, clips and adapters, and other suspension components required to support ceiling units and other ceiling-supported construction.
- F. Attachment Devices: Size for 5 times the design load indicated in ASTM C 635/C 635M, Table 1, Direct Hung, unless otherwise indicated.
 - 1. Expansion Anchors: Fabricated from corrosion-resistant materials, with allowable load or strength design capacities calculated according to ICC-ES AC193 and ACI 318, greater than or equal to the design load, as determined by testing per ASTM E 488/E 488M conducted by a qualified testing agency.
 - 2. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with allowable load capacities calculated according to ICC-ES AC70, greater than or equal to the design load, as determined by testing per ASTM E 1190 conducted by a qualified testing agency.
- G. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:
 - 1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
 - 2. Size: Select wire diameter so its stress at 3 times hanger design load indicated in ASTM C 635/C 635M, Table 1, Direct Hung, is less than yield stress of wire, but provide not less than 0.106-inch-diameter wire.

2.3 ALUMINUM GRID UNITS AND STEEL GRID UNITS FOR SUSPENDED DECORATIVE GRIDS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Suspended Decorative Grid Type CL2 as indicated in Section 09 00 01 "Finish Key" or comparable approved product meeting all requirements including sustainability requirements.
 - 1. Refer to Sections 01 2500 "Substitution Procedures" and 01 6000 "Product Requirements" for comparable product requirements.
- B. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of pre-consumer recycled content not less than 25 percent.
 - 1. Refer to Section 01 81 13.14 "Sustainable Design Requirements - LEED v4 BD+C" for additional information and requirements for recycled content.
- C. Environmental Product Disclosure: Provide an Environmental Product Declarations (EPD) that conforms with one of the following:
 - 1. Product specific declarations in accordance with ISO 1404

2. Environmental Product Declarations conforming to ISO 14025, 14040, 14044 and EN 15804 or ISO 21930
3. Industry Wide Product Specific Type III EPD Third Party Certification

2.4 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Measure each installation area and establish layout of suspended decorative grids to balance border widths at opposite edges of each space. Comply with layout shown on reflected ceiling plans.

3.3 INSTALLATION

- A. Install suspended decorative grids to comply with ASTM C 636/C 636M and seismic design requirements indicated, according to manufacturer's written instructions and Cisca's "Ceiling Systems Handbook."
- B. Suspend ceiling hangers from building's structural members and as follows:
 1. Install hangers plumb and free from contact with insulation or other objects within plenum that are not part of supporting structure or of grid suspension system.
 2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 3. Where width of ducts and other construction within plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
 4. Secure hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for structure to which hangers are attached and for hanger type involved.
 5. Do not support grids directly from permanent metal forms or floor deck. Fasten hangers to expansion anchors or power-actuated anchors that extend through forms into concrete.

6. Do not attach hangers to steel deck tabs.
- C. Secure bracing wires to ceiling suspension members and to supports with a minimum of three tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with expansion anchors.
- D. Install suspended decorative grids in coordination with suspension system and exposed moldings and trim. Comply with installation tolerances according to CISC's "Metal Ceilings Technical Guidelines."
 1. Align joints in adjacent courses to form uniform, straight joints parallel to room axis in both directions unless otherwise indicated.
 2. Fit adjoining units to form flush, tight joints.
 3. Where grid edges are visible, install cover profiles unless other trim is indicated.

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Perform the following tests and inspections on each floor when installation of the suspended decorative grid on each floor is 20 percent complete. Do not proceed with installing the remainder of the grid on each floor until results in the test area for the floor show compliance with requirements.
 1. Hanger-Wire Attachment: Within each test area, testing agency selects one of every 10 power-actuated anchors and expansion anchors used to attach hangers to concrete and tests them for 100 lbf of tension.
 2. Bracing-Wire Attachment: Within each test area, testing agency selects one of every two expansion anchors used to attach bracing wires to concrete and tests them for 100 lbf of tension.
 3. When tested anchors do not comply with requirements, testing agency tests those anchors not previously tested until 20 pass consecutively and then resumes initial testing frequency.
- C. Suspended decorative grid anchors will be considered defective if they do not pass tests and inspections.
- D. Prepare tests and inspection reports.

3.5 CLEANING

- A. Clean exposed surfaces of suspended decorative grids, including trim and edge moldings, after removing strippable, temporary protective covering if any. Comply with manufacturer's written instructions for stripping of temporary protective covering, cleaning, and touchup of minor finish damage. Remove and replace grid components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage, including dented and deformed grids.
- B. Refer to Section 01 74 23 "Final Cleaning" for additional requirements.

END OF SECTION 09 54 36

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections (including all sustainability requirements), apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Resilient base.
 - 2. Resilient molding accessories.
- B. Related Sections:
 - 1. Division 09 Section "Finish Key" for finish selections.
 - 2. Division 09 Section "Resilient Tile Flooring" for resilient floor tile.
 - 3. Division 09 Section "Static-Control Resilient Flooring" for resilient floor coverings designed to control electrostatic discharge.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Sustainable Design Submittals:
- C. Sustainable Design Documentation Submittals: Refer to section 01 81 13.14 "Sustainable Design Requirements – LEED V4 BD+C".
 - 1. Product Data: Documentation for Low Emitting Materials
 - a. Low Emitting Materials for Adhesives and Sealants
 - b. Low Emitting Materials for Flooring
 - 2. Product Certificates: Provide the following:
 - a. Environmental Product Declarations (EPD's)
- D. Samples for Initial Selection: For each type of product indicated.
- E. Samples for Verification: For each type of product indicated and for each color, texture, and pattern required in manufacturer's standard-size Samples, but not less than 12 inches long.
- F. Product Schedule: For resilient base and accessory products. Use same designations indicated on Drawings.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Furnish not less than 10 linear feet for every 500 linear feet or fraction thereof, of each type, color, pattern, and size of resilient product installed.

- A. Mockups: Build mockups to comply with Section 01 43 39 "Visual Mock-Up Requirements".
 - 1. Coordinate mockups in this Section with mockups specified in other Sections.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F.

1.7 FIELD CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive resilient products during the following time periods:
 - 1. 48 hours before installation.
 - 2. During installation.
 - 3. 48 hours after installation.
- B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
- C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Flooring products shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers" and additional low emitting requirements in Section 01 81 13.14 "Sustainable Design Requirements - LEED v4 BD+C".

2.2 THERMOPLASTIC-RUBBER BASE

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Resilient Base types as indicated in Section 09 00 01 "Finish Key" or comparable approved product meeting all requirements including sustainability requirements.
 - 1. Refer to Sections 01 2500 "Substitution Procedures" and 01 6000 "Product Requirements" for comparable product requirements.
- B. Product Standard: ASTM F 1861, Type TP (rubber, thermoplastic).
 - 1. Group: I (solid, homogeneous).
 - 2. Style and Location:
 - a. Style A, Straight: Provide in areas with carpet.
 - b. Style B, Cove: Provide in areas with resilient flooring.
- C. Thickness: 0.125 inch.

- D. Height: As indicated on Drawings or in Section 09 00 01 "Finish Key."
- E. Lengths: Coils in manufacturer's standard length.
- F. Outside Corners: Preformed.
- G. Inside Corners: Preformed.
- H. Colors: As indicated by manufacturer's designations.

2.3 RUBBER MOLDING ACCESSORY

- A. 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:
 - 1. Burke Mercer Flooring Products; Division of Burke Industries, Inc.
 - 2. Johnsonite.
 - 3. Roppe Corporation, USA.
 - 4. Tarkett Group
- B. Description: Rubber Carpet edge for glue-down applications, nosing for carpet, nosing for resilient floor covering, reducer strip for resilient floor covering, joiner for tile and carpet, and transition strips.
- C. Profile and Dimensions: As indicated.
- D. Locations: Provide rubber molding accessories in areas indicated.
- E. Colors and Patterns: As selected by Architect from full range of industry colors.

2.4 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by resilient-product manufacturer for applications indicated.
 - 1. Provide manufacture statements that confirm that the product used meets the California Department of Public Health (CDPH) Standard Method v1.1 2010 using the applicable exposure scenario.
 - 2. Refer to Section 01 81 13.14 "Sustainable Design Requirements - LEED v4 BD+C" for additional requirements.
- B. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.
 - 1. Provide manufacture statements that confirm that the product used meets the California Department of Public Health (CDPH) Standard Method v1.1 2010 using the applicable exposure scenario.
 - 2. Refer to Section 01 81 13.14 "Sustainable Design Requirements - LEED v4 BD+C" for additional requirements.
- C. Metal Edge Strips: Extruded aluminum with mill finish of width shown, of height required to protect exposed edges of flooring, and in maximum available lengths to minimize running joints.

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
 - 1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
 - 1. Installation of resilient products indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- C. Do not install resilient products until they are the same temperature as the space where they are to be installed.
 - 1. At least 48 hours in advance of installation, move resilient products and installation materials into spaces where they will be installed.
- D. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

3.3 RESILIENT BASE INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient base.
- B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- C. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.
- D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- E. Do not stretch resilient base during installation.
- F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.
- G. Preformed Corners: Install preformed corners before installing straight pieces.

3.4 RESILIENT ACCESSORY INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient accessories.
- B. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of floor covering that would otherwise be exposed.

3.5 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.
- B. Perform the following operations immediately after completing resilient-product installation:
 - 1. Remove adhesive and other blemishes from exposed surfaces.
 - 2. Sweep and vacuum horizontal surfaces thoroughly.
 - 3. Damp-mop horizontal surfaces to remove marks and soil.
- C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Floor Polish: Remove soil, visible adhesive, and surface blemishes from resilient stair treads before applying liquid floor polish.
 - 1. Apply three coat(s).
- E. Cover resilient products subject to wear and foot traffic until Substantial Completion.
- F. Refer to Section 01 35 46 "Indoor Air Quality" and Section 01 74 23 "Final Cleaning" for additional requirements.

END OF SECTION 09 65 13

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections (including all sustainability requirements), apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Solid vinyl floor tile.
 - 2. Rubber floor tile.
 - 3. Vinyl composition floor tile.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Sustainable Design Documentation Submittals: Refer to section 01 81 13.14 "Sustainable Design Requirements – LEED V4 BD+C".
 - 1. Product Data: Documentation for Leadership Extraction Practices in the following:
 - a. Extended Producer Responsibility
 - 2. Product Data: Documentation for Low Emitting Materials
 - a. Low Emitting Materials for Adhesives and Sealants
 - b. Low Emitting Materials for Flooring
- C. Shop Drawings: For each type of floor tile. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
 - 1. Show details of special patterns.
- D. Samples: Full-size units of each color and pattern of floor tile required.
 - 1. For heat-welding bead, manufacturer's standard-size Samples, but not less than 9 inches long, of each color required.
- E. Samples for Verification: Full-size units of each color and pattern of floor tile required.
 - 1. For heat-welding bead, manufacturer's standard-size Samples, but not less than 9 inches long, of each color required.
- F. Welded-Seam Samples: For seamless-installation technique indicated and for each flooring product, color, and pattern required; with seam running lengthwise and in center of 6-by-9-inch Sample applied to a rigid backing and prepared by Installer for this Project.
- G. Product Schedule: For floor tile. Use same designations indicated on Drawings and in Section 09 00 01 "Finish Key".

- A. Qualification Data: For Installer.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of floor tile to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Floor Tile: Furnish five boxes for every 50 boxes or fraction thereof, of each type, color, and pattern of floor tile installed.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs workers for this Project who are competent in techniques required by manufacturer for floor tile installation and seaming method indicated.
 - 1. Engage an installer who employs workers for this Project who are trained or certified by floor tile manufacturer for installation techniques required.
- B. Mockups: Build mockups to comply with Section 01 43 39 "Visual Mock-Up Requirements".
 - 1. Build mockups at locations and in sizes shown on Drawings.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store floor tile and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F. Store floor tiles on flat surfaces.

1.9 FIELD CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive floor tile during the following time periods:
 - 1. 48 hours before installation.
 - 2. During installation.
- B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
- C. Close spaces to traffic during floor tile installation.
- D. Close spaces to traffic for 48 hours after floor tile installation.

- E. Install floor tile after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For resilient tile flooring, as determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.
- B. Low Emitting Flooring
1. Provide manufacture statements that confirm that the product used meets the California Department of Public Health (CDPH) Standard Method v1.1 2010 using the applicable exposure scenario.
 2. Refer to Section 01 81 13.14 "Sustainable Design Requirements - LEED v4 BD+C" for additional requirements.

2.2 RESILIENT FLOOR TILE

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Resilient Tile Flooring types as indicated in Section 09 00 01 "Finish Key" or comparable approved product meeting all requirements including sustainability requirements.
1. Refer to Sections 01 2500 "Substitution Procedures" and 01 6000 "Product Requirements" for comparable product requirements.

2.3 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by resilient-product manufacturer for applications indicated.
1. Provide manufacture statements that confirm that the product used meets the California Department of Public Health (CDPH) Standard Method v1.1 2010 using the applicable exposure scenario.
 2. Refer to Section 01 81 13.14 "Sustainable Design Requirements - LEED v4 BD+C" for additional requirements.
- B. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.
1. Provide manufacture statements that confirm that the product used meets the California Department of Public Health (CDPH) Standard Method v1.1 2010 using the applicable exposure scenario.
 2. Refer to Section 01 81 13.14 "Sustainable Design Requirements - LEED v4 BD+C" for additional requirements.
- C. Seamless-Installation Accessories:
1. Chemical-Bonding Compound: Manufacturer's product for chemically bonding seams.
 2. Provide manufacture statements that confirm that the product used meets the California Department of Public Health (CDPH) Standard Method v1.1 2010 using the applicable exposure scenario.

- a. Refer to Section 01 81 13.14 "Sustainable Design Requirements - LEED v4 BD+C" for additional requirements.
- D. Floor Polish: Provide protective, liquid floor-polish products recommended by resilient stair-tread manufacturer and complying with Section 01 35 46 "Indoor Air Quality" and Section 01 74 23 "Final Cleaning".
- E. Sealers and Finish Coats for Resilient Terrazzo Floor Tile: Products recommended by floor tile manufacturer for resilient terrazzo floor tile and complying with Section 01 35 46 "Indoor Air Quality" and Section 01 74 23 "Final Cleaning".

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
 - 1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor tile.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare substrates according to floor tile manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates: Prepare according to ASTM F 710.
 - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 - 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by floor tile manufacturer. Do not use solvents.
 - 3. Alkalinity and Adhesion Testing: Perform tests recommended by floor tile manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9 pH.
 - 4. Moisture Testing: Proceed with installation only after substrates pass testing according to floor tile manufacturer's written recommendations, but not less stringent than the following:
 - a. Perform relative humidity test using in situ probes according to ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level.
 - b. Perform test so that each area does not exceed 200 sq. ft.
- C. Access Flooring Panels: Remove protective film of oil or other coating using method recommended by access flooring manufacturer.
- D. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.

- E. Do not install floor tiles until they are the same temperature as the space where they are to be installed.
 - 1. At least 48 hours in advance of installation, move resilient floor tile and installation materials into spaces where they will be installed.
- F. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient floor tile.

3.3 FLOOR TILE INSTALLATION

- A. Comply with manufacturer's written instructions for installing floor tile.
- B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.
 - 1. Lay tiles square with room axis.
- C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.
 - 1. Lay tiles in pattern of colors and sizes indicated.
- D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
- E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent marking device.
- G. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in finished floor areas. Maintain overall continuity of color and pattern between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.
- H. Adhere floor tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.
- I. Seamless Installation:
 - 1. Chemically Bonded Seams: Bond seams with chemical-bonding compound to permanently fuse sections into a seamless flooring. Prepare seams and apply compound to produce tightly fitted seams without gaps, overlays, or excess bonding compound on flooring surfaces.

3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting floor tile.

- B. Perform the following operations immediately after completing floor tile installation:
 - 1. Remove adhesive and other blemishes from exposed surfaces.
 - 2. Sweep and vacuum surfaces thoroughly.
 - 3. Damp-mop surfaces to remove marks and soil.
- C. Protect floor tile from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Floor Polish: Remove soil, adhesive, and blemishes from floor tile surfaces before applying liquid floor polish.
 - 1. Apply three coat(s).
- E. Joint Sealant: Apply sealant to resilient floor tile perimeter and around columns, at door frames, and at other joints and penetrations. Refer to Section 07 92 00 "Joint Sealants".
- F. Cover floor tile until Substantial Completion.
- G. Refer to Section 01 35 46 "Indoor Air Quality" and Section 01 74 23 "Final Cleaning" for additional requirements.

END OF SECTION 09 65 19

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections (including all sustainability requirements), apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Static-dissipative, solid vinyl floor tile.
- B. Related Sections:
 - 1. Division 09 Section "Finish Key" for finish selections.
 - 2. Division 09 Section "Resilient Base and Accessories" for resilient base, reducer strips, and other accessories installed with static-control resilient floor coverings.

1.3 PERFORMANCE REQUIREMENTS

- A. Static-Dissipative Properties: Provide floor coverings with static-control properties indicated as determined by testing identical products per test method indicated by an independent testing and inspecting agency.
 - 1. Electrical Resistance: Test per ASTM F 150, NFPA 00 2-6.3.8, UL 779, and ANSI/ESD S7.1 with 100-V applied voltage.
 - a. Average greater than 1 megohm and less than or equal to 1000 megohms when test specimens are tested surface to ground.
 - b. Average no less than 1 megohm and less than or equal to 1000 megohms when installed floor coverings are tested surface to ground.
 - 2. Static Generation: Less than 300 V when tested per AATCC-134 at 20 percent relative humidity with conductive footwear.
 - 3. Static Decay: 5000 to 0 V in less than 0.25 seconds when tested per FED-STD-101C/4046.1.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Sustainable Design Documentation Submittals: Refer to section 01 81 13.14 "Sustainable Design Requirements – LEED V4 BD+C".
 - 1. Product Data: Documentation for Leadership Extraction Practices in the following:
 - a. Leadership Extraction Practices for Recycled Content
 - 2. Product Data: Documentation for Low Emitting Materials
 - a. Low Emitting Materials for Flooring
 - 3. Product Certificates: Provide the following:
 - a. Environmental Product Declarations (EPD's)

- C. Shop Drawings: For each type of floor covering. Include floor covering layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
 - 1. Show details of special patterns.
 - 2. Submit grounding diagram showing location of grounding strips and connections.
- D. Samples for Initial Selection: For each type of floor covering indicated.
- E. Samples for Verification: For each type of floor covering indicated and of size indicated below:
 - 1. Floor Tile: Full-size units.
- F. Seam Samples: For seamless-installation technique indicated and for each floor covering product, color, and pattern required; with seam running lengthwise and in center of 6-by-9-inch Sample applied to a rigid backing and prepared by Installer for this Project.
- G. Product Schedule: For floor covering. Use same designations indicated on Drawings.
- H. Qualification Data: For qualified Installer.
- I. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for floor coverings.
- J. Maintenance Data: For each type of floor covering to include in maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs workers for this Project who are competent in techniques required by manufacturer for floor covering installation and seaming method indicated.
 - 1. Engage an installer who employs workers for this Project who are trained or certified by manufacturer for installation techniques required.
- B. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
 - 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.
- C. Mockups: Build mockups to comply with Section 01 43 39 "Visual Mock-Up Requirements".
 - 1. Build mockups for floor coverings including integral-flash-cove base and accessories.
- D. Preinstallation Conference: Conduct conference at project site.
 - 1. Review methods and procedures related to static-control resilient floor coverings including, but not limited to, the following:
 - a. Examination and preparation of substrates to receive floor covering.
 - b. Installation.
 - c. Field quality-control testing.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store floor coverings and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer but not less than 50 deg F or more than 90 deg F.
 - 1. Floor Tile: Store on flat surfaces.
 - 2. Sheet Floor Covering: Store rolls upright.

1.7 PROJECT CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 85 deg F, in spaces to receive floor coverings during the following time periods:
 - 1. 48 hours before installation.
 - 2. During installation.
 - 3. 48 hours after installation.
- B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
- C. Close spaces to traffic during floor covering installation.
- D. Close spaces to traffic for 48 hours after floor covering installation.
- E. Install floor coverings after other finishing operations, including painting, have been completed.

1.8 EXTRA MATERIALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Floor Tile: Furnish 1 box for every 50 boxes or fraction thereof, of each type, color, and pattern of floor tile installed.

1.9 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For finishes to include in maintenance manuals.
- B. Warranty: Manufacturer's standard 5-year warranty.

PART 2 - PRODUCTS

2.1 STATIC-DISSIPATIVE RESILIENT FLOOR COVERINGS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Static Control Tile Flooring types as indicated in Section 09 00 01 "Finish Key" or comparable approved product meeting all requirements including sustainability requirements.
 - 1. Refer to Sections 01 2500 "Substitution Procedures" and 01 6000 "Product Requirements" for comparable product requirements.

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.
 - 1. Provide manufacture statements that confirm that the product used meets the California Department of Public Health (CDPH) Standard Method v1.1 2010 using the applicable exposure scenario.
 - 2. Refer to Section 01 81 13.14 "Sustainable Design Requirements - LEED v4 BD+C" for additional requirements.
- B. Static-Control Adhesive: Provided or approved by manufacturer; type that maintains electrical continuity of floor covering system to ground connection.
 - 1. Provide manufacture statements that confirm that the product used meets the California Department of Public Health (CDPH) Standard Method v1.1 2010 using the applicable exposure scenario.
 - 2. Refer to Section 01 81 13.14 "Sustainable Design Requirements - LEED v4 BD+C" for additional requirements.
- C. Adhesives: Water-resistant type recommended by floor tile and adhesive manufacturers to suit floor tile and substrate conditions indicated.
 - 1. Provide manufacture statements that confirm that the product used meets the California Department of Public Health (CDPH) Standard Method v1.1 2010 using the applicable exposure scenario.
 - 2. Refer to Section 01 81 13.14 "Sustainable Design Requirements - LEED v4 BD+C" for additional requirements.
- D. Grounding Strips: Provided or approved by manufacturer; type and size that maintains electrical continuity of floor covering system to ground connection.
- E. Maintenance Floor Tiles: Special floor tiles inscribed "Conductive Floor. Do Not Wax."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Construction Manager, Installer and manufacturer's representative present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion or static-control characteristics of floor coverings.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions and with oversight by manufacturer's representative to ensure adhesion of floor coverings and electrical continuity of floor covering systems.

- B. Concrete Substrates: Prepare according to ASTM F 710.
 - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 - 2. Remove substrate coatings and other substances that are incompatible with floor covering adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
 - 3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
 - 4. Moisture Testing: Perform tests recommended by manufacturer and as follows. Proceed with installation only after substrates pass testing.
 - a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
 - b. Perform relative humidity test using in situ probes, ASTM F 2170. Proceed with installation only after substrates have maximum 75 percent relative humidity level measurement.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.
- D. Do not install floor coverings until they are same temperature as space where they are to be installed.
 - 1. Move floor coverings and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
- E. Sweep and vacuum clean substrates to be covered by floor coverings immediately before installation.

3.3 INSTALLATION, GENERAL

- A. Install static-control resilient floor covering according to manufacturer's written instructions and with oversight by manufacturer's representative.
- B. Embed grounding strips in static-control adhesive. Extend grounding strips beyond perimeter of static-control resilient floor covering surfaces to ground connections.
- C. Scribe, cut, and fit floor coverings to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
- D. Extend floor coverings into toe spaces, door reveals, closets, and similar openings. Extend floor covering to center of door openings.
- E. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor coverings as marked on substrates. Use chalk or other nonpermanent, nonstaining marking device.
- F. Install floor coverings on covers for telephone and electrical ducts, and similar items in installation areas. Maintain overall continuity of color and pattern with pieces of floor coverings installed on covers. Tightly adhere floor covering edges to substrates that abut covers and to cover perimeters.

- G. Adhere floor coverings to substrates using a full spread of static-control adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.4 FLOOR TILE INSTALLATION

- A. Comply with manufacturer's written instructions for installing floor tile.
- B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so floor tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half floor tile at perimeter.
 - 1. Lay floor tiles in pattern indicated.
- C. Match floor tiles for color and pattern by selecting floor tiles from cartons in same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed floor tiles.
 - 1. Lay static-dissipative, vinyl composition floor tiles in pattern of colors and sizes indicated.

3.5 FIELD QUALITY CONTROL

- A. Testing: Owner will engage a qualified testing agency to test electrical resistance of static-control resilient floor covering systems for compliance with requirements.
 - 1. Arrange for testing after installation static-control adhesives have fully cured and floor covering systems have stabilized to ambient conditions and after ground connections are completed.
- B. Static-control resilient floor coverings will be considered defective if they do not pass tests and inspections.
- C. Prepare test and inspection reports.

3.6 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protection of floor coverings.
- B. Perform the following operations immediately after completing floor covering installation:
 - 1. Remove static-control adhesive and other blemishes from exposed surfaces.
 - 2. Sweep and vacuum surfaces thoroughly.
 - 3. Damp-mop surfaces to remove marks and soil.
- C. Protect floor coverings from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
 - 1. Do not wax static-control resilient floor coverings.
- D. Cover floor coverings until Substantial Completion.

ORLANDO INTERNATIONAL AIRPORT
BP-S195
Terminal C
Airside Concourse

STATIC-CONTROL RESILIENT FLOORING

SECTION 09 65 36

- E. Refer to Section 01 35 46 "Indoor Air Quality" and Section 01 74 23 "Final Cleaning" for additional requirements.

END OF SECTION 09 65 36

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections (including all sustainability requirements), apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Thin-set epoxy-resin terrazzo flooring and coved base.
 - 2. Precast terrazzo stair tread and riser units.
 - 3. Cast-in-place epoxy-resin terrazzo stair landings.
- B. Related Section:
 - 1. Section 05 71 00 "Decorative Metal Stairs" for precast terrazzo treads and risers and poured-in-place landings.
 - 2. Section 07 92 00 "Joint Sealants" for sealants installed with terrazzo.

- 1.3 Allowances are sometimes used for special terrazzo patterns. If allowances apply to Work of this Section, insert brief paragraph here to alert Contractor and reference appropriate Division 01 Section for specific details.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Sustainable Design Documentation Submittals: Refer to section 01 81 13.14 "Sustainable Design Requirements – LEED V4 BD+C".
 - 1. Product Data: Documentation for Leadership Extraction Practices in the following:
 - a. Leadership Extraction Practices for Recycled Content
 - 2. Product Data: Documentation for Low Emitting Materials
 - a. Low Emitting Materials for Flooring
 - 3. Product Certificates: Provide the following:
 - a. Environmental Product Declarations (EPD's)
- C. Shop Drawings: Include terrazzo installation requirements. Include plans, elevations, sections, component details, and attachments to other work. Show layout on drawings at a minimum scale of 1/8" = 1'-0" of the following:
 - 1. Divider strips, base and border strips.
 - 2. Control-joint strips.
 - 3. Accessory strips.
 - 4. Abrasive strips.
 - 5. Stair treads, risers, and landings.
 - 6. Precast terrazzo jointing and edge configurations.
 - 7. Terrazzo patterns.
 - 8. Preparation and repair of substrate.

- D. Samples for Verification: For each type, material, color, and pattern of terrazzo and accessory required showing the full range of color, texture, and pattern variations expected. Label each terrazzo sample to identify manufacturer's matrix color, all aggregate types, sizes, marble fill and proportions of each material. Prepare samples of same thickness and from same material to be used for the Work in size indicated below:
 - 1. Terrazzo: 12-inch square Samples.
 - 2. Precast Terrazzo: 12-inch square Samples.
 - 3. Full-profile, 12" wide samples of combination tread/riser with cast-in nosing.
 - 4. Accessories: 12-inch long Samples of each exposed strip item required.
- E. Installer Certificates: Signed by manufacturer's certifying that installers comply with requirements.
- F. Qualification Data for Terrazzo Contractor Experience: Furnish list of at least three (3) resinous matrix terrazzo flooring projects using material being submitted for this project or similar that contractor has installed during the last five years of the same scope, complexity and phasing and at least 20% of the square footage of this project, including the following:
 - 1. Project name and description.
 - 2. Photos of project-minimum of 3 each @ 8.5x11."
 - 3. Square footage of terrazzo installed and materials used.
 - 4. Reference letters from Owner and General Contractor/Const Manager attesting to the quality of installation and workmanship.
 - 5. Address of facility with contact name and phone number of Owner and GC.
 - 6. Provide field experience resumes of key project personnel including lead supervisor and field technicians to be used on this project.
- G. Material Certificates: For each type of terrazzo material or product, from manufacturer.
- H. Maintenance Manual: Submit written instructions, specifically designed for this project, for repair procedures and periodic maintenance of all resinous matrix terrazzo surfaces, including floors, walls and stairs. Submit the required information in three ring binders with clear identification labels on the front cover and spine and on DVD inserted in binder.
- I. Coefficient of Friction reports on completed terrazzo installation.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who is acceptable to terrazzo resin manufacturer to install manufacturer's products and with at least five years of satisfactory experience in installation of resinous epoxy terrazzo. See Division 01 "Submittals" section for additional requirements and documentation.
 - 1. Engage an installer who is certified in writing by terrazzo manufacturer as qualified to install manufacturer's products.
 - 2. Engage an installer who is a contractor member in good standing of NTMA.
 - 3. Engage an installer who has completed a minimum of three terrazzo installations similar in material and extent to that indicated for Project over the

last five years and that have resulted in construction with a record of successful in-service performance.

- B. Source Limitations: Obtain primary Resinous Matrix terrazzo flooring system materials including membranes, primers, moisture vapor reducing and hardening agents from a single manufacturer with documented experience providing resinous matrix terrazzo flooring materials and proof of NTMA membership in good standing. Provide secondary materials including patching and fill material, joint sealant, and repair materials of type and from source recommended by manufacturer of primary materials.
- C. Source Limitations for Marble Chips Aggregates: Obtain each color, grade, type, and variety of granular materials from one source with resources to provide materials of consistent quality in appearance and physical properties.
- D. Source Limitations for Supplemental Aggregates: Obtain each color, grade, type, and variety of granular materials from one source with resources to provide materials of consistent quality in appearance and physical properties.
- E. NTMA Standards: Comply with NTMA's "Terrazzo Specifications and Design Guide" and with written recommendations for terrazzo type indicated unless more stringent requirements are specified.
- F. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution of further work.
 - 1. Build mockups for terrazzo including accessories.
 - a. Size: Minimum 100 sq. ft. for each mock-up of typical poured-in-place flooring and base condition for each color and pattern, including divider strips, in locations directed by Architect and/or as indicated on drawings.
 - 2. Sample installations shall be complete with all bedding, jointing, and sealants as shown in accordance with the final shop drawings. Sample installations shall be reviewed by the Architect for acceptance of terrazzo assemblies including jointing and workmanship. Replace unsatisfactory work as directed. Maintain sample installations during construction as a standard for judging acceptability of terrazzo work. Properly finished and maintained sample installations shall be retained as a portion of the completed work
- G. Preinstallation Conference: Conduct conference at project site.
 - 1. Review methods and procedures related to terrazzo including, but not limited to, the following:
 - a. Inspect and discuss condition of substrate and other preparatory work performed by other trades.
 - b. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - c. Review special terrazzo designs and patterns.
 - d. Review dust-control procedures.
 - e. Review Phasing Plan and Operational Constraints

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in supplier's original wrappings and containers, labeled with source's or manufacturer's name, material or product brand name, and lot number if any.
- B. Store materials in their original, undamaged packages and containers, inside a well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Provide minimum substrate and atmospheric temperature of 55 degrees F during stripping and pouring and until 48 hours after pouring. Do not allow substrate or air temperature to fall below 40 degrees F after terrazzo has been poured. Comply with manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting terrazzo installation if more stringent than the requirements listed previously.
- B. Terrazzo contractor shall, prior to surface preparation:
 - 1. Evaluate slab condition, including slab moisture content and extent of repairs required, if any.
 - 2. Test concrete substrates according to ASTM F2170 (Determining Relative Humidity in Concrete Floor Slabs using in situ Probes). Do not install terrazzo or terrazzo accessories until test results are 75% or less RH. If RH is not met consult resin manufacturer for additional drying or negative side moisture mitigating measures. Testing shall be by an independent testing laboratory acceptable to the manufacturer of the epoxy materials and the Construction Manager/Architect. Prior to and during each day of installation, the terrazzo contractor shall verify that the dew point is at least 5 degrees F less than the slab and air temperature.
- C. Field Measurements: Verify actual dimensions of construction contiguous with precast terrazzo by field measurements before fabrication.
- D. Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during terrazzo installation. Provide a minimum of 50 foot-candles in areas where terrazzo system is being installed
- E. Close spaces to traffic during terrazzo application and for not less than 24 hours after application unless manufacturer recommends a longer period.
- F. Control and collect dust produced by grinding operations. Protect adjacent construction from detrimental effects of grinding operations.
 - 1. Provide dustproof partitions and temporary enclosures to limit dust migration and to isolate areas from noise.

1.8 WARRANTY

- A. Manufacturer and Installer shall provide a three year Joint and Several Project Warranty signed by the terrazzo installer and the manufacturer of resinous terrazzo

materials stating that the Moisture Vapor Barrier shall protect the epoxy terrazzo installation from moisture related blistering or disbondment. Under the terms of the Warranty, the Contractor shall promptly repair or replace all defective or damaged items delivered under the contract, at no cost to LAWA.

- B. The Contractor warrants that installation of the resinous terrazzo floor completed as part of the Work of this contract will be free from defects in design, material or workmanship and against damage prior to final inspection and acceptance.

PART 2 - PRODUCTS

2.1 EPOXY-RESIN TERRAZZO

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Resinous Matrix Terrazzo Flooring as indicated in Section 09 00 01 "Finish Key" or comparable approved product meeting all requirements including sustainability requirements.
1. Refer to Sections 01 25 00 "Substitution Procedures" and 01 60 00 "Product Requirements" for comparable product requirements.
- B. System Performance: The epoxy resin flooring system shall possess the following properties:
1. Compressive Strength, ASTM D695: 10,000 psi
 2. Water Absorption, ASTM D570: 0.10 %
 3. Tensile Strength, ASTM D638: 3,000 psi
 4. Flexural Strength, ASTM D790: 4,500 psi
 5. Adhesion, ACI 503R: 350 psi, 100% concrete failure
 6. Hardness, ASTM D2240: 65-85 Shore D
 7. Impact Resistance – MIL-D-3134, Sec. 4.7.3: Withstands 16 ft/lbs. no chipping, cracking, spalling or loss of adhesion.
 8. Abrasion Resistance, ASTM D4060, CS 17 Wheel: 70-90 milligrams lost
 9. Slip Resistance: Meets ADA Standards
 10. Critical Radiant Flux, ASTM D648: .90
 11. Thermal coefficient of linear expansion, ASTM D696: 25×10^{-6} in/in/ degree F.
- C. Recycled Content of Epoxy Resin Terrazzo System: Postconsumer recycled content plus one-half of pre-consumer recycled content not less than 25 percent.
1. Refer to Section 01 81 13.14 "Sustainable Design Requirements - LEED v4 BD+C" for additional information and requirements for recycled content.
- D. Low Emitting Flooring
1. Provide manufacture statements that confirm that the product used meets the California Department of Public Health (CDPH) Standard Method v1.1 2010 using the applicable exposure scenario.
 2. Refer to Section 01 81 13.14 "Sustainable Design Requirements - LEED v4 BD+C" for additional requirements.
- E. Environmental Product Disclosure: Provide an Environmental Product Declarations (EPD) that conforms with one of the following:
1. Product specific declarations in accordance with ISO 1404
 2. Environmental Product Declarations conforming to ISO 14025, 14040, 14044 and EN 15804 or ISO 21930

3. Industry Wide Product Specific Type III EPD Third Party Certification

F. Accessory Materials:

1. Moisture Vapor Barrier: Provide one of the following:
 - a. Moisture Vapor Treatment; Terrazzo and Marble (T & M) Supply Companies or comparable approved product meeting all requirements including sustainability requirements.
 - 1) Refer to Sections 01 2500 "Substitution Procedures" and 01 6000 "Product Requirements" for comparable product requirements.
2. Flexible Epoxy Membrane (Crack Bridging Membrane): 100% solids for crack preparation followed by full coverage application. Provide one of the following:
 - a. Isocrack Membrane; Terrazzo and Marble (T & M) Supply Companies or comparable approved product meeting all requirements including sustainability requirements.
 - 1) Refer to Sections 01 2500 "Substitution Procedures" and 01 6000 "Product Requirements" for comparable product requirements.
 - b. System Performance: The flexible epoxy membrane shall possess the following properties:
 - 1) Tensile Strength, ASTM D412: 1,000-1,300 psi
 - 2) Elongation at Break, ASTM D412: 130-145%
 - 3) Adhesion, ACI 503R: 350 psi, 100% concrete failure
 - 4) Hardness, ASTM D2240: 23 Shore D
 - 5) Thermal Cycling, ASTM C884 (24 hours, -21C to +25C: No Cracking
 - 6) Flammability: Self-extinguishing over concrete
3. Fabric Reinforcing: Fiberglass of type and manufacture recommended and acceptable to the matrix manufacturer.
 - a. FS38-4.4 Fiberglass Scrim; General Polymers or comparable approved product meeting all requirements including sustainability requirements.
 - 1) Refer to Sections 01 2500 "Substitution Procedures" and 01 6000 "Product Requirements" for comparable product requirements.
4. Primer: 100% solids, moisture insensitive, two-component resin recommended by matrix manufacturer and meeting low emitting flooring requirements. No solvent containing primers are allowed.
5. Moisture Vapor Barrier to be used throughout. For areas on grade use 2 coats and 1 coat for areas on suspended concrete slab above Level 1.
 - a. Moisture Vapor Treatment; Terrazzo and Marble (T & M) Supply Companies or comparable approved product meeting all requirements including sustainability requirements.
 - 1) Refer to Sections 01 2500 "Substitution Procedures" and 01 6000 "Product Requirements" for comparable product requirements.
6. Epoxy Mortar Fill/Underlayment: 100% solids fill mortar system including blended aggregate of a type recommended by the epoxy resin terrazzo manufacturer and meeting low emitting flooring requirements.
 - a. Terroxy Fill; Terrazzo and Marble (T & M) Supply Companies or comparable approved product meeting all requirements including sustainability requirements.
 - 1) Refer to Sections 01 2500 "Substitution Procedures" and 01 6000 "Product Requirements" for comparable product requirements.

7. Aggregates: Natural, sound, crushed stone chips, mother of pearl, glass, mirror, plastic, and metal filings with colors selected and graded to match Architect's samples, but with maximum size within limits of workability for terrazzo thickness indicated.
 - a. Sizes shall be #1, #2, and #3, conforming with NTMA gradation standards.
 - b. Abrasion and Impact Resistance: Less than 40 percent loss per ASTM C 131.
 - c. 24-Hour Absorption Rate: Less than 0.75 percent.
 - d. Chips shall contain no deleterious or foreign matter.
 - e. Dust Content: Less than 1.0 percent by weight.
 - f. Obtain and stockpile each aggregate material from a single source of consistent quality in appearance and physical properties for the entire project.
8. Finishing Grout: 100% solids resin-based grout with filler and pigments as recommended by matrix manufacturer and meeting low emitting flooring requirements.
 - a. Terroxy Fill; Terrazzo and Marble (T & M) Supply Companies or comparable approved product meeting all requirements including sustainability requirements.
 - 1) Refer to Sections 01 2500 "Substitution Procedures" and 01 6000 "Product Requirements" for comparable product requirements.
9. Divider Strip Adhesive: Epoxy bed, Morticite or equal, thickened by Aerosil or equal recommended by manufacturer.
10. Control Joint Filler: Grindable Epoxy Joint Filler in color selected by Architect to match/compliment terrazzo and meeting low emitting flooring requirements with the following properties:
 - a. Tensile Strength ASTM D2370 @ 68 F 1600 psi
 - b. Elongation ASTM D2370 @ 68 F 100%
 - c. Tensile Modulus ASTM D2370 @ 68 F 27,800 psi

2.2 PRECAST EPOXY-RESIN TERRAZZO

- A. Precast Terrazzo Units: Precast epoxy-resin terrazzo stair tread and riser units. Comply with NTMA's written recommendations for fabricating precast terrazzo units in sizes and profiles indicated. Reinforce units as required by unit sizes, profiles, and thicknesses and as recommended by manufacturer. Finish exposed-to-view edges and reveals to match face finish. Ease exposed edges to 1/8-inch radius.
- B. Precast Terrazzo Stair Treads and Risers: Profile and thickness as indicated on Drawings.
 1. Portland Cement: ASTM C150, Type I, non0air entraining, non-staining white and gray as required to match Architect's epoxy terrazzo samples. Obtain cement from a single source for all work of one color.
 2. Sand: ASTM C33 for fine aggregates as required to match Architect's epoxy terrazzo samples.
Water: Fresh, clean and potable.
 3. Aggregates, Glass, Plastic and Shell Materials: As required to match Architect's epoxy terrazzo samples.
 4. Abrasive Strips: Three-line abrasive inserts at nosings Aluminum Oxide non-slip #46-70 grit for combination with matrix cast into treads.

5. Color, Pattern, and Finish: Match Architect's sample.
- C. Reinforcing, Anchors and Fasteners for Precast Units:
 1. Reinforcing for Treads and Risers: ASTM A615, grade as selected by fabricator. Reinforcing adjacent to the exposed surface of panels is to be positioned and firmly held in place by hangers, or other means without the use of form-contact bar supports.
 2. Welded Wire Fabric for Treads and Risers: ASTM A185, 2- x 2-inches x 16 gage, galvanized.
 3. Anchors and Fasteners: All anchors, clips, shapes, fasteners, dowels, cramps, and accessories for erecting precast terrazzo units shall be galvanized steel devices of grade, type, size and number required to attach precast terrazzo to supporting stair substrates.
- D. Precast Terrazzo Treads and Risers Fabrication:
 1. Minimum thickness of precast terrazzo treads shall be 1-1/2"-inch.
 2. Forms: Construct forms of non-staining metal, fiberglass reinforced polyester, plywood, or other acceptable material. Fabricate and reinforce forms for close control of dimensions and details. Construct forms tightly to prevent leakage of mixes. Form joints will not be permitted on faces exposed to view in the finished work.
 3. Reinforcement: place welded wire and reinforcing bars of size and spacings as required to resist shrinkage, temperature and handling stresses. Support an space reinforcement using devices to ensure that it will remain positioned in the precast terrazzo units as required. Keep reinforcement from the edges and surfaces of the units.
 4. Mixing and Placing: mix terrazzo mixes to distribute fine and coarse aggregate evenly throughout. Place terrazzo to prevent segregation in the forms.
 5. Curing: allow units to cure.
 6. Casting Tolerances: as required to achieve installation tolerances. Units which have bowed, warped, or curled shall not be acceptable.
- E. Precast Terrazzo Finishing:
 1. Finish exposed-to-view edges or reveals to match face finish. Grind and polish to match terrazzo floor finish.
 2. Ease exposed edges to 1/8-inch radius U.O.N.

2.3 STRIP MATERIALS

- A. Thin-Set Divider Strips: L-type angle or T-type, 1/4 inch +deep or as indicated on Drawings.
 1. Material: White-zinc alloy.
 2. Top Width: 1/4 inch-unless indicated otherwise on drawings.
 3. Verify compatibility of divider strips with resin supplier prior to ordering.
- B. Control-Joint Strips: Separate, double L-type zinc angles, positioned back to back, that match material, thickness, and color of divider strips and in depth required for topping thickness indicated, filled with Flexible Epoxy Membrane pigmented to match resin color of terrazzo. Verify compatibility of control-joint strips with resin supplier prior to ordering.

- C. Accessory Strips: Match divider strip width, material, and color unless otherwise indicated. Use the following types of accessory strips as required to provide a complete installation:
 - 1. Base-bead strips for exposed top edge of terrazzo base.
 - 2. Edge-bead strips for exposed edges of terrazzo.
 - 3. Nosings for terrazzo stair treads and landings.
 - 4. Verify compatibility of accessory strips with resin supplier prior to ordering.
- D. Abrasive Strips: Silicon carbide or aluminum oxide, or combination of both, in epoxy-resin binder and set in channel.
 - 1. Width: 1/2 inch.
 - 2. Depth: As required by terrazzo thickness.
 - 3. Length: 4 inches less than stair width.
 - 4. Color: As selected by Architect from manufacturer's full range.
 - 5. Verify compatibility of abrasive strips with resin supplier prior to ordering.

2.4 MISCELLANEOUS ACCESSORIES

- A. Strip Adhesive: Epoxy-resin adhesive recommended by adhesive manufacturer for this use and acceptable to terrazzo manufacturer.
 - 1. Low Emitting Adhesives and Sealants
 - a. Provide manufacture statements that confirm that the product used meets the California Department of Public Health (CDPH) Standard Method v1.1 2010 using the applicable exposure scenario.
 - b. Refer to Section 01 81 13.14 "Sustainable Design Requirements - LEED v4 BD+C" for additional requirements.
- B. Anchoring Devices:
 - 1. Precast Terrazzo: Provide mechanical anchoring devices and setting bed as recommended by fabricator for proper anchorage and support of units for conditions of installation and support.
- C. Joint Compound: Terrazzo manufacturer's resinous product approved and recommended by manufacturer for application indicated.
- D. Cleaner: Chemically neutral cleaner with pH factor between 7 and 10 that is biodegradable, phosphate free, free from crystallizing salts or water soluble alkaline salts, and recommended by sealer manufacturer for use on terrazzo type indicated.
- E. Sealer: Water-based, colorless, slip- and stain-resistant penetrating-type sealer that is chemically neutral with pH factor between 6 and 9; does not affect color or physical properties of terrazzo; is recommended by sealer manufacturer; and complies with NTMA's "Terrazzo Specifications and Design Guide" for terrazzo type indicated.
 - 1. Product shall meet low emitting flooring requirements.
 - 2. Surface Friction: Not less than ADA Guidelines of 0.6 tested on level and 0.8 on ramps according to ASTM D 2047.
 - 3. Acid-Base Properties: With pH factor between 6 and 9.

3.1 EXAMINATION

- A. Examine substrates and areas, with Contractor and Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions, including flatness and levelness tolerances, have been corrected.

3.2 PREPARATION

- A. Clean substrates of substances, including oil, grease, and curing compounds, that might impair terrazzo bond. Provide clean, dry, and neutral substrate for terrazzo application.
- B. Concrete Slabs:
 - 1. Provide sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants incompatible with terrazzo.
 - a. Prepare slab substrates to "open" surface pores by means of shot-blast surfaces to medium sandpaper texture (approximately ICRI profile #5) with an apparatus that physically abrades the concrete surface, contains the dispensed shot within the apparatus, and recirculates the shot by magnets and utilizes vacuum pickup for debris.
 - b. All oil or grease not removed by scarification or blasting shall be removed by either detergent scrubbing with heavy duty cleaner/degreaser, low pressure water cleaning, steam cleaning, or chemical cleaning methods in accordance with the manufacturer's written instructions.
 - c. All spalled or deteriorated slab surfaces shall be mechanically removed by scabbling or chipping hammers.
 - d. Acid etching is not acceptable.
 - e. Repair damaged and deteriorated concrete according to terrazzo manufacturer's written recommendations.
 - f. Use patching and fill material to fill holes and depressions in substrates according to terrazzo manufacturer's written instructions.
 - g. Use patching and fill material to provide level substrate as needed to meet installation tolerance specified herein.
 - h. Fill all concrete slab-on-grade control joints solid with epoxy resin rigid joint filler.
 - 2. Verify that concrete substrates are visibly dry and free of moisture.
 - 3. Substrates to Receive Epoxy Terrazzo: Before the terrazzo flooring installation, visit the jobsite to evaluate substrate condition. The evaluation shall include a determination of the suitability of the substrate to receive the epoxy terrazzo materials and to test for moisture and alkalinity of the substrate.
 - a. Test for moisture by relative humidity probe and digital meter method according to ASTM F 2170 "Standard Test Method for Determining

- Relative Humidity in Concrete Floor Slabs Using In-situ Probes" and the probe manufacturer's instructions.
- b. Use a minimum of 1 probe for every 5,000 s.f. of surface to receive terrazzo flooring.
 - c. Proceed with the epoxy floor system installation only after substrates have a maximum relative-humidity-measurement reading of 75 percent in 24 hours.
 - d. If the pH of the slab is 10 or lower, notify the manufacturer for preparations required to ensure a good bond:.
 - e. Proceed with installation only after substrates have a maximum 80 percent relative-humidity-level measurement.
- C. Protect other work from dust generated by grinding operations. Control dust to prevent air pollution and comply with environmental protection regulations.
1. Erect and maintain temporary enclosures and other suitable methods to limit dust migration and to ensure adequate ambient temperatures and ventilation conditions during installation.
- D. Installation of terrazzo indicates acceptance of surfaces and conditions.
- E. Cracks: Cracks and non-expansion joints greater than 1/16" wide after surface preparation shall be prepared until sound and treated with membrane materials in accordance with the instructions of the epoxy terrazzo manufacturer and as follows. Allow in base bid for above crack detailing as follows - 5% of lineal footage of total project square footage for combined Type 1 & 2, and 3% of lineal footage of Type 3. (i.e., a 10,000 sq ft project would allow for a combined 500 lineal feet of Type 1 & 2 repairs and 300 lineal feet of Type 3 repairs.
1. Type 1 Crack Detailing: Hairline cracks shall receive detail coat of epoxy primer with 6" fabric reinforcement.
 2. Type 2 Crack Detailing Fill cracks greater than hairline but less than 1/16" wide after surface preparation with neat, epoxy membrane. Place detail coat of epoxy membrane over crack and embed 12" fiberglass cloth. Lightly abrade or solvent wipe treated cracks prior to applying primer.
 3. Type 3 Crack Detailing Fill cracks greater than 1/16" with flexible epoxy membrane. Place 25-30 mil detail coat so that flexible epoxy membrane extends at least 9" to 12" on each side of crack or joint. After flexible epoxy membrane has leveled, lay precut reinforcing fabric into wet membrane. Smooth cloth with a flat steel trowel, allowing cloth to be encapsulated but remain exposed on the surface of flexible epoxy membrane. Lightly abrade or solvent wipe treated cracks prior to applying primer

3.3 EPOXY-RESIN TERRAZZO INSTALLATION

- A. General:
1. Comply with NTMA's written recommendations for terrazzo and accessory installation.
 2. Extend terrazzo work into recesses and under equipment in the spaces shown or scheduled to receive terrazzo. Form a complete covering without interruptions or seams, except provide divider strips where shown. Place and finish terrazzo uniformly and neatly around obstructions so as to achieve continuous color, pattern and finish throughout the Work.

3. Place, rough grind, grout, cure grout, fine grind, and finish terrazzo according to manufacturer's written instructions and NTMA's "Terrazzo Specifications and Design Guide."
 4. Installation Tolerance: Limit variation in terrazzo surface from level to 1/4 inch in 10 feet; non-cumulative with maximum variation of 1/8" in 1 foot circle.
 5. Ensure that matrix components and fluids from grinding operations do not stain terrazzo by reacting with divider and control-joint strips.
 6. Delay fine grinding until heavy trade work is complete and construction traffic through area is restricted.
 7. Refer to Section 01 35 46 "Indoor Air Quality" for additional requirements.
- B. Thickness: 3/8 inch minimum.
- C. Moisture Vapor Reducing System
1. On concrete slabs on grade apply two coats of Moisture Vapor Reducing Primer and one coat on concrete slabs above Level 1 per manufacturer's written instructions.
- D. Flexible Reinforcing Membrane:
1. Prepare and prefill substrate cracks with membrane material.
 2. Install membrane 25 mils thick to produce full substrate coverage in all areas to receive terrazzo.
 3. Reinforce membrane with fiberglass scrim in second coat 15 mils thick.
 4. Prepare membrane according to manufacturer's written instructions before applying substrate primer.
- E. Strip Materials:
1. Divider and Control-Joint Strips:
 - a. Locate divider strips in locations indicated.
 - b. Install dual "L" control-joint strips bookended in locations indicated. Control-joint strips shall be located directly above all concrete control joints.
 - c. Install control-joint strips with nominal 1/4-inch gap between strips, and install sealant in gap, unless indicated otherwise on Drawings.
 - d. Install strips in epoxy adhesive without voids below strips, as recommended by strip manufacturer. If flexible membrane was placed greater than 72 hours before placement of epoxy terrazzo, solvent wipe completely prior to installing epoxy primer and terrazzo.
 2. Accessory Strips: Install accessory strips as required to provide a complete installation and in locations indicated.
 3. Abrasive Strips: Install with surface of abrasive strip positioned 1/32 inch higher than terrazzo surface.
- F. Priming: Apply epoxy primer evenly over prepared flexible membrane at the rate of 200-300 square feet per gallon, to thoroughly wet surface, but avoiding "ponding" the material.
- G. Epoxy Terrazzo: Carefully proportion, thoroughly mix all components and trowel apply blended terrazzo matrix topping-to thickness of nominally 3/8 inches minimum and allow to cure as recommended by written instructions from manufacturer.

- H. Grinding: Exercise extreme care to ensure fluids from grinding operation do not react with dividers and strips to produce a stain on aggregate. Delay grinding until heavy trade work is completed and construction traffic through the area is restricted.
 - 1. Rough Grinding: Grind with 24 grit silicon carbide or D-36 Diamond matrix stones until all terrazzo strips and chips are uniformly exposed.
 - 2. Intermediate Grinding: Follow initial grind with 80 or finer grit stones.
 - 3. Grouting:
 - a. Clean floor with clean water and rinse.
 - b. Remove excess rinse water by wet vacuum, dry and fill voids with epoxy-resin matrix or clear resin.
 - c. Allow grout to cure.
 - 4. Fine Grinding: Grind with stones 120 grit or finer until all grout is removed from surface. Repeat rough grinding, grout coat, and fine grinding if large voids exist after initial fine grinding. Produce surface with a minimum of 70- to 75-percent aggregate exposure.
- I. Surface Finishing:
 - 1. Flood mop and wet vacuum all slurry from surface insuring all latency and particulate matter is removed.
 - 2. Continue grinding process with Genesis diamond grits 220, 400 and 600 repeating flood mop and wet vacuum between steps insuring all previous grit latency and particulate matter is removed.
 - 3. Inspect entire surface for consistent appearance, manifesting no abrasion scratches from previous grits. Readdress any area manifesting previous grit scratch pattern not matching 600 grit finish before continuing.
 - 4. Mechanically polish surface using 1,000 grit Ceramica diamond pads. Surface shall have uniform reflective appearance showing no high or low sheen variances.
 - 5. Flood mop and wet vacuum as described in Step 1 insuring no presence of any particulate matter or other trades' dirt or oils.
 - 6. Final polish surface using manufacturer's standard polish using white polishing pad.
 - 7. Thoroughly scrub and agitate entire surface using manufacturer's recommended cleaning fluid, wet vacuum scrub from surface insuring all final chemistry is removed.
- J. Repair: Remove and replace terrazzo areas that evidence lack of bond with substrate. Cut out terrazzo areas in panels defined by strips and replace to match adjacent terrazzo, or repair panels according to NTMA's written recommendations, as approved by Architect.
- K. Termination of pours: Terminate pours with jagged fingers approximately 4 inches in length unless terminated against zinc strip to ensure that color of next pour blends with previous pour. Any noticeable color variation between pours is not acceptable.
- L. Acceptance: Replace any terrazzo that does not match the approved mock-ups' color, appearance, finish and pattern.

3.4 PRECAST TERRAZZO INSTALLATION

- A. Preparation: Clean precast terrazzo surfaces which have become dirty or stained prior to setting to remove soil, stains and foreign materials. Clean precast terrazzo

by thoroughly scrubbing with fiber brushes followed by a thorough drenching with clear water. Use only mild cleaning compounds that contain no caustic or harsh filler or abrasives.

B. Installation, General:

1. Employ only skilled and experienced workmen to install the precast terrazzo work. Use carborundum or diamond tipped power saws to cut precast terrazzo units which need to be fitted to existing field conditions.

C. Install precast terrazzo units using method recommended NTMA and manufacturer unless otherwise indicated.

1. Set precast terrazzo units to comply with requirements indicated on drawings and final shop drawings. Install anchors, supports, fasteners and other attachments indicated or necessary to secure precast terrazzo work in place. Shim and adjust anchors, supports and accessories to set precast terrazzo work accurately in locations indicated with uniform joints of widths indicated and with edges and faces aligned

D. Installation Tolerance: Set units with alignment level and true to dimensions, varying 1/8-inch maximum in length, height, or width; non-cumulative.

1. Additional Tolerances:
 - a. Joint Widths: +/- 1/16 inch.
 - b. Variation from Plumb: +/- 1/16 inch.
 - c. Variation from Level: +/- 1/8 inch in 20 feet, non-cumulative.
 - d. Piece Alignments (Edge to Edge): +/- 1/32 inch.

E. Installation of Stair Tread/Risers:

1. Place setting bed on steel pan and poured in place concrete type stairs where shown and in accordance with NTMA, and the applicable provisions of TCA S151 Method F111 (for steel pan stairs) and Methods F112 and W211 (for concrete stairs) and ANSI A108.1A.
2. Tamp units into setting bed to achieve a full bond without voids. Level units at joints. Grind at joints to remove any minor discrepancies in level of units.

F. Do not install units that are chipped, cracked, discolored, or not properly finished.

G. Seal joints between units with joint compound matching precast terrazzo matrix color.

3.5 FIELD QUALITY CONTROL

A. Installer shall provide Coefficient of Friction testing in accordance with ANSI A137.1.

1. Provide written reports to Architect.

3.6 CLEANING AND PROTECTION

A. Cleaning:

1. Remove grinding dust from installation and adjacent areas.
2. Wash surfaces with cleaner according to NTMA's written recommendations and manufacturer's written instructions; rinse surfaces with water and allow to thoroughly dry.
3. Refer to Section 01 74 23 "Final Cleaning" for additional requirements.

B. Sealing:

1. Seal surfaces according to NTMA written recommendations.
- C. Protection: Provide final protection from other trades with minimum 1/4 inch Masonite hardboard with taped joints on top of minimum 6 mils Visqueen to ensure that terrazzo is without damage or deterioration at time of Substantial Completion and that no color bleed from Masonite to terrazzo occurs.
- D. Protect zinc strips at edges and terminations from damage from other trades by installing tapered hardwood thresholds against strips until final adjoining material is installed.
- E. Before Final Acceptance clean and polish complete terrazzo installation.

END OF SECTION 09 66 23

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. High-performance resinous flooring systems.
 - 2. Decorative flake polymeric floor coating.
- B. Related Sections:
 - 1. Division 07 Section "Joint Sealants" for sealants installed at joints in resinous flooring systems.
 - 2. Division 09 Section "Finish Key" for finish selections.
 - 3. Division 09 Section "Resinous Matrix Terrazzo Flooring" for thin-set, resinous matrix terrazzo.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated. Include manufacturer's technical data, application instructions, and recommendations for each resinous flooring component required.
- B. Sustainable Design Submittal:
 - 1. Product Data: Refer to section 01 81 13.14 "Sustainable Design Requirements – LEED V4 BD+C" for Leadership Extraction Practices for the following:
 - a. Extended Producer Responsibility
 - b. Recycled content
 - c. Regional material requirements
 - 2. Product Certificates: Refer to section 01 81 13.14 "Sustainable Design Requirements – LEED V4 BD+C" for the following:
 - a. Environmental Product Declarations (EPD's)
 - b. Corporate Sustainability Reporting (CSR's)
 - c. Health Product Declarations (HPD's)
- C. Samples for Initial Selection: For each type of exposed finish required.
- D. Samples for Verification: For each resinous flooring system required, 6 inches square, applied to a rigid backing by Installer for this Project.
- E. Installer Certificates: Signed by manufacturer certifying that installers comply with specified requirements.
- F. Material Certificates: For each resinous flooring component, from manufacturer.
- G. Material Test Reports: For each resinous flooring system.
- H. Maintenance Data: For resinous flooring to include in maintenance manuals.
- I. Warranty: Sample of manufacturer's standard warranty.

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of flooring systems required for this Project.
 - 1. Engage an installer who is certified in writing by resinous flooring manufacturer as qualified to apply resinous flooring systems indicated.
- B. Source Limitations: Obtain primary resinous flooring materials, including primers, resins, hardening agents, grouting coats, and topcoats, from single source from single manufacturer. Provide secondary materials, including patching and fill material, joint sealant, and repair materials, of type and from source recommended by manufacturer of primary materials.
- C. Preinstallation Conference: Conduct conference at project site.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original packages and containers, with seals unbroken, bearing manufacturer's labels indicating brand name and directions for storage and mixing with other components.

1.5 PROJECT CONDITIONS

- A. Environmental Limitations: Comply with resinous flooring manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting resinous flooring application.
- B. Lighting: Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during resinous flooring application.
- C. Close spaces to traffic during resinous flooring application and for not less than 24 hours after application unless manufacturer recommends a longer period.

1.6 WARRANTY

- A. Special Warranty: Contractor shall provide a five-year Project Warranty jointly signed by the resinous flooring installer and the manufacturer of the resinous flooring materials guaranteeing the Work against material or installation defects. Under the terms of the Warranty, the Contractor shall promptly repair or replace all defective or damaged items delivered under the contract.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, provide Basis of Design product indicated.

2.2 INDUSTRIAL RESINOUS FLOORING

- A. Resinous Flooring: Abrasion-, impact- and chemical-resistant, industrial-aggregate-filled, resin-based, monolithic floor surfacing designed to produce a seamless floor and integral cove base.

- B. Low Emitting Flooring
 - 1. Provide manufacture statements that confirm that the product used meets the California Department of Public Health (CDPH) Standard Method v1.1 2010 using the applicable exposure scenario.
 - 2. Refer to Section 01 81 13.14 "Sustainable Design Requirements - LEED v4 BD+C" for additional requirements.
- C. Basis-of-Design Product: Subject to compliance with requirements, provide Resinous Flooring types as indication in Section 09 00 01 "Finish Key" or comparable approved product meeting all requirements including sustainability requirements.
 - 1. Refer to Sections 01 25 00 "Substitution Procedures" and 01 60 00 "Product Requirements" for comparable product requirements.
 - 2. Wearing Surface: As indicated in the Finish Key.
 - 3. Overall System Thickness: As indicated in the Finish Key.
- D. Body Coats:
 - 1. Resin: Epoxy.
 - 2. Formulation Description: 100 percent solids.
 - 3. Application Method: Troweled.
 - a. Thickness of Coats: As indicated in the Finish Key.
 - b. Number of Coats: As indicated in the Finish Key.
 - 4. Aggregates: Manufacturer's standard.
- E. Topcoat: Sealing or finish coats.
 - 1. Resin: Epoxy.
 - 2. Formulation Description: 100 percent solids Water based.
 - 3. Type: Clear.
 - 4. Finish: Gloss.
 - 5. Number of Coats: One.
- F. System Physical Properties: Provide resinous flooring system with the following minimum physical property requirements when tested according to test methods indicated:
 - 1. Compressive Strength: 10,000 psi per ASTM C 579.
 - 2. Tensile Strength: 1,640 per ASTM C 307.
 - 3. Flexural Modulus of Elasticity: 4,300 per ASTM C 580.
 - 4. Water Absorption: 0.3 percent per ASTM C 413.
 - 5. Impact Resistance: No chipping, cracking, or delamination and not more than 0.014-inch permanent indentation per MIL-D-3134.
 - 6. Abrasion Resistance: 0.04 gr maximum weight loss per ASTM D 4060.
 - 7. Electrical Conductivity (NFPA 56A): Di-electric.
 - 8. Flammability: Self-extinguishing per ASTM D 635.
 - 9. Hardness: 80-85, Shore D per ASTM D 2240.
 - 10. Bond Strength: >400 psi, 100 percent concrete failure per ACI 503R.
 - 11. Coefficient of Friction: Static friction with saltwater on surface 0.95 per MIL-PRF-3134).
- G. System Chemical Resistance: Test specimens of cured resinous flooring system are unaffected when tested according to ASTM D 1308 for 50 percent immersion and ASTM C 267 for immersion in the following reagents for no fewer than seven days:

1. Urea.

2.3 DECORATIVE FLAKE POLYMERIC FLOOR COATING

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Decorative Flake Polymetric Coating Flooring types as indication in Section 09 00 01 "Finish Key" or comparable approved product meeting all requirements including sustainability requirements.
 1. Refer to Sections 01 25 00 "Substitution Procedures" and 01 60 00 "Product Requirements" for comparable product requirements.
- B. System Components:
 1. Base Coat: Manufacturer's standard two-part UV resistant epoxy base coat.
 2. Color Flakes: Manufacturer's standard decorative flakes broadcast at density and color combination to match Architect's sample.
 3. Grout Coats: Two coats of manufacturer's standard chemical resistant. non-ambering resin.
 4. Finish Coat: Clear, three-part high solids chemical and wear resistant aliphatic urethane.

2.4 ACCESSORIES

- A. Low Emitting Flooring
 1. Provide manufacture statements that confirm that the product used meets the California Department of Public Health (CDPH) Standard Method v1.1 2010 using the applicable exposure scenario.
 2. Refer to Section 01 81 13.14 "Sustainable Design Requirements - LEED v4 BD+C" for additional requirements.
- B. Primer: Type recommended by manufacturer for substrate and body coats indicated.
 1. Formulation Description: 100 percent solids.
- C. Reinforcing Membrane: Flexible resin formulation that is recommended by manufacturer for substrate and primer and body coats indicated and that prevents substrate cracks from reflecting through resinous flooring.
 1. Formulation Description: 100 percent solids.
 - a. Provide fiberglass scrim embedded in reinforcing membrane.
- D. Patching and Fill Material: Resinous product of or approved by resinous flooring manufacturer and recommended by manufacturer for application indicated.

PART 3 - EXECUTION

3.1 PREPARATION

- A. General: Prepare and clean substrates according to resinous flooring manufacturer's written instructions for substrate indicated. Provide clean, dry substrate for resinous flooring application.
- B. Concrete Substrates: Provide sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants incompatible with resinous flooring.

1. Roughen concrete substrates as follows:
 - a. Shot-blast surfaces with an apparatus that abrades the concrete surface, contains the dispensed shot within the apparatus, and recirculates the shot by vacuum pickup.
 - b. Comply with ASTM C 811 requirements unless manufacturer's written instructions are more stringent.
 2. Repair damaged and deteriorated concrete according to resinous flooring manufacturer's written instructions.
 3. Verify that concrete substrates are dry and moisture-vapor emissions are within acceptable levels according to manufacturer's written instructions.
 - a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with application of resinous flooring only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. of slab area in 24 hours.
 4. Alkalinity and Adhesion Testing: Verify that concrete substrates have pH within acceptable range. Perform tests recommended by manufacturer. Proceed with application only after substrates pass testing.
- C. Resinous Materials: Mix components and prepare materials according to resinous flooring manufacturer's written instructions.
- D. Use patching and fill material to fill holes and depressions in substrates according to manufacturer's written instructions.
- E. Treat control joints and other nonmoving substrate cracks to prevent cracks from reflecting through resinous flooring according to manufacturer's written instructions.

3.2 APPLICATION

- A. General: Apply components of resinous flooring system according to manufacturer's written instructions to produce a uniform, monolithic wearing surface of thickness indicated.
1. Coordinate application of components to provide optimum adhesion of resinous flooring system to substrate, and optimum intercoat adhesion.
 2. Cure resinous flooring components according to manufacturer's written instructions. Prevent contamination during application and curing processes.
 3. At substrate expansion and isolation joints, comply with resinous flooring manufacturer's written instructions.
- B. Apply primer over prepared substrate at manufacturer's recommended spreading rate.
- C. Apply reinforcing membrane to entire substrate surface.
- D. Integral Cove Base: Apply cove base mix to wall surfaces before applying flooring. Apply according to manufacturer's written instructions and details including those for taping, mixing, priming, troweling, sanding, and topcoating of cove base. Round internal and external corners.
- E. Apply self-leveling slurry body coats in thickness indicated for flooring system.
1. Broadcast aggregates at rate recommended by manufacturer and, after resin is cured, remove excess aggregates to provide surface texture indicated.

- F. Apply troweled or screeded body coats in thickness indicated for flooring system. Hand or power trowel and grout to fill voids. When cured, remove trowel marks and roughness using method recommended by manufacturer.
- G. Apply grout coat, of type recommended by resinous flooring manufacturer, to fill voids in surface of final body coat and to produce wearing surface indicated.
- H. Apply topcoats in number indicated for flooring system and at spreading rates recommended in writing by manufacturer.

3.3 PROTECTION

- A. Protect resinous flooring from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by resinous flooring manufacturer.

END OF SECTION 09 67 23

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes modular carpet tile.
- B. Related Requirements:
 - 1. Section 09 65 19 "Resilient Tile Flooring" for resilient wall base and accessories installed with carpet tile.
 - 2. Section 09 68 16 "Sheet Carpeting" for carpet roll goods.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review methods and procedures related to carpet tile installation including, but not limited to, the following:
 - a. Review delivery, storage, and handling procedures.
 - b. Review ambient conditions and ventilation procedures.
 - c. Review subfloor preparation procedures.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include manufacturer's written data on physical characteristics, durability, and fade resistance.
 - 2. Include manufacturer's written installation recommendations for each type of substrate.
- B. Sustainable Design Documentation Submittals: Refer to section 01 81 13.14 "Sustainable Design Requirements – LEED V4 BD+C".
 - 1. Product Data: Documentation for Leadership Extraction Practices in the following:
 - a. Leadership Extraction Practices for Recycled Content
 - 2. Product Data: Documentation for Low Emitting Materials
 - a. Low Emitting Materials for Flooring
 - 3. Product Certificates: Provide the following:
 - a. Environmental Product Declarations (EPD's)
 - b. Corporate Sustainability Reporting (CSR's)
 - c. Health Product Declarations (HPD's)
- C. Shop Drawings: For carpet tile installation, plans showing the following:
 - 1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet tiles.
 - 2. Carpet tile type, color, and dye lot.
 - 3. Type of subfloor.
 - 4. Type of installation.
 - 5. Pattern of installation.
 - 6. Pattern type, location, and direction.
 - 7. Pile direction.
 - 8. Type, color, and location of insets and borders.

9. Type, color, and location of edge, transition, and other accessory strips.
 10. Transition details to other flooring materials.
- D. Samples: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.
1. Carpet Tile: Full-size Sample.
 2. Exposed Edge, Transition, and Other Accessory Stripping: 12-inch-long Samples.
- E. Samples for Initial Selection: For each type of carpet tile.
1. Include Samples of exposed edge, transition, and other accessory stripping involving color or finish selection.
- F. Samples for Verification: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.
1. Carpet Tile: Full-size Sample.
 2. Exposed Edge, Transition, and Other Accessory Stripping: 12-inch-long Samples.
- G. Product Schedule: For carpet tile. Use same designations indicated on Drawings.
- H. Sustainable Product Certification: Provide ANSI/NSF 140 certification for carpet products.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For carpet tile, for tests performed by a qualified testing agency.
- C. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For carpet tiles to include in maintenance manuals. Include the following:
1. Methods for maintaining carpet tile, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
 2. Precautions for cleaning materials and methods that could be detrimental to carpet tile.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Carpet Tile: Full-size units equal to 5 percent of amount installed for each type indicated, but not less than 10 sq. yd..

- A. Installer Qualifications: An experienced installer who is certified by the International Certified Floorcovering Installers Association at the Commercial II certification level.
- B. Mockups: Build mockups to comply with Section 01 43 39 (Visual Mock-Up Requirements".
 - 1. Build mockups at locations and in sizes shown on Drawings.
 - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Comply with CRI's "CRI Carpet Installation Standard."

1.9 FIELD CONDITIONS

- A. Comply with CRI's "CRI Carpet Installation Standard" for temperature, humidity, and ventilation limitations.
- B. Environmental Limitations: Do not deliver or install carpet tiles until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at levels planned for building occupants during the remainder of the construction period.
- C. Do not install carpet tiles over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet tile manufacturer.
- D. Where demountable partitions or other items are indicated for installation on top of carpet tiles, install carpet tiles before installing these items.

1.10 WARRANTY

- A. Special Warranty for Carpet Tiles: Manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.
 - 1. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse.
 - 2. Failures include, but are not limited to, the following:
 - a. More than 10 percent edge raveling, snags, and runs.
 - b. Dimensional instability.
 - c. Excess static discharge.
 - d. Loss of tuft-bind strength.
 - e. Loss of face fiber.
 - f. Delamination.
 - 3. Warranty Period: 10 years from date of Substantial Completion.

2.1 CARPET TILE

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Tile Carpet as indicated in Section 09 00 01 "Finish Key" or comparable approved product meeting all requirements including sustainability requirements.
 - 1. Refer to Sections 01 2500 "Substitution Procedures" and 01 6000 "Product Requirements" for comparable product requirements.
- B. Recycled Content: Postconsumer recycled content plus one-half of pre-consumer recycled content not less than 25 percent.
 - 1. Refer to Section 01 81 13.14 "Sustainable Design Requirements - LEED v4 BD+C" for additional information and requirements for recycled content.
- C. Health Product Declaration: Provide Health Product Declaration (HPD) with full disclosure of known hazards in compliance with the Health Product Declaration Open Standard
- D. Environmental Product Disclosure: Provide an Environmental Product Declarations (EPD) that conforms with one of the following:
 - 1. Product specific declarations in accordance with ISO 1404
 - 2. Environmental Product Declarations conforming to ISO 14025, 14040, 14044 and EN 15804 or ISO 21930
 - 3. Industry Wide Product Specific Type III EPD Third Party Certification
- E. Corporate Sustainability Report: Provide third-party verified Corporate Sustainability Report (CPD) including impacts of extraction operations and activities associated with the manufacturer's product and product's supply chain conforming the following:
 - 1. Global Reporting Initiative (GRI) Sustainability report
 - 2. Organization for Economic Co-operation and Development (OOECD) Guidelines for Multinational Enterprises.
 - 3. U.N. Global Compact: Communication of Progress
 - 4. ISO 26000: 2010 Guidance on Social Responsibility
 - 5. USGBC Approved Program: Other approved programs meeting the CSR criteria.

2.2 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.
- B. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that comply with flammability requirements for installed carpet tile, and are recommended by carpet tile manufacturer for releasable installation.
 - 1. Provide manufacture statements that confirm that the product used meets the California Department of Public Health (CDPH) Standard Method v1.1 2010 using the applicable exposure scenario.
 - 2. Refer to Section 01 81 13.14 "Sustainable Design Requirements - LEED v4 BD+C" for additional requirements.

- C. Metal Edge/Transition Strips: Extruded aluminum with mill finish of profile and width shown, of height required to protect exposed edge of carpet, and of maximum lengths to minimize running joints.
 - 1. Recycled Content: Postconsumer recycled content plus one-half of pre-consumer recycled content not less than 25 percent.
 - a. Refer to Section 01 81 13.14 "Sustainable Design Requirements - LEED v4 BD+C" for additional information and requirements for recycled content.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance.
- B. Examine carpet tile for type, color, pattern, and potential defects.
- C. Concrete Slabs: Verify that finishes comply with requirements specified in Section 03 30 00 "Cast-in-Place Concrete" and that surfaces are free of cracks, ridges, depressions, scale, and foreign deposits.
 - 1. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft., and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
 - a. Anhydrous Calcium Chloride Test: ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
 - b. Perform additional moisture tests recommended in writing by adhesive and carpet tile manufacturers. Proceed with installation only after substrates pass testing.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. General: Comply with CRI's "Carpet Installation Standards" and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile.
- B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch wide or wider, and protrusions more than 1/32 inch unless more stringent requirements are required by manufacturer's written instructions.
- C. Concrete Substrates: Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by adhesive and carpet tile manufacturers.

- D. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

3.3 INSTALLATION

- A. Installation Method: As recommended in writing by carpet tile manufacturer.
- B. Maintain dye-lot integrity. Do not mix dye lots in same area.
- C. Maintain pile-direction patterns indicated on Drawings.
- D. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.
- E. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on carpet tile as marked on subfloor. Use nonpermanent, nonstaining marking device.
- G. Install pattern parallel to walls and borders.
- H. Access Flooring: Stagger joints of carpet tiles so carpet tile grid is offset from access flooring panel grid. Do not fill seams of access flooring panels with carpet adhesive; keep seams free of adhesive.

3.4 CLEANING AND PROTECTION

- A. Perform the following operations immediately after installing carpet tile:
 - 1. Remove excess adhesive and other surface blemishes using cleaner recommended by carpet tile manufacturer.
 - 2. Remove yarns that protrude from carpet tile surface.
 - 3. Vacuum carpet tile using commercial machine with face-beater element.
- B. Protect installed carpet tile to comply with CRI's "Carpet Installation Standard," Section 20, "Protecting Indoor Installations."
- C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.
- D. Refer to Section 01 35 46 "Indoor Air Quality" and Section 01 74 23 "Final Cleaning" for additional requirements.

END OF SECTION 09 68 13

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes sheet carpet.
- B. Related Requirements:
 - 1. Section 09 65 19 "Resilient Tile Flooring" for resilient wall base and accessories installed with carpet.
 - 2. Section 09 68 13 "Tile Carpeting" for modular carpet tiles.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review methods and procedures related to carpet installation including, but not limited to, the following:
 - a. Review delivery, storage, and handling procedures.
 - b. Review ambient conditions and ventilation procedures.
 - c. Review subfloor preparation procedures.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include manufacturer's written data on physical characteristics and durability.
 - 2. Include manufacturer's written installation recommendations for each type of substrate.
- B. Sustainable Design Documentation Submittals: Refer to section 01 81 13.14 "Sustainable Design Requirements – LEED V4 BD+C".
 - 1. Product Data: Documentation for Leadership Extraction Practices in the following:
 - a. Leadership Extraction Practices for Recycled Content
 - 2. Product Data: Documentation for Low Emitting Materials
 - a. Low Emitting Materials for Flooring
 - 3. Product Certificates: Provide the following:
 - a. Environmental Product Declarations (EPD's)
 - b. Corporate Sustainability Reporting (CSR's)
 - c. Health Product Declarations (HPD's)
- C. Shop Drawings: For carpet installation, showing the following:
 - 1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet.
 - 2. Carpet type, color, and dye lot.
 - 3. Locations where dye lot changes occur.
 - 4. Seam locations, types, and methods.
 - 5. Type of subfloor.
 - 6. Type of installation.
 - 7. Pattern type, repeat size, location, direction, and starting point.
 - 8. Pile direction.
 - 9. Types, colors, and locations of insets and borders.

10. Types, colors, and locations of edge, transition, and other accessory strips.
 11. Transition details to other flooring materials.
- D. Samples: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.
1. Carpet: 12-inch-square Sample.
 2. Exposed Edge, Transition, and Other Accessory Stripping: 12-inch-long Samples.
 3. Carpet Seam: 6-inch Sample.
- E. Samples for Initial Selection: For each type of product.
1. Include Samples of exposed edge, transition, and other accessory stripping involving color or finish selection.
- F. Samples for Verification: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.
1. Carpet: 12-inch-square Sample.
 2. Exposed Edge, Transition, and Other Accessory Stripping: 12-inch-long Samples.
 3. Carpet Cushion: 6-inch-square Sample.
 4. Carpet Seam: 6-inch Sample.
- G. Product Schedule: For carpet. Use same designations indicated on Drawings.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For carpet, for tests performed by a qualified testing agency.
- C. Sample Warranties: For special warranties.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For carpet to include in maintenance manuals. Include the following:
1. Methods for maintaining carpet, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
 2. Precautions for cleaning materials and methods that could be detrimental to carpet.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Carpet: Full-width rolls equal to 5 percent of amount installed for each type indicated, but not less than 10 sq. yd..

- A. Installer Qualifications: An experienced installer who is certified by the International Certified Floorcovering Installers Association at the Commercial II certification level.
- B. Mockups: Build mockups to comply with Section 01 43 39 (Visual Mock-Up Requirements".
 - 1. Build mockups at locations and in sizes shown on Drawings.
 - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Comply with CRI's "CRI Carpet Installation Standard."
- B. Deliver carpet in original mill protective covering with mill register numbers and tags attached.

1.9 FIELD CONDITIONS

- A. Comply with CRI's "CRI Carpet Installation Standard" for temperature, humidity, and ventilation limitations.
- B. Environmental Limitations: Do not deliver or install carpet until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at levels planned for building occupants during the remainder of the construction period.
- C. Do not install carpet over concrete slabs until slabs have cured, are sufficiently dry to bond with adhesive, and have pH range recommended by carpet manufacturer.

1.10 WARRANTY

- A. Special Warranty for Carpet: Manufacturer agrees to repair or replace components of carpet installation that fail in materials or workmanship within specified warranty period.
 - 1. Warranty does not include deterioration or failure of carpet due to unusual traffic, failure of substrate, vandalism, or abuse.
 - 2. Failures include, but are not limited to, the following:
 - a. More than 10 percent loss of face fiber, edge raveling, snags, and runs.
 - b. Loss of tuft bind strength.
 - c. Excess static discharge.
 - d. Delamination.
 - 3. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SHEET CARPET

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Sheet Carpet types as indicated in Section 09 00 01 "Finish Key" or comparable approved product meeting all requirements including sustainability requirements.

1. Refer to Sections 01 2500 "Substitution Procedures" and 01 6000 "Product Requirements" for comparable product requirements.
- B. Recycled Content: Postconsumer recycled content plus one-half of pre-consumer recycled content not less than 25 percent.
 1. Refer to Section 01 81 13.14 "Sustainable Design Requirements - LEED v4 BD+C" for additional information and requirements for recycled content.
- C. Health Product Declaration: Provide Health Product Declaration (HPD) with full disclosure of known hazards in compliance with the Health Product Declaration Open Standard
- D. Environmental Product Disclosure: Provide an Environmental Product Declarations (EPD) that conforms with one of the following:
 1. Product specific declarations in accordance with ISO 1404
 2. Environmental Product Declarations conforming to ISO 14025, 14040, 14044 and EN 15804 or ISO 21930
 3. Industry Wide Product Specific Type III EPD Third Party Certification
- E. Corporate Sustainability Report: Provide third-party verified Corporate Sustainability Report (CPD) including impacts of extraction operations and activities associated with the manufacturer's product and product's supply chain conforming the following:
 1. Global Reporting Initiative (GRI) Sustainability report
 2. Organization for Economic Co-operation and Development (OOECD) Guidelines for Multinational Enterprises.
 3. U.N. Global Compact: Communication of Progress
 4. ISO 26000: 2010 Guidance on Social Responsibility
 5. USGBC Approved Program: Other approved programs meeting the CSR criteria.

2.2 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.
- B. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that comply with flammability requirements for installed carpet tile, and are recommended by carpet tile manufacturer for releasable installation.
 1. Provide manufacture statements that confirm that the product used meets the California Department of Public Health (CDPH) Standard Method v1.1 2010 using the applicable exposure scenario.
 2. Refer to Section 01 81 13.14 "Sustainable Design Requirements - LEED v4 BD+C" for additional requirements.
- C. Metal Edge/Transition Strips: Extruded aluminum with mill finish of profile and width shown, of height required to protect exposed edge of carpet, and of maximum lengths to minimize running joints.
 1. Recycled Content: Postconsumer recycled content plus one-half of pre-consumer recycled content not less than 25 percent.

- a. Refer to Section 01 81 13.14 "Sustainable Design Requirements - LEED v4 BD+C" for additional information and requirements for recycled content.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet performance.
- B. Examine carpet for type, color, pattern, and potential defects.
- C. Concrete Slabs: Verify that finishes comply with requirements specified in Section 03 30 00 "Cast-in-Place Concrete" and that surfaces are free of cracks, ridges, depressions, scale, and foreign deposits.
 1. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft., and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
 - a. Anhydrous Calcium Chloride Test: ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
 - b. Perform additional moisture tests recommended in writing by adhesive and carpet manufacturers. Proceed with installation only after substrates pass testing.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. General: Comply with CRI's "CRI Carpet Installation Standard" and with carpet manufacturer's written installation instructions for preparing substrates.
- B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch wide or wider, and protrusions more than 1/32 inch, unless more stringent requirements are required by manufacturer's written instructions.
- C. Concrete Substrates: Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by adhesive and carpet manufacturers.
- D. Broom and vacuum clean substrates to be covered immediately before installing carpet.

3.3 CARPET INSTALLATION

- A. Comply with CRI's "CRI Carpet Installation Standard" and carpet manufacturer's written installation instructions for the following:
 1. Direct-glue-down installation.

- B. Comply with carpet manufacturer's written instructions and Shop Drawings for seam locations and direction of carpet; maintain uniformity of carpet direction and lay of pile. At doorways, center seams under the door in closed position.
- C. Install as indicated on Drawings.
- D. Install borders with mitered corner seams.
- E. Do not bridge building expansion joints with carpet.
- F. Cut and fit carpet to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet manufacturer.
- G. Extend carpet into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- H. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on carpet as marked on subfloor. Use nonpermanent, nonstaining marking device.

3.4 CLEANING AND PROTECTION

- A. Perform the following operations immediately after installing carpet:
 - 1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet manufacturer.
 - 2. Remove yarns that protrude from carpet surface.
 - 3. Vacuum carpet using commercial machine with face-beater element.
- B. Protect installed carpet to comply with CRI's "CRI Carpet Installation Standard."
- C. Protect carpet against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods recommended in writing by carpet manufacturer and carpet adhesive manufacturer.
- D. Refer to Section 01 35 46 "Indoor Air Quality" and Section 01 74 23 "Final Cleaning" for additional requirements.

END OF SECTION 09 68 16

SECTION 09 69 00 - ACCESS FLOORING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Composite board panel access flooring.

1.2 COORDINATION

- A. Coordinate location of mechanical and electrical work in underfloor cavity to prevent interference with access flooring.
- B. Mark pedestal locations on subfloor to enable mechanical and electrical work to proceed without interfering with access-flooring pedestals installed after mechanical and electrical work.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review connections between access flooring and mechanical and electrical systems.
 - 2. Review requirements related to sealing the plenum.
 - 3. Review procedures for keeping underfloor space clean.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for access flooring.
 - 2. Include loading capacities.
- B. Sustainable Design Documentation Submittals: Refer to section 01 81 13.14 "Sustainable Design Requirements – LEED V4 BD+C".
 - 1. Product Data: Documentation for Leadership Extraction Practices in the following:
 - a. Leadership Extraction Practices for Recycled Content
 - 2. Product Data: Documentation for Low Emitting Materials
 - a. Low Emitting Materials for Flooring
 - 3. Product Certificates: Provide the following:
 - a. Environmental Product Declarations (EPD's)
- C. Samples: For the following products:
 - 1. Floor Coverings: Full-size units for each color and texture specified.
 - 2. Exposed Metal Accessories: Approximately 10 inches in length.
 - 3. One full-size floor panel, pedestal, and understructure unit for each type of access flooring required.
- D. Samples for Initial Selection: For each type of exposed finish.

- E. Samples for Verification: For the following products:
 - 1. Floor Coverings: Full-size units.
 - 2. Exposed Metal Accessories: Approximately 10 inches in length.
 - 3. One full-size floor panel, pedestal, and understructure unit for each type of access flooring required.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and testing agency.
- B. Product Certificates: For each type of access flooring.
- C. Product Test Reports: For each type of access-flooring material and floor covering, performed by a qualified testing agency.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Panels: Ten.
 - 2. Pedestals: Ten.
 - 3. Stringers: Ten.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- B. Mockups: Build mockups to comply with Section 01 43 39 (Visual Mock-Up Requirements".
 - 1. Build mockup of typical access flooring, as shown on Drawings. Size to be an area no fewer than five floor panels in length by five floor panels in width.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 FIELD CONDITIONS

- A. Environmental Limitations: Do not install access flooring until spaces are enclosed, ambient temperature is between 50 and 90 deg F, and relative humidity is not less than 20 and not more than 70 percent.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide access flooring capable of complying with the following performance requirements according to testing procedures in Cisca's "Recommended Test Procedures for Access Floors":
1. Concentrated Loads: 2500 lbs. applied on one square inch area at any location on the panel without experiencing permanent set as defined by Cisca. The loading method used to determine design (allowable) load shall be in conformance with Cisca Concentrated Load test method but with panel tested on actual understructure instead of steel blocks.
 2. Ultimate Loads: Panel supported on actual understructure system shall be capable of supporting a point load of at least 5000 lbs. applied through a load indenter on a one square inch area at any location on the panel without failure (i.e. minimum safety factor of 2) when tested in accordance with Cisca A/F, Section 2, "Ultimate Loading".
 3. Rolling Loads: Panel supported on actual understructure system shall be able to withstand the following rolling loads at any location on the panel without developing a local and overall surface deformation greater than 0.040 inches when tested in accordance with Cisca A/F Section 3, "Rolling Loads". Note: wheel 1 and wheel 2 tests shall be performed on two separate panels.
 - a. Cisca Wheel 1: 10 passes at Size: 3" dia x 1 13/16" wide Load: 2000 lbs. Passes: 10.
 - b. Cisca Wheel 2: Size: (A) 6" dia x 2" wide Load: 2000 lbs. Passes: 10,000 (B) 10" dia. X 4" wide.
 4. Stringer Concentrated Load: Stringer shall be capable of withstanding a concentrated load of 450 lbs. placed in its midspan on a one square inch area using a round or square indenter without exceeding a permanent set of 0.010" after the load is removed when tested in accordance with Cisca A/F, Section 4, "Stringer Load Testing".
 5. Pedestal Axial Load: Pedestal support assembly shall provide a 6000 lb. axial load without permanent deformation when tested in accordance with Cisca A/F, Section 5, "Pedestal Axial Load Test".
 6. Pedestal-Overturning-Moment: Pedestal support assembly shall provide an average overturning moment of 1000 in-lbs. when glued to a clean, sound, uncoated concrete surface when tested in accordance with Cisca A/F, Section 6, "Pedestal Overturning Moment Test".
 7. Uniform Load: Panel supported on actual understructure system shall be capable of supporting a point load of at least 5000 lbs. applied through a load indenter on a one square inch area at any location on the panel without failure (i.e. minimum safety factor of 2) when tested in accordance with Cisca A/F, Section 2, "Ultimate Loading".
 8. Drop Impact Load Test: Panel shall be capable of being dropped face up onto to a concrete slab from a height of 36", after which it shall continue to meet all load performance requirements as previously defined.
- B. Fire Performance:

1. System shall meet *Class A* Flame spread requirements for flame spread and smoke development. Tests shall be performed in accordance with ASTM-E84-1998, Standard Test Method for Surface Burning Characteristics for Building Materials.
- C. Recycled Content of Access Floor System: Postconsumer recycled content plus one-half of pre-consumer recycled content not less than 50 percent.
 1. Refer to Section 01 81 13.14 "Sustainable Design Requirements - LEED v4 BD+C" for additional information and requirements for recycled content.

2.2 COMPOSITE BOARD PANEL ACCESS FLOORING

- A. Fabricate panels with particleboard core laminated to bottom steel face sheets, and with a flame-spread index of 25 or less according to ASTM E 84. Provide core edges enclosed with upturned, die-formed, bottom-sheet edge or with perimeter steel channel welded to top sheet and welded or bonded to bottom sheet. Protect metal surfaces against corrosion by manufacturer's standard factory-applied finish.
 1. Basis-of-Design Product: Subject to compliance with requirements, provide Tate Access Floors, Inc; ConCore 2500 or a comparable product by one of the following:
 - a. ASM Modular Systems, Inc.
 - b. Computer Environments, Inc.
 - c. Location: Ticketing and TSA Security areas.
 2. Basis-of-Design Product: Subject to compliance with requirements, provide Tate Access Floors, Inc; ConCore 1250 or a comparable product by one of the following:
 - a. ASM Modular Systems, Inc.
 - b. Computer Environments, Inc.
 - c. Location: Ground Transportation Level office areas and all other areas not indicated.
 3. Panels shall consist of a top steel sheet welded to a formed steel bottom pan filled internally with a lightweight cementitious material. Mechanical or adhesive methods for attachment of the steel top and bottom sheets are unacceptable.
 4. Cementitious fill material shall be totally encased within the steel welded shell except where cut for special conditions.
 5. Configuration: Provide modular panels with nominal size of 24 by 24 inches, interchangeable with other field panels without disturbing adjacent panels or understructure.
 6. Attachment to Understructure: Gravity.
 7. Low Emitting Composite Wood
 - a. Provide composite wood products that meet the California Air Resources Board (CARB), Airborne Toxic Measure ATCM requirements for ultra-low emitting formaldehyde (ULEF) resins or no added formaldehyde resins.
 - b. Refer to Section 01 81 13.14 "Sustainable Design Requirements - LEED v4 BD+C" for additional requirements.

- B. Pedestal System Understructure: System consisting of base, column with provisions for height adjustment, and head (cap); made of steel.
1. Pedestal assemblies shall be corrosive resistant, all steel welded construction, and shall provide an adjustment range of +/- 1" for finished floor heights 6" or greater. Zinc electroplating shall be prohibited on all pedestal components, including head plate, threaded rod, adjustment nut, pedestal tube, base plate, and all fasteners.
 2. Pedestal assemblies shall provide a means of leveling and locking the assembly at a selected height, which requires deliberate action to change height setting and prevents vibration displacement.
 3. Hot dip galvanized steel pedestal head shall be welded to a threaded rod which includes a specially designed adjusting nut. The nut shall provide location lugs to engage the pedestal base assembly, such that deliberate action is required to change the height setting.
 4. Threaded rod shall provide a specially designed anti-rotation device, such that when the head assembly is engaged in the base assembly, the head cannot freely rotate (for FFH of 7" or greater and Types 1A, 2B and 3B square tube bases only).
 5. Hot dip galvanized pedestal base assembly shall consist of a formed steel plate with no less than 16 inches of bearing area, welded to a 7/8" square steel tube and shall be designed to engage the head assembly.
 6. Pedestal assemblies shall be corrosive resistant, all steel welded construction, and shall provide an adjustment range of +/- 1" for finished floor heights 6" or greater. Zinc electroplating shall be prohibited on all pedestal components, including head plate, threaded rod, adjustment nut, pedestal tube, base plate, and all fasteners.
 7. Pedestal assemblies shall provide a means of leveling and locking the assembly at a selected height, which requires deliberate action to change height setting and prevents vibration displacement.
 8. Hot dip galvanized steel pedestal head shall be welded to a threaded rod which includes a specially designed adjusting nut. The nut shall provide location lugs to engage the pedestal base assembly, such that deliberate action is required to change the height setting.
 9. Threaded rod shall provide a specially designed anti-rotation device, such that when the head assembly is engaged in the base assembly, the head cannot freely rotate (for FFH of 7" or greater and Types 1A, 2B and 3B square tube bases only). Note: This prevents the assembly from inadvertently losing its leveling adjustment when panels are removed from the installation during use.
 10. Hot dip galvanized pedestal base assembly shall consist of a formed steel plate with no less than 16 inches of bearing area, welded to a 7/8" square steel tube and shall be designed to engage the head assembly.
- C. Stringer System Understructure: Modular steel stringer systems designed to bolt to pedestal heads and form a grid pattern. Protect steel components with manufacturer's standard galvanized or corrosion-resistant paint finish.
1. Stringers shall support each edge of panel.
 2. Steel stringer shall have conductive galvanized coating. Zinc electroplating shall be prohibited on stringers and stringer fasteners.

3. Stringers shall be individually and rigidly fastened to the pedestal with one machine screw for each foot of stringer length. Bolts shall provide positive electrical contact between the stringers and pedestals. Connections depending on gravity or spring action are unacceptable.
 4. Stringer grid shall be 4' stringers in a basketweave configuration ensuring maximum lateral stability in all directions.
 5. Stringers shall support each edge of panel.
 6. Steel stringer shall have conductive galvanized coating. Zinc electroplating shall be prohibited on stringers and stringer fasteners.
 7. Stringers shall be individually and rigidly fastened to the pedestal with one machine screw for each foot of stringer length. Bolts shall provide positive electrical contact between the stringers and pedestals. Connections depending on gravity or spring action are unacceptable.
 8. Stringer grid shall be 4' stringers in a basketweave configuration ensuring maximum lateral stability in all directions. (Also available in 2' x 4' and 2' x 2' grid patterns)
- D. Floor Finish: Provide factory-applied floor finish fabricated in one piece to cover entire panel face; with integral trim edging. Refer to drawings and finish key for location of each finish.
1. Resinous Matrix Terrazzo
 - a. Refer to Section 09 66 23 "Resinous Matrix Terrazzo Flooring" for color and mix.
 2. Resilient Tile
 - a. Refer to Section 09 00 01 "Finish Key" for type.
 3. Unfinished
 - a. Provide suitable surface for field installation of tile carpet. Refer to Section 09 68 13 "Tile Carpeting" for requirements.

2.3 FABRICATION

- A. Fabrication Tolerances:
1. Size: Plus or minus 0.020 inch of required size.
 2. Squareness: Plus or minus 0.015 inch between diagonal measurements across top of panel.
 3. Flatness: Plus or minus 0.035 inch, measured on a diagonal on top of panel.
- B. Panel Markings: Clearly and permanently mark floor panels on their underside with panel type and concentrated-load rating.
- C. Cutouts: Fabricate cutouts in floor panels for cable penetrations and service outlets. Provide reinforcement or additional support, if needed, to make panels with cutouts comply with structural performance requirements.
1. Number, Size, Shape, and Location: As indicated.
 2. Grommets: Where indicated, fit cutouts with manufacturer's standard grommets; or, if size of cutouts exceeds maximum grommet size available, trim edge of cutouts with manufacturer's standard plastic molding with tapered top flange. Furnish removable covers for grommets.

3. Provide foam-rubber pads for sealing annular space formed in cutouts by cables.

2.4 ACCESSORIES

- A. Panel Lifting Device: Panel manufacturer's standard portable lifting device for each type of panel required.
- B. Perimeter Support: Where indicated, provide manufacturer's standard method for supporting panel edge and forming transition between access flooring and adjoining floor coverings at same level as access flooring.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer and manufacturer's authorized representative present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
 1. Verify that substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of conditions and deleterious substances that might interfere with attachment of pedestals.
 2. Verify that concrete floor sealer and finish have been applied and cured.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Lay out floor panel installation to keep the number of cut panels at floor perimeter to a minimum. Avoid using panels cut to less than 6 inches.
- B. Locate each pedestal, complete any necessary subfloor preparation, and vacuum subfloor to remove dust, dirt, and construction debris before beginning installation.

3.3 INSTALLATION

- A. Install access flooring and accessories under supervision of access-flooring manufacturer's authorized representative to produce a rigid, firm installation that complies with performance requirements and is free of instability, rocking, rattles, and squeaks.
- B. Adjust pedestals so installed panels are flat, level, and at the proper height.
- C. Stringer Systems: Secure stringers to pedestal heads according to access-flooring manufacturer's written instructions.
- D. Install flooring panels securely in place, leaving them properly seated with panel edges flush. Do not force panels into place.
- E. Scribe perimeter panels to provide a close fit, with adjoining construction having no voids greater than 1/8 inch where panels abut vertical surfaces.

1. To prevent dusting, seal cut edges of steel-encapsulated, wood-core panels with sealer recommended in writing by panel manufacturer.
- F. Cut and trim access flooring and perform other dirt-or-debris-producing activities at a remote location or as required to prevent contamination of subfloor under installed access flooring.
- G. Grounded Access Flooring: Ground access flooring as recommended by manufacturer and as needed to comply with performance requirements for electrical resistance of floor coverings.
 1. Panel-to-Understructure Resistance: Not more than 10 ohms as measured without floor coverings.
- H. Clean dust, dirt, and construction debris caused by floor installation, and vacuum subfloor area as installation of floor panels proceeds.
- I. Install access flooring without change in elevation between adjacent panels and within the following tolerances:
 1. Plus or minus 1/16 inch in any 10-foot distance.
- J. Refer to Section 01 35 46 "Indoor Air Quality" and Section 01 74 23 "Final Cleaning" for additional requirements.

3.4 PROTECTION

- A. Prohibit traffic on access flooring for 24 hours and removal of floor panels for 72 hours after installation, to allow pedestal adhesive to set.
- B. Replace access-flooring panels that are stained, scratched, or otherwise damaged or that do not comply with specified requirements.

END OF SECTION 09 69 00

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections (including all sustainability requirements), apply to this Section.

1.2 SUMMARY

- A. Section includes dimension stone paneling on interior walls.
- B. Related Requirements:
 - 1. Section 07 92 00 "Joint Sealants" for sealing joints in stone paneling system with elastomeric sealants.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: For each manufactured product.
- B. Sustainable Design Submittals:
- C. Sustainable Design Documentation Submittals: Refer to section 01 81 13.14 "Sustainable Design Requirements – LEED V4 BD+C".
 - 1. Product Data: Documentation for Low Emitting Materials
 - a. Low Emitting Materials for Adhesives and Sealants
 - 2. Product Certificates: Provide the following:
 - a. Health Product Declarations (HPD's)
- D. Shop Drawings: Show fabrication and installation details for stone paneling system, including dimensions and profiles of stone units.
 - 1. Show locations and details of joints both within stone paneling system and between stone paneling system and other finish materials.
- E. Samples for Verification:
 - 1. For each stone type indicated, in sets of Samples not less than 12 inches square. Include three or more Samples in each set and show the full range of variations in appearance characteristics in completed Work.
 - 2. For each color of grout and sealant required.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Material Test Reports:

1. Sealant Compatibility and Adhesion Test Report: From sealant manufacturer indicating that sealants will not stain or damage stone. Include interpretation of test results and recommendations for primers and substrate preparation needed for adhesion.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For stone paneling to include in maintenance manuals. Include product data for stone-care products used or recommended by Installer and names, addresses, and telephone numbers of local sources for products.

1.7 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate stone paneling similar to that required for this Project, and whose products have a record of successful in-service performance.
- B. Installer Qualifications: Fabricator of stone paneling.
- C. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for fabrication and installation.
 1. Refer to Section 01 43 39 "Visual Mock-Up Requirements" for additional requirements.
 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store and handle stone and related materials to prevent deterioration or damage due to moisture, temperature changes, contaminants, corrosion, breaking, chipping, and other causes.
 1. Lift stone with wide-belt slings; do not use wire rope or ropes that might cause staining. Move stone, if required, using dollies with cushioned wood supports.
 2. Store stone on wood A-frames or pallets with nonstaining, waterproof covers. Arrange to distribute weight evenly and to prevent damage to stone. Ventilate under covers to prevent condensation.
- B. Mark stone units, on surface that will be concealed after installation, with designations used on Shop Drawings to identify individual stone units. Orient markings on vertical panels so that they are right side up when units are installed.
- C. Deliver sealants to Project site in original unopened containers labeled with manufacturer's name, product name and designation, color, expiration period, pot life, curing time, and mixing instructions for multicomponent materials.
- D. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

- A. Maintain air and material temperatures to comply with requirements of installation material manufacturers, but not less than 50 deg F during installation and for seven days after completion.
- B. Field Measurements: Verify dimensions of construction to receive stone paneling by field measurements before fabrication and indicate measurements on Shop Drawings.

1.10 COORDINATION

- A. Coordinate installation of inserts that are to be embedded in concrete or masonry and similar items to be used by stone paneling Installer for anchoring and supporting stone paneling. Furnish setting drawings, templates, and directions for installing such items and deliver to Project site in time for installation.
- B. Time delivery and installation of stone paneling to avoid extended on-site storage and to coordinate with work adjacent to stone paneling.

PART 2 - PRODUCTS

2.1 QUARTZ-BASED STONE ST1

- A. Health Product Declaration: Provide Health Product Declaration (HPD) with full disclosure of known hazards in compliance with the Health Product Declaration Open Standard
- B. Basis-of-Design Product: Subject to compliance with requirements, provide metal framed wall paneling as indicated in Section 09 00 01 "Finish Key" or comparable approved product meeting all requirements including sustainability requirements.
 - 1. Refer to Sections 01 2500 "Substitution Procedures" and 01 6000 "Product Requirements" for comparable product requirements.
- C. Finish: As indicated.

2.2 SETTING MATERIALS

- A. Molding Plaster: ASTM C 59/C 59M.
- B. Portland Cement: ASTM C 150/C 150M, Type I or Type II.
 - 1. Low-Alkali Cement: Not more than 0.60 percent total alkali when tested according to ASTM C 114.
- C. Hydrated Lime: ASTM C 207, Type S.
- D. Aggregate: ASTM C 144.
- E. Water: Potable.

- A. Joint Sealants: Manufacturer's standard sealants that comply with applicable requirements in Section 07 92 00 "Joint Sealants" and will not stain the stone they are applied to.
 - 1. Use mildew-resistant joint sealant at plumbing fixtures and for control and expansion joints in toilet rooms and other wet locations.
 - 2. Colors: Provide colors of exposed sealants to match other joints in stone adjoining sealed joints unless otherwise indicated.

2.4 ADHESIVES

- A. Two component, high strength epoxy adhesive formulated to bonding stone installations on vertical surfaces.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide LATACRETE International, Inc., Latapoxy 310 or comparable product meeting all requirements including sustainability requirements by, but not limited to, the following manufacturers.
 - a. PROFLEX Products, Inc.
 - b. MAPEI Corporation
 - c. SGM, Inc.
 - 2. Health Product Declaration: Provide Health Product Declaration (HPD) with full disclosure of known hazards in compliance with the Health Product Declaration Open Standard
 - 3. Low Emitting Adhesives and Sealants
 - a. Provide manufacture statements that confirm that the product used meets the California Department of Public Health (CDPH) Standard Method v1.1 2010 using the applicable exposure scenario.
 - b. Refer to Section 01 81 13.14 "Sustainable Design Requirements - LEED v4 BD+C" for additional requirements.
 - c.

2.5 STONE ACCESSORIES

- A. Temporary Setting Shims: Rigid plastic shims, nonstaining to stone, sized to suit joint thickness.
- B. Setting Shims for Direct-Mount Anchoring Systems: Strips of resilient plastic or neoprene, nonstaining to stone, of thickness needed to prevent point loading of stone on anchors and of depths to suit anchors without intruding into required depths of pointing materials.
- C. Cleaner: Stone cleaner specifically formulated for stone types, finishes, and applications indicated, as recommended by stone producer. Do not use cleaning compounds containing acids, caustics, harsh fillers, or abrasives.

2.6 STONE FABRICATION, GENERAL

- A. Select stone for intended use to prevent fabricated units from containing cracks, seams, and starts that could impair structural integrity or function.

1. Repairs that are characteristic of the varieties specified are acceptable provided they do not impair structural integrity or function and are not aesthetically displeasing, as judged by Architect.
- B. Fabricate stone paneling in sizes and shapes required to comply with requirements indicated.
- C. Cut stone to produce pieces of thickness, size, and shape indicated and to comply with fabrication and construction tolerances recommended by applicable stone association.
 1. Where items are installed with adhesive or where stone edges are visible in the finished work, make items uniform in thickness and of identical thickness for each type of item; gage back of stone if necessary.
 2. Clean sawed backs of stones to remove rust stains and iron particles.
 3. Dress joints straight and at right angle to face unless otherwise indicated.
 4. Cut and drill sinkages and holes in stone for anchors, supports, and lifting devices as indicated or needed to set stone securely in place; shape beds to fit supports.
 5. Provide openings, reveals, and similar features as needed to accommodate adjacent work.
- D. Finish exposed faces and edges of stone to comply with requirements indicated for finish of each stone type required and to match approved Samples and mockups.
- E. Carefully inspect finished stone units at fabrication plant for compliance with requirements for appearance, material, and fabrication. Replace defective units.
 1. Grade and mark stone for overall uniform appearance when assembled in place. Natural variations in appearance are acceptable if installed stone units match range of colors and other appearance characteristics represented in approved Samples.

2.7 STONE PANELING ON WALLS

- A. Arrange panels in shop or other suitable space in proposed orientation and sequence for examination by Architect. Mark units with temporary sequence numbers to indicate position in proposed layout.
 1. Lay out one elevation at a time if approved by Architect.
 2. Notify Architect seven days in advance of date and time when layout will be available for viewing.
 3. Provide lighting of similar type and level as that of final installation for viewing layout unless otherwise approved by Architect.
 4. Rearrange panels as directed by Architect until layout is approved.
 5. Do not trim nonmodular-size units to less than modular size until after Architect's approval of layout, unless otherwise approved by Architect.
 6. Mark backs of units and Shop Drawings with sequence numbers based on approved layout. Mark backs of units to indicate orientation of units in completed Work.
- B. Nominal Thickness: As indicated.

- C. Cut stone to produce uniform joints 1/16 inch wide and in locations indicated.
- D. Pattern Arrangement: Fabricate and arrange panels with veining and other natural markings to comply with the following requirements:
 - 1. Arrange panels with veining as indicated on Drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces to receive stone paneling and conditions under which stone paneling will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of stone paneling.
- B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of stone paneling.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SETTING STONE, GENERAL

- A. Before setting stone, clean surfaces that are dirty or stained by removing soil, stains, and foreign materials. Clean stone by thoroughly scrubbing with fiber brushes and then drenching with clear water. Use only mild cleaning compounds that contain no caustic or harsh materials or abrasives.
- B. Do necessary field cutting as stone is set. Use power saws with diamond blades to cut stone. Cut lines straight and true, with edges eased slightly to prevent snapping.
- C. Contiguous Work: Provide reveals and openings as required to accommodate contiguous work.
- D. Set stone to comply with requirements indicated. Install anchors, supports, fasteners, and other attachments indicated or necessary to secure stone in place. Shim and adjust anchors, supports, and accessories to set stone accurately in locations indicated, with edges and faces aligned according to established relationships and indicated tolerances.
- E. Erect stone units level, plumb, and true with uniform joint widths. Use temporary shims to maintain joint width.
- F. Provide expansion, control, and pressure-relieving joints of widths and at locations indicated.
 - 1. Sealing of expansion and other joints is specified in Section 07 92 00 "Joint Sealants."
 - 2. Keep expansion joints free of plaster, mortar, grout, and other rigid materials.

3.3 CONSTRUCTION TOLERANCES

- A. Variation from Plumb: For vertical lines and surfaces, do not exceed 1/8 inch in 96 inches, 1/4 inch maximum.

- B. Variation from Level: For lintels, sills, chair rails, horizontal bands, horizontal grooves, and other conspicuous lines, do not exceed 1/8 inch in 10 feet, 1/4 inch in 20 feet, 3/8 inch maximum.
- C. Variation of Linear Building Line: For position shown in plan and related portion of walls and partitions, do not exceed 1/8 inch in 10 feet, 1/4 inch in 20 feet, 3/8 inch maximum.
- D. Variation in Cross-Sectional Dimensions: For thickness of walls from dimensions indicated, do not exceed plus or minus 1/8 inch.
- E. Variation in Joint Width: Do not vary from average joint width more than plus or minus 1/16 inch or one-fourth of nominal joint width, whichever is less.
- F. Variation in Plane between Adjacent Stone Units (Lipping): Do not exceed 1/32-inch difference between planes of adjacent units.

3.4 INSTALLATION OF STONE FACING

- A. Set units firmly against setting spots. Locate setting spots at anchors and spaced not more than 18 inches apart across back of unit, but provide no fewer than one setting spot per 2 sq. ft. unless otherwise indicated.
- B. Fill joints with sealant after setting stone.

3.5 JOINT-SEALANT INSTALLATION

- A. Prepare joints and apply sealants of type and at locations indicated to comply with applicable requirements in Section 07 92 00 "Joint Sealants." Remove temporary shims before applying sealants.

3.6 ADJUSTING AND CLEANING

- A. In-Progress Cleaning: Clean stone paneling as work progresses. Remove adhesive, grout, mortar, and sealant smears immediately.
- B. Remove and replace stone paneling of the following description:
 - 1. Broken, chipped, stained, or otherwise damaged stone. Stone may be repaired if methods and results are approved by Architect.
 - 2. Defective stone paneling.
 - 3. Defective joints, including misaligned joints.
 - 4. Stone paneling and joints not matching approved Samples and mockups.
 - 5. Stone paneling not complying with other requirements indicated.
- C. Replace in a manner that results in stone paneling that matches approved Samples and mockups, complies with other requirements, and shows no evidence of replacement.
- D. Clean stone paneling no fewer than six days after completion of grouting and pointing, using clean water and soft rags or stiff-bristle fiber brushes. Do not use wire brushes, acid-type cleaning agents, cleaning compounds with caustic or harsh fillers, or other materials or methods that could damage stone.

- E. Sealer Application: Apply stone sealer to comply with stone producer's and sealer manufacturer's written instructions and recommendations.

3.7 PROTECTION

- A. Protect stone surfaces, edges, and corners from construction damage. Use securely fastened untreated wood, plywood, or heavy cardboard to prevent damage.
 - 1. Provide composite wood products that meet the California Air Resources Board (CARB), Airborne Toxic Measure ATCM requirements for ultra-low emitting formaldehyde (ULEF) resins or no added formaldehyde resins.
 - 2. Refer to Section 01 81 13.14 "Sustainable Design Requirements - LEED v4 BD+C" for additional requirements.
- B. Before inspection for Substantial Completion, remove protective coverings and clean surfaces.

END OF SECTION 09 75 13

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Flush phenolic wall paneling.
 - 2. Quartz-based wall paneling.
 - 3. Plastic laminate faced wall paneling.
 - 4. Interior wall panel attachment system.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product, including panel products, adhesives, fire-retardant-treated materials, composite wood, high-pressure decorative laminate, and finishing materials and processes.
 - 1. Include data for fire-retardant treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.
- B. Sustainable Design Documentation Submittals: Refer to section 01 81 13.14 "Sustainable Design Requirements – LEED V4 BD+C".
 - 1. Product Data: Documentation for Leadership Extraction Practices in the following:
 - a. Leadership Extraction Practices for Recycled Content
 - 2. Product Data: Documentation for Low Emitting Materials
 - a. Low Emitting Materials for Adhesives and Sealants
 - 3. Product Certificates: Provide the following:
 - a. Environmental Product Declarations (EPD's)
- C. Shop Drawings: Show location of paneling, large-scale details, attachment devices, and other components. Include dimensioned plans and elevations.
 - 1. Show details full size.
 - 2. Show locations and sizes of furring and blocking, including concealed blocking specified in other Sections.
 - 3. For paneling produced from premanufactured sets, show finished panel sizes, set numbers, sequence numbers within sets, and method of cutting panels to produce indicated sizes.
- D. Samples for Initial Selection:
 - 1. Flush phenolic paneling.
- E. Samples for Verification:
 - 1. Flush phenolic paneling products, 12 by 12 inches, for each finish specified.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of product.

- B. Evaluation Reports: For fire-retardant-treated materials and fire-retardant-treated paneling, from ICC-ES.

1.5 QUALITY ASSURANCE

- A. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Build mockups of typical paneling as shown on Drawings.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver paneling until painting and similar operations that could damage paneling have been completed in installation areas. If paneling must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

1.7 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install paneling until building is enclosed, wet work is complete, and HVAC system is operating and will maintain temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Field Measurements: Where paneling is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 - 1. Locate concealed framing, blocking, and reinforcements that support paneling by field measurements before being enclosed and indicate measurements on Shop Drawings.
- C. Established Dimensions: Where paneling is indicated to fit to other construction, establish dimensions for areas where woodwork is to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.8 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that paneling can be installed as indicated.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: 75 or less.
 - 2. Smoke-Developed Index: 450 or less.

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Flush Wall Paneling as indicated in Section 09 00 01 "Finish Key" or comparable approved product meeting all requirements including sustainability requirements.
 - 1. Refer to Sections 01 2500 "Substitution Procedures" and 01 6000 "Product Requirements" for comparable product requirements.

2.3 QUARTZ-BASED WALL PANELING

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Quartz-Based Stone Wall Facing as indicated in Section 09 00 01 "Finish Key" or comparable approved product meeting all requirements including sustainability requirements.
 - 1. Refer to Sections 01 25 00 "Substitution Procedures" and 01 60 00 "Product Requirements" for comparable product requirements.

2.4 PLASTIC-LAMINATE-FACED WOOD PANELING

- A. Grade: Premium.
- B. Plastic Laminate: High-pressure decorative laminate complying with NEMA LD 3 and the following requirements:
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide plastic laminate as indicated in Section 09 00 01 "Finish Key" or comparable approved product meeting all requirements including sustainability requirements.
 - a. Refer to Sections 01 25 00 "Substitution Procedures" and 01 60 00 "Product Requirements" for comparable product requirements.
 - 2. Faces: Grade HGS.
 - 3. Backs: Grade BKV.
 - 4. Exposed Edges: Same as faces.
- C. Panel Core: MDF.
 - 1. Thickness: $\frac{3}{4}$ -inch.
- D. Exposed Panel Edges: Plastic-laminate matching faces.
- E. Adhesives for Bonding Plastic Laminate: Unpigmented contact cement.
 - 1. Adhesive for Bonding Edges: Hot-melt adhesive or adhesive specified above for faces.
 - 2. Low Emitting Adhesives and Sealants for field application
 - a. Provide manufacture statements that confirm that the product used meets the California Department of Public Health (CDPH) Standard Method v1.1 2010 using the applicable exposure scenario.
 - b. Refer to Section 01 81 13.14 "Sustainable Design Requirements - LEED v4 BD+C" for additional requirements.

2.5 STAINLESS STEEL-FACED WOOD PANELING

- A. Grade: Premium.
- B. Stainless-Steel Sheet: ASTM A 240/A 240M, stainless steel, Type 304.

1. Thickness: 1.5mm
- C. Panel Core: MDF
 1. Thickness: 3/4-inch.
- D. Exposed Panel Edges: Wrap face material.
- E. Adhesives for Bonding Stainless Steel: Unpigmented contact cement.
 1. Low Emitting Adhesives and Sealants for field application
 - a. Provide manufacture statements that confirm that the product used meets the California Department of Public Health (CDPH) Standard Method v1.1 2010 using the applicable exposure scenario.
 - b. Refer to Section 01 81 13.14 "Sustainable Design Requirements - LEED v4 BD+C" for additional requirements.

2.6 VERTICAL SURFACING PANEL

- A. Basis-of-Design Product: Subject to compliance with requirements, provide vertical surface panel as indicated in Section 09 00 01 "Finish Key" or comparable approved product meeting all requirements including sustainability requirements.
 1. Refer to Sections 01 2500 "Substitution Procedures" and 01 6000 "Product Requirements" for comparable product requirements.
- B. Panel Core: MDF
 1. Thickness: 3/8-inch.

2.7 WALL PANEL ATTACHMENT SYSTEM

- A. Flush phenolic paneling
 1. Products: Subject to compliance with requirements, provide the following:
 - a. Wall Panel Systems, Inc., 3/4" Shadow Line System.
- B. Quartz-based wall paneling
 1. Products: Subject to compliance with requirements, provide the following:
 - a. Monarch Metal Fabrication, MF375 Clip.
 2. Stainless steel reveal: 16 ga. sheet metal.
- C. Plastic laminate and paneling
 1. Products: Subject to compliance with requirements, provide the following:
 - a. Wall Panel Systems, Inc., 3/4" Shadow Line System.
- D. Vertical surface paneling
 1. Products: Subject to compliance with requirements, provide the following:
 - a. Fry Geglet Corporation, Graph 3/4.
 2. Finish: Clear anodized.
 3. Framing Assemblies: as indicated.
- E. Stainless steel paneling
 1. Wall Panels: Subject to compliance with requirements, provide the following:
 - a. Wall Panel System, Inc., Complete Reveal System Butt Joint
 2. Floor Panels: Subject to compliance with requirements, provide the following:
 - a. Wall Panel System, Inc., ES 500 Concealed Fastening system

3.1 PREPARATION

- A. Ensure substrate is constructed to sufficiently accommodate attachment of the wall panel system.
- B. Before installation, condition paneling to average prevailing humidity conditions in installation areas.
- C. Before installing paneling, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

3.2 INSTALLATION

- A. Install paneling level, plumb, true, and straight with no distortions. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches. Install with no more than 1/16 inch in 96-inch vertical cup or bow and 1/8 inch in 96-inch horizontal variation from a true plane.
- B. Anchor paneling to supporting substrate with concealed panel-hanger clips and splined connection strips. Do not use face fastening unless otherwise indicated.

3.3 ADJUSTING AND CLEANING

- A. Repair damaged and defective paneling, where possible, to eliminate defects; where not possible to repair, replace paneling. Adjust for uniform appearance.
- B. Clean paneling on exposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.
 - 1. Refer to Section 01 35 46 "Indoor Air Quality" and Section 01 74 23 "Final Cleaning" for additional requirements.

END OF SECTION 09 78 00

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections (including all sustainability requirements), apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Acoustic plaster ceiling systems.
- B. Related Sections include the following:
 - 1. Division 09 Section "Finish Key" for finish selections.
 - 2. Division 09 Section "Non-Structural Metal Framing" for supports for acoustic plaster ceiling systems.
 - 3. Division 09 Section "Gypsum Board" for substrates for acoustic plaster ceiling systems.

1.3 SUBMITTALS

- A. Product Data: For each component of acoustic plaster ceiling systems indicated. Include construction details relative to materials, individual components and profiles, finishes, and fire ratings (if required).
- B. Sustainable Design Documentation Submittals: Refer to section 01 81 13.14 "Sustainable Design Requirements – LEED V4 BD+C".
 - 1. Product Data: Documentation for Low Emitting Materials
 - a. Low Emitting Materials for Adhesives and Sealants
- C. Shop Drawings: Show dimensioned ceiling plans with control joint locations, mounting details, transition details to adjacent work, design, weight, thickness, color and other data necessary to install the work and coordinate work with other affected trades.
- D. Samples: Provide 8-1/2" x 11" samples of the acoustical finish system on solid substrate in color indicated in Division 09 Section "Finish Key."
- E. Acoustical Performance Data:
 - 1. Provide Certified Acoustical Performance Sound Absorption Test Report data, conducted by a recognized, independent, testing agency, shall be submitted upon request and meet the following minimum requirements. Sound absorption reports shall not be more than 3 years old. Noise Reduction Coefficient (NRC) for the 1.18" (30mm) system shall be 0.75 per ASTM C 423-07 Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method. Specific performance of the 1.18" seamless absorptive plaster system shall be as follows:

Frequency, Hz	Absorption Coefficient
100	0.08

125	0.11
200	0.23
250	0.39
400	0.55
800	1.03
1,000	1.00
1,250	1.03
1,600	0.91
2,000	0.82
2,500	0.78
4,000	0.74
5,000	0.71

F. Fire Test Data:

1. Certified Reports on Surface Burning Characteristics Determined by ASTM E 84 Twenty-Five Foot Tunnel Furnace Test Method, conducted by a recognized, independent, testing agency, shall be submitted upon request and meet the following minimum requirements:
 - a. Class A Flame Spread Classification
 - 1) 0 – 25 Flame Spread
 - 2) 0 – 10 Smoke Development

G. Light Reflectance Coefficient Test Data:

1. Certified Reports on Light Reflectance Coefficient Performance Determined by ASTM E 1477-98 Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating Sphere Reflectometer, conducted by a recognized, independent, testing agency, shall be submitted upon request and meet the following minimum requirements:
 - a. Light Reflectance Value
 - 1) D65 (Daylight) 0.78 or greater
 - 2) CWF2 (Cool White Fluorescent) 0.79 or greater

H. Coordination Drawings: Reflected ceiling plans drawn to scale and coordinating penetrations and ceiling-mounted items with concealed framing, suspension systems, piping, ductwork, and other construction. Show the following:

1. Ceiling-mounted items including access doors and frames, lighting fixtures, diffusers, grilles, speakers, sprinklers, and special trim.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain all materials through one source from a single manufacturer.
- B. Size Variations: Obtain Architect's acceptance of manufacturer's standard-size units, which may vary slightly from sizes indicated.
- C. Mock Ups: Install a 4' x 4' mock-up of the sound absorptive finish system replicating relative details and conditions in location identified by Design Builder. Obtain mock-up acceptance from Architect before any additional applications. Accomplish work to equal, or exceed standard established by accepted job site mock-up.
 1. Refer to Section 01 43 39 "Visual Mock-up Requirements" for additional requirements.

1.5 PROJECT CONDITIONS

- A. Environmental Requirements: Comply with requirements of referenced plaster application standards and recommendations of product manufacturer for environmental conditions before, during and after installation.
- B. Cold Weather Requirements: When ambient outdoor temperatures are below 40 deg F, maintain a continuous uniform indoor temperature of at least 50 deg F for at least 3 days before beginning the material application, during its application and until material is dry, but for at least 7 days after application is complete. Distribute heat evenly; prevent concentrated or uneven heat from contacting the materials.
- C. Ventilation: Ventilate building spaces as required to remove excess moisture to promote drying of the applied materials.
- D. Protect contiguous work form soiling, splattering, moisture deterioration and other harmful effects that may be caused by the application of the materials.
- E. Work is not to be performed until a minimum of 50fc of light is available on the work surface.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For finishes to include in maintenance manuals.
- B. Warranty: Manufacturer's standard 5-year warranty.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design: Subject to compliance with requirements, provide BASWA Acoustic North America; "BASWApheon Sound Absorptive Acoustical Finish System" or comparable product by one of the following:
 - 1. Fellert North America.
 - 2. Pyrok; "StarSilent."

2.2 MATERIALS

- A. Acoustical plaster shall be provided in a total system thickness (adhesive, pre-coated mineral wool panels, base coat and top coat) as indicated in Section 09 00 01 "Finish Key".
- B. The seamless sound absorption system shall consist of pre-coated mineral wool supporting panels, panel adhesive, fill, a base coat and a finish coat.
- C. Trim Pieces:
 - 1. All corner beads, reveals, terminations, control joints or other trim pieces shall be white vinyl, manufactured by Trim-Tex or Vinyl Corp. in profiles approved by Architect.
 - a. Low Emitting Adhesives and Sealants
 - 1) Provide manufacture statements that confirm that the product used meets the California Department of Public Health (CDPH)

Standard Method v1.1 2010 using the applicable exposure scenario.

- 2) Refer to Section 01 81 13.14 "Sustainable Design Requirements - LEED v4 BD+C" for additional requirements.

D. Base and top coats color: as indicated in Section 09 00 01 "Finish Key".

PART 3 - EXECUTION

3.1 PREPARATION

- A. Advise installers of other work about specific requirements relating to acoustical plaster ceiling system installation, as well as locations of supports, inserts, and anchoring devices.

3.2 INSPECTION

- A. Examine, with the Design Builder and Installer present, areas where, and conditions under which, acoustical plaster ceiling system is to be installed. Correct any conditions detrimental to the proper and timely completion of the work. Do not proceed until unsatisfactory conditions have been corrected in order to permit the proper installation of the work.
- B. Verify that all mechanical and electrical services within the area of application have been roughed in at the appropriate depth relative to the thickness of the system; tested and approved, prior to commencement of application. Review approved details provided by acoustical plaster ceiling system manufacturer for verification.

3.3 ACCEPTABLE SUBSTRATE

- A. General:
 1. All acoustical plaster ceiling systems must be installed over a "sealed air tight" substrate. All penetrations shall be "closed off" to prevent air from passing through the acoustical plaster ceiling system thereafter through the substrate and then into the plenum above, or vice versa.
 2. All HVAC, electrical, fire sprinkler and other penetrations of the substrate shall be sealed with traditional drywall tape or a self-adhesive fire tape to prevent air movement between the plenum and finished space or vice versa.
 3. Adhesive Strength required for bonding to the substrate surface for the application of the acoustical plaster ceiling system is a minimum of 17 N/psf.
 4. Plywood substrates are not acceptable due to the potential of excessive expansion and contraction movement.
 5. All substrates for the application shall not vary from plumb, level, or a "smooth consistent curvature" by more than $\frac{1}{4}$ inch in 12 feet.
- B. Substrate Material:
 1. Drywall substrates receiving acoustical plaster systems shall be a Level One finish; taped only.

3.4 INSTALLATION

- A. Comply with manufacturer's written instructions for installing acoustic plaster systems.

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ACOUSTICAL PLASTER SYSTEMS

SECTION 09 82 60

- B. Installation shall start only after all other work in the area of installation is complete.

END OF SECTION 09 82 60

SECTION 09 83 16 - SPRAY APPLIED ACOUSTICAL FINISH SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes sprayed cellulose finish system.
- B. Related Items:
 - 1. Clips, hangers, supports, sleeves and other attachments to spray bases are to be placed by other trades prior to the application of sprayed insulation.
 - 2. Ducts, piping, conduit or other suspended equipment shall not be positioned until after the application of sprayed insulation.

1.2 SUBMITTALS

- A. Copy of manufacturer's ISO 9001:2008 Certification.
- B. Test reports indicating compliance with the requirements listed.
- C. Manufacturer's written certification that product contains no asbestos, fiberglass or other man-made mineral fibers.
- D. Sustainable Design Documentation Submittals: Refer to section 01 81 13.14 "Sustainable Design Requirements – LEED V4 BD+C".
 - 1. Product Data: For Leadership Extraction Practices in the following:
 - a. Leadership Extraction Practices for Recycled Content
 - 2. Product Data: Documentation for Low Emitting Materials
 - a. Low Emitting Materials for Paints and Coatings

1.3 QUALITY ASSURANCE

- A. Manufacturer must have a current listing with Underwriters Laboratories (UL) Code Evaluation Report.
- B. Manufacturer must be ISO 9001:2008 Certified.
- C. Applicator: Licensed by manufacturer.
- D. Manufacturer must subscribe to independent laboratory follow-up inspection services of Underwriters Laboratories. Each bag shall be labeled accordingly.
- E. Mock-up: Apply a 100 square foot representative sample to be reviewed by the Architects and/or Owner prior to proceeding.
 - 1. Refer to Section 01 43 39 "Visual Mock-up Requirements" for additional requirements.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Deliver in original, unopened containers bearing name of manufacturer, product identification and reference to U.L. testing.
- B. Store materials dry, off ground and under cover.

- C. Protect liquid adhesive from freezing.

PART 2 - PRODUCTS

2.1 PRODUCTS

1. Basis-of-Design Product: Subject to compliance with requirements, provide International Cellulose Corporation; Sonaspray "FC" Acoustical Finish or comparable product by one of the following:
 - a. Acoustical Surfaces, Inc.
 - b. United States Gypsum Company.
2. Color to match Architect's sample.

2.2 SPRAY-APPLIED ACOUSTICAL FINISH CHARACTERISTICS

- A. NRC values per ASTM C-423 conducted by a NVLAP certified testing laboratory:

Spray Applied Acoustical Finish System on Solid Backing							
Thickness	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	NRC
0.50"	.00	.14	.49	.87	1.00	.99	.65
1.00"	.05	.40	.94	1.04	.97	.99	.85

Spray Applied Acoustical Finish System on Ribbed Metal Deck							
Thickness	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	NRC
0.75"	.17	.58	.91	.89	.87	.84	.80

- B. Flame Spread Index: 5 ASTM E-84/UL 723
- C. Smoke Developed: 5 ASTM E-84/UL 723
- D. Bond Strength >600 psf ASTM E-736
- E. Compression Strength >400 psf ASTM E-761
- F. Comply with Florida Building Code, Building 803.3 stability requirements for interior finishes.
- G. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of pre-consumer recycled content not less than 25 percent.
1. Refer to Section 01 81 13.14 "Sustainable Design Requirements - LEED v4 BD+C" for additional information and requirements for recycled content.
- H. Provide manufacture statements that confirm that the product used meets the California Department of Public Health (CDPH) Standard Method v1.1 2010 using the applicable exposure scenario.
1. Refer to Section 01 81 13.14 "Sustainable Design Requirements - LEED v4 BD+C" for additional requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces and report unsatisfactory conditions in writing. Do not proceed until unsatisfactory conditions are corrected.

- B. Verify surfaces to receive spray insulation to determine if priming/sealing is required to ensure bonding and/or to prevent discoloration caused by migratory stains.

3.2 PREPARATION

- A. Provide masking, drop cloths or other satisfactory coverings for materials/surfaces that are not to receive insulation to protect from over-spray.
- B. Coordinate installation of the sprayed cellulose fiber with work of other trades.
- C. Prime surfaces as required by manufacturer's instructions or as determined by examination.

3.3 INSTALLATION

- A. Average thickness to achieve NRC as indicated.
- B. Install spray applied acoustical finish according to manufacturer's recommendations.
- C. Cure material with continuous natural or mechanical ventilation.
- D. Remove and dispose of over spray.

END OF SECTION 09 83 16

SECTION 09 84 00 - METAL WALL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections (including all sustainability requirements), apply to this Section.

1.2 SUMMARY

- A. Section includes metal wall panel systems.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: Submit manufacturer's technical data for each type of metal wall panel.
- B. Sustainable Design Documentation Submittals: Refer to section 01 81 13.14 "Sustainable Design Requirements – LEED V4 BD+C".
 - 1. Product Data: Documentation for Leadership Extraction Practices in the following:
 - a. Leadership Extraction Practices for Recycled Content
 - 2. Product Data: Documentation for Low Emitting Materials
 - a. Low Emitting Materials for Paints and Coatings (applied on-site only)
 - b. Low Emitting Materials for Adhesives and Sealants
 - 3. Product Certificates: Provide the following:
 - a. Environmental Product Declarations (EPD's)
- C. Shop Drawings: Show fabrication and installation details for wall panels.
- D. Coordination Drawings: Show all items to be attached to and inserted into the wall panels.
- E. Samples for Initial Selection: For products involving selection of color, texture, or design.
- F. Samples for Verification: For each type of exposed finish required, prepared on 6-inch-square Samples of metal of same thickness and material indicated for the Work.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Certificates: For each type of product.

- A. Manufacturer: Firm with manufacturing and delivery capacity required for the project, shall have successfully completed at least ten projects within the past five years, utilizing systems, materials and techniques as herein specified.
- B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.
 - 1. Build in-place mockups in location as selected by the Architect.
 - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver wall panels wrapped in protective coverings and strapped together in suitable packs or in heavy-duty cartons. Remove protective coverings before they stain or bond to finished surfaces.

PART 2 - PRODUCTS

2.1 METAL WALL SYSTEMS, GENERAL

- A. Basis-of-Design Manufacturer: Subject to compliance with requirements, provide metal wall systems by Gordon, Inc. or comparable products by one of the following manufacturers meeting all requirements including sustainability requirements.
 - 1. BellPro Architectural, LLC.
 - 2. C.R. Laurence Co., Inc.
 - 3. Fry Reglet Architectural Metals

2.2 MATERIALS

- A. Metal Wall Panel System, secondary framing, anchors, clips and extrusion shall be provided as complete package of this work. No exposed fasteners for metal closures are allowed.
- B. Provide metals free from surface blemishes where exposed to view in finished unit. Surfaces exhibiting pitting, seam marks, roller marks, stains, discolorations, or other imperfections on finished units are not acceptable.
- C. Steel sheet, 0.0598 inch thick.
 - 1. Finish: Custom Powder Coat
 - 2. Color: Match Benjamin Moore, Dove White (OC17)
 - 3. Smooth, High-Gloss
- D. Mounting Accessories
 - 1. For surface mounting to structural wall, furnish Z Clips in extruded aluminum.
- E. Recycled Content: Postconsumer recycled content plus one-half of pre-consumer recycled content not less than 35 percent.
 - 1. Refer to Section 01 81 13.14 "Sustainable Design Requirements - LEED v4 BD+C" for additional information and requirements for recycled content.

- F. Environmental Product Disclosure: Provide an Environmental Product Declarations (EPD) that conforms with one of the following:
1. Product specific declarations in accordance with ISO 1404
 2. Environmental Product Declarations conforming to ISO 14025, 14040, 14044 and EN 15804 or ISO 21930
 3. Industry Wide Product Specific Type III EPD Third Party Certification

2.3 FABRICATION, GENERAL

- A. Coordinate dimensions and attachment methods of wall panels with those of adjoining construction to produce integrated assemblies with closely fitting joints and with edges and surfaces aligned unless otherwise indicated.
- B. Form metal to profiles indicated, in maximum lengths to minimize joints. Produce flat, flush, oil-can free surfaces without cracking or grain separation at bends.

2.4 GENERAL FINISH REQUIREMENTS

- A. Complete mechanical finishes of flat sheet metal surfaces before fabrication where possible. After fabrication, finish all joints, bends, abrasions, and other surface blemishes to match sheet finish.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of column covers.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install wall panels in accordance with manufacturer's written installation instructions and shop drawings.
- B. Wall Panels shall be erected plumb, level, square, true to line, securely anchored, and in proper alignment and relationship to work of other trades. Exterior joints shall be sealed by installer with backer rods and sealant.
- C. Wall Panels shall be inspected before installation and shall be free from dents, scratches, and other defects.

- A. Removal of protective covering shall occur immediately after installation to prevent adhesive transfer.
- B. Clean all surfaces following installation according to manufacturer's written instructions.
 - 1. Cleaning: Refer to section 01 74 23 "Final Cleaning" for approved cleaning products.

3.4 PROTECTION

- A. Protect finishes from damage during construction period. Remove temporary protective coverings at time of Substantial Completion.

END OF SECTION 09 84 00

SECTION 09 84 33 - SOUND-ABSORBING WALL UNITS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes shop-fabricated, fabric-wrapped panel units tested for acoustical performance, including:
 - 1. Sound-absorbing wall panels.
- B. Related Sections:
 - 1. Section 09 00 01 "Finish Key" for finish selection information.

1.2 DEFINITIONS

- A. NRC: Noise Reduction Coefficient.
- B. SAA: Sound Absorption Average.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of fabric facing, panel edge, core material, and mounting indicated.
- B. Sustainable Design Submittals:
 - 1. Product Data: Documentation for Low Emitting Materials
- C. Shop Drawings: For sound-absorbing wall units. Include mounting devices and details; details at panel head, base, joints, and corners; and details at ceiling, floor base, and wall intersections. Indicate panel edge and core materials.
 - 1. Include elevations showing panel sizes and direction of fabric weave and pattern matching.
- D. Samples for Initial Selection: For each type of fabric facing from sound-absorbing wall unit manufacturer's full range.
- E. Samples for Verification: For the following products, prepared on Samples of size indicated below:
 - 1. Fabric: Full-width by approximately 36-inch-long Sample, but not smaller than required to show complete pattern repeat, from dye lot to be used for the Work, and with specified treatments applied. Mark top and face of fabric.
 - 2. Panel Edge: 12-inch-long Sample(s) showing each edge profile, corner, and finish.
 - 3. Core Material: 12-inch-square Sample at corner.
 - 4. Mounting Devices: Full-size Samples.
 - 5. Assembled Panels: Approximately 36 by 36 inches, including joints and mounting methods.

1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Elevations 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:
 - 1. Electrical outlets, switches, and thermostats.
 - 2. Items penetrating or covered by sound-absorbing wall units including the following:
 - a. Lighting fixtures.
 - b. Air outlets and inlets.
 - c. Speakers.
 - d. Alarms.
 - e. Sprinklers.
 - f. Access panels.
 - 3. Show operation of hinged and sliding components covered by or adjacent to sound-absorbing wall units.
- B. Product Certificates: For each type of sound-absorbing wall unit, from manufacturer.
- C. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For sound-absorbing wall units to include in maintenance manuals. Include fabric manufacturers' written cleaning and stain-removal recommendations.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials from same production run that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Fabric: For each fabric, color, and pattern installed, provide length equal to 10 percent of amount installed, but no fewer than 10 yards.
 - 2. Mounting Devices: Full-size units equal to 5 percent of amount installed, but no fewer than five devices, including unopened adhesives.

1.7 QUALITY ASSURANCE

- A. Source Limitations: Obtain sound-absorbing wall units from single source from single manufacturer.
- B. Fire-Test-Response Characteristics: Provide sound-absorbing wall units meeting the following as determined by testing identical products by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
 - 1. Surface-Burning Characteristics: As determined by testing per ASTM E 84.
 - a. Flame-Spread Index: 25 or less.
 - b. Smoke-Developed Index: 450 or less.

2. Fire Growth Contribution: Meeting acceptance criteria of local code and authorities having jurisdiction when tested according to NFPA 265.
- C. Mockups: Build mockups to comply with Section 01 43 39 (Visual Mock-Up Requirements".
 1. Build mockup of typical wall area as shown on Drawings. Include intersection of wall and ceiling, corners, and perimeters.
 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
- D. Preinstallation Conference: Conduct conference at Project site.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Comply with fabric and sound-absorbing wall unit manufacturers' written instructions for minimum and maximum temperature and humidity requirements for shipment, storage, and handling.
- B. Deliver materials and units in unopened bundles and store in a temperature-controlled dry place with adequate air circulation.

1.9 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install sound-absorbing wall units 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.
- B. Lighting: Do not install sound-absorbing wall units until a permanent level of lighting is provided on surfaces to receive the units.
- C. Air-Quality Limitations: Protect sound-absorbing wall units from exposure to airborne odors, such as tobacco smoke, and install units under conditions free from odor contamination of ambient air.
- D. Field Measurements: Verify locations of sound-absorbing wall units and actual dimensions of openings and penetrations by field measurements before fabrication.

1.10 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of sound-absorbing wall units that fail in materials or workmanship within specified warranty period.
 1. Failures include, but are not limited to the following:
 - a. Acoustical performance.
 - b. Fabric sagging, distorting, or releasing from panel edge.
 - c. Warping of core.
 2. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SOUND-ABSORBING WALL UNITS

- A. Products
 - 1. Refer to Section 09 00 01 "Finish Key".
- B. Sound-Absorbing Wall Panel: Manufacturer's standard ultra-high impact panel construction consisting of facing material laminated to front face, edges, and back edge border of core.
 - 1. Mounting: Back mounted with manufacturer's standard metal z-clips, secured to wall-mounted rails.
 - 2. Core: Manufacturer's standard glass-fiber board.
 - a. Core-Face Layer: Manufacturer's standard impact-resistant, acoustically transparent, perforated copolymer sheet.
 - 3. Edge Construction: Manufacturer's standard chemically hardened core with no frame.
 - 4. Edge Profile: Square.
 - 5. Corner Detail in Elevation: Square with continuous edge profile indicated.
 - 6. Reveals between Panels: Flush reveals as selected by Architect from manufacturer's full range or as indicated on Drawings.
 - 7. Facing Material: as indicated in Section 09 00 01 "Finish Key."
 - 8. Acoustical Performance: Sound absorption NRC of not less than 0.65 according to ASTM C 423 for Type A mounting according to ASTM E 795.
 - 9. Nominal Overall Panel Thickness: 9/16 inch minimum.
 - 10. Panel Width: As indicated on Drawings.
 - 11. Panel Height: As indicated on Drawings.

2.2 MATERIALS

- A. Sustainability Requirements:
 - 1. Low Emitting Materials: Comply with the requirements of the California Air Resources Board (CARB), Airborne Toxic Measure ATCM requirements for ultra-low emitting formaldehyde (ULEF) resins or no added formaldehyde resins. Refer to Section 01 81 13.14 "Sustainable Design Requirements - LEED v4 BD+C" for additional requirements.
- B. Core Materials: Manufacturer's standard.
 - 1. Glass-Fiber Board: ASTM C 612, Type standard with manufacturer; nominal density of 6 to 7 lb/cu. ft., unfaced, and dimensionally stable, molded rigid board; and with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.
 - 2. Impact-Resistant, Acoustically Transparent, Copolymer Sheet for Face Layer: 1/16- to 1/8-inch-thick layer of perforated, noncombustible, copolymer sheet laminated to face of core.
- C. Facing Material: Fabric from same dye lot; color and pattern as indicated by manufacturer's designations in Section 09 00 01 "Finish Key."

- D. Mounting Devices: Concealed on back of unit, recommended by manufacturer to support weight of unit, and as follows:
 - 1. Metal Clips or Bar Hangers: Manufacturer's standard two-part metal "Z" clips, with one part of each clip mechanically attached to back of unit and the other part to substrate, designed to permit unit removal.

2.3 FABRICATION

- A. General: Use manufacturer's standard construction except as otherwise indicated; with facing material applied to face, edges, and back border of dimensionally stable core; and with rigid edges to reinforce panel perimeter against warpage and damage.
 - 1. Glass-Fiber Board Cores: Chemically harden core edges and areas of core where mounting devices are attached.
- B. Core-Face Layer: Evenly stretched over core face and edges and securely attached to core; free from puckers, ripples, wrinkles, or sags.
- C. Facing Material: Apply fabric facing fully covering visible surfaces of unit; with material stretched straight, on the grain, tight, square, and free from puckers, ripples, wrinkles, sags, blisters, seams, adhesive, or other visible distortions or foreign matter.
 - 1. Square Corners: Tailor corners.
 - 2. Fabrics with Directional or Repeating Patterns or Directional Weave: Mark fabric top and attach fabric in same direction so pattern or weave matches in adjacent units.
- D. Dimensional Tolerances of Finished Units: Plus or minus 1/16 inch for the following:
 - 1. Thickness.
 - 2. Edge straightness.
 - 3. Overall length and width.
 - 4. Squareness from corner to corner.
 - 5. Chords, radii, and diameters.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine fabric, fabricated units, substrates, areas, and conditions, for compliance with requirements, installation tolerances, and other conditions affecting performance of sound-absorbing wall units.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install sound-absorbing wall units in locations indicated with vertical surfaces and edges plumb, top edges level and in alignment with other units, faces flush, and scribed to fit adjoining work accurately at borders and at penetrations.

- B. Comply with sound-absorbing wall unit manufacturer's written instructions for installation of units using type of mounting devices indicated. Mount units securely to supporting substrate.
- C. Align and level fabric pattern and grain among adjacent units.

3.3 INSTALLATION TOLERANCES

- A. Variation from Plumb and Level: Plus or minus 1/16 inch.
- B. Variation of Panel Joints from Hairline: Not more than 1/32 inch wide.

3.4 CLEANING

- A. Clip loose threads; remove pills and extraneous materials.
- B. Clean panels on completion of installation to remove dust and other foreign materials according to manufacturer's written instructions.
- C. Refer to Section 01 35 46 "Indoor Air Quality" and Section 01 74 23 "Final Cleaning" for additional requirements.

END OF SECTION 09 84 33

SECTION 09 91 13 - EXTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes surface preparation and the application of paint systems on exterior substrates.
- B. Related Requirements:
 - 1. Section 05 50 00 "Metal Fabrications" for shop priming metal fabrications.
 - 2. Section 05 52 13 "Pipe and Tube Railings" for shop priming pipe and tube railings.
 - 3. Section 09 96 00 "High-Performance Coatings" for tile-like coatings.

1.2 DEFINITIONS

- A. MPI Gloss Level 1: Not more than five units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
- B. MPI Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- C. MPI Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
- D. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.
- E. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.
- F. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
 - 1. Include printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
- B. Samples for Verification: For each type of paint system and each color and gloss of topcoat.
 - 1. Submit Samples on rigid backing, 8 inchessquare.
 - 2. Step coats on Samples to show each coat required for system.
 - 3. Label each coat of each Sample.
 - 4. Label each Sample for location and application area.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Paint: 5 percent, but not less than 1 gallonof each material and color applied.

1.5 QUALITY ASSURANCE

- A. Mockups: Build mockups to verify selections made under Sample submittals in. Refer to Section 01 43 39 "Visual Mock-up Requirements" for additional requirements.
 - 1. Final approval of color selections will be based on mockups.
 - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
 - 1. Maintain containers in clean condition, free of foreign materials and residue.
 - 2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 PAINT, GENERAL

- A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists."
- B. Material Compatibility:
 - 1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 - 2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
- C. Colors: As indicated in Section 09 00 01 "Finish Key".

2.2 GALVANIZING REPAIR PAINT

- A. High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - 1. Concrete: 12 percent.
 - 2. Masonry (Clay and CMUs): 12 percent.
 - 3. Portland Cement Plaster: 12 percent.
 - 4. Gypsum Board: 12 percent.
- C. Portland Cement Plaster Substrates: Verify that plaster is fully cured.
- D. Exterior Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- E. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.
- F. Proceed with coating application only after unsatisfactory conditions have been corrected.
 - 1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- D. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.
- E. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer.

- F. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- G. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
- H. Plastic Trim Fabrication Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."
 - 1. Use applicators and techniques suited for paint and substrate indicated.
 - 2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
 - 3. Paint both sides and edges of exterior doors and entire exposed surface of exterior door frames.
 - 4. Paint entire exposed surface of window frames and sashes.
 - 5. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
 - 6. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
- B. Tint undercoats same color as topcoat, but tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
 - 1. Paint the following work where exposed to view:
 - a. Equipment, including panelboards.
 - b. Uninsulated metal piping.
 - c. Uninsulated plastic piping.
 - d. Pipe hangers and supports.
 - e. Metal conduit.
 - f. Plastic conduit.
 - g. Tanks that do not have factory-applied final finishes.

3.4 FIELD QUALITY CONTROL

- A. Installer shall provide field quality control by certified staff and shall provide the following reports and checklists.
 - 1. BECxA shall provide initial BECx checklists. Contractor shall provide weekly updates verifying all locations have been inspected and are free of installation defects and damage.
 - a. BECx Checklists shall include specific locations of the work and specific location and description of any repairs.
 - b. BECx checklist shall be completed in its entirety and shall be provided weekly to the Construction Manager, Architect, and Owner.
 - 2. Provide field inspection reports within 5 working days of inspection.

3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 EXTERIOR PAINTING SCHEDULE

- A. CMU Substrates:
 - 1. Latex over Alkali-Resistant Primer System MPI EXT 4.2L:
 - a. Prime Coat: Primer, alkali resistant, water based, MPI #3.
 - b. Intermediate Coat: Latex, exterior, matching topcoat.
 - c. Topcoat: Latex, exterior, low sheen (MPI Gloss Level 3-4), MPI #15.
- B. Steel and Iron Substrates:
 - 1. Water-Based Light Industrial Coating System MPI EXT 5.1C:
 - a. Prime Coat: Primer, alkyd, anti-corrosive for metal, MPI #79.
 - b. Intermediate Coat: Light industrial coating, exterior, water based, matching topcoat.
 - c. Topcoat: Light industrial coating, exterior, water based, semi-gloss (MPI Gloss Level 5), MPI #163.
- C. Galvanized-Metal Substrates:
 - 1. Water-Based Light Industrial Coating System MPI EXT 5.3J:
 - a. Prime Coat: Primer, galvanized, water based, MPI #134.
 - b. Intermediate Coat: Light industrial coating, exterior, water based, matching topcoat.
 - c. Topcoat: Light industrial coating, exterior, water based, semi-gloss (MPI Gloss Level 5), MPI #163.

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BP-S195
Terminal C
Airside Concourse

EXTERIOR PAINTING

SECTION 09 91 13

END OF SECTION 09 91 13

SECTION 09 91 23 - INTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes surface preparation and the application of paint systems on interior substrates.
- B. Related Requirements:
 - 1. Section 05 50 00 "Metal Fabrications" for shop priming metal fabrications.
 - 2. Section 05 51 13 "Metal Pan Stairs" for shop priming metal pan stairs.
 - 3. Section 05 52 13 "Pipe and Tube Railings" for shop priming pipe and tube railings.
 - 4. Section 09 96 00 "High-Performance Coatings" for tile-like coatings.

1.2 DEFINITIONS

- A. MPI Gloss Level 1: Not more than five units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
- B. MPI Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- C. MPI Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- D. MPI Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
- E. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.
- F. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.
- G. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
 - 1. Include Printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
- B. Sustainable Design Documentation Submittals: Refer to section 01 81 13.14 "Sustainable Design Requirements – LEED V4 BD+C".
 - 1. Product Data: Documentation for Low Emitting Materials
 - a. Low Emitting Materials for Paints and Coatings
 - 2. Product Certificates: Provide the following:
 - a. Corporate Sustainability Reporting (CSR's)
 - b. Health Product Declarations (HPD's)
- C. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.
 - 1. Submit Samples on rigid backing, 8 inches square.
 - 2. Step coats on Samples to show each coat required for system.
 - 3. Label each coat of each Sample.

4. Label each Sample for location and application area.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. Paint: 5 percent, but not less than 1 gallon of each material and color applied.

1.5 QUALITY ASSURANCE

- A. Mockups: Build mockups to verify selections made under Sample submittals in. Refer to Section 01 43 39 "Visual Mock-up Requirements" for additional requirements.
 1. Architect will select one surface to represent surfaces and conditions for application of each paint system.
 - a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft..
 - b. Other Items: Architect will designate items or areas required.
 2. Final approval of color selections will be based on mockups.
 - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
 1. Maintain containers in clean condition, free of foreign materials and residue.
 2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Interior Paint types as indicated in Section 09 00 01 "Finish Key" or comparable approved product meeting all requirements including sustainability requirements.
 1. Refer to Sections 01 2500 "Substitution Procedures" and 01 6000 "Product Requirements" for comparable product requirements.

2.2 PAINT, GENERAL

- A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists."
- B. Material Compatibility:
 - 1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 - 2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
- C. Low Emitting Paints & Coatings
 - 1. Provide manufacture statements that confirm that the product used meets the California Department of Public Health (CDPH) Standard Method v1.1 2010 using the applicable exposure scenario.
 - 2. Refer to Section 01 81 13.14 "Sustainable Design Requirements - LEED v4 BD+C" for additional requirements.
- D. Health Product Declaration: Provide Health Product Declaration (HPD) with full disclosure of known hazards in compliance with the Health Product Declaration Open Standard
- E. Corporate Sustainability Report: Provide third-party verified Corporate Sustainability Report (CPD) including impacts of extraction operations and activities associated with the manufacturer's product and product's supply chain conforming the following:
 - 1. Global Reporting Initiative (GRI) Sustainability report
 - 2. Organization for Economic Co-operation and Development (OOECD) Guidelines for Multinational Enterprises.
 - 3. U.N. Global Compact: Communication of Progress
 - 4. ISO 26000: 2010 Guidance on Social Responsibility
 - 5. USGBC Approved Program: Other approved programs meeting the CSR criteria.
- F. Colors: As indicated in Section 09 00 01 "Finish Key".

2.3 GALVANIZING REPAIR PAINT

- A. High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - 1. Masonry (Clay and CMUs): 12 percent.
 - 2. Gypsum Board: 12 percent.

3. Plaster: 12 percent.
- C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- D. Plaster Substrates: Verify that plaster is fully cured.
- E. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.
- F. Proceed with coating application only after unsatisfactory conditions have been corrected.
 1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 1. Remove incompatible primers and re-prime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
 2. Refer to Section 01 74 23 "Final Cleaning" for additional requirements.
- D. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.
- E. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer.
- F. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."
 1. Use applicators and techniques suited for paint and substrate indicated.
 2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.

4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
 1. Paint the following work where exposed in equipment rooms:
 - a. Equipment, including panelboards.
 - b. Uninsulated metal piping.
 - c. Pipe hangers and supports.
 - d. Metal conduit.
 - e. Tanks that do not have factory-applied final finishes.
 - f. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
 2. Paint the following work where exposed in occupied spaces:
 - a. Equipment, including panelboards.
 - b. Uninsulated metal piping.
 - c. Pipe hangers and supports.
 - d. Metal conduit.
 - e. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
 - f. Other items as directed by Architect.
 3. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

3.4 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.5 INTERIOR PAINTING SCHEDULE

A. CMU Substrates:

1. Latex System MPI INT 4.2A:
 - a. Block Filler: Block filler, latex, interior/exterior, MPI #4.
 - b. Intermediate Coat: Latex, interior, matching topcoat.
 - c. Topcoat: Latex, interior (MPI Gloss Level 3), MPI #52.

B. Steel Substrates:

1. Water-Based Dry-Fall System MPI INT 5.1C:
 - a. Prime Coat: Shop primer specified in Section where substrate is specified.
 - b. Topcoat: Dry fall, water based, for galvanized steel, flat (MPI Gloss Level 1), MPI #133.

C. Galvanized-Metal Substrates:

1. Water-Based Dry-Fall System MPI INT 5.3H:
 - a. Prime Coat: Dry fall, water based, for galvanized steel, matching topcoat.
 - b. Topcoat: Dry fall, water based, for galvanized steel, flat (MPI Gloss Level 1), MPI #133.

D. Gypsum Board Substrates:

1. Latex over Latex Sealer System MPI INT 9.2A:
 - a. Prime Coat: Primer sealer, latex, interior, MPI #50.
 - b. Prime Coat: Latex, interior, matching topcoat.
 - c. Intermediate Coat: Latex, interior, matching topcoat.
 - d. Topcoat: Latex, interior (MPI Gloss Level 3), MPI #52.

END OF SECTION 09 91 23

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections (including all sustainability requirements), apply to this Section.

1.2 SUMMARY

- A. Section Includes
 - 1. Interior decorative polished plaster finish system for installation over walls.
- B. Related Sections
 - 1. Section 09 29 00 "Gypsum Board" for preparation of substrate.

1.3 REFERENCES

- A. ASTM D 1308 - Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes; 1998.
- B. ASTM D 2486 - Standard Test Method for Scrub Resistance of Wall Paints; 1996.
- C. ASTM D 3363 - Standard Test Method for Film Hardness by Pencil Test; 1992a.
- D. ASTM E 84 - Standard Test method for Surface Burning Characteristics of Building Materials; 1999.
- E. ASTM D 3273 – Standard Test Method for Resistance to the Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
- F. ASTM D 3274 – Standard Test Method for Evaluating Degree of Surface Disfigurement of Paint Films by Microbial (Fungal or Algal) Growth or Soil and Dirt Accumulation.
- G. ASTM D 3960 – Standard Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings.

1.4 SYSTEM PERFORMANCE REQUIREMENTS

- A. Polished plaster shall be tested by a qualified independent testing agency for the following properties according to the following test methods:
 - 1. Pencil Hardness: Minimum of 5H+ when tested in accordance with ASTM D3363.
 - 2. Scrub Resistance: Minimum 10,000 cycles using 10 grams of scrubbing medium and 5 grams of water applied by brush.
 - 3. Chemical Exposure: Passes ASTM D 1308.
 - 4. Mold Resistance – Minimum rating of 10 when tested according to ASTM D 3273 and D 3274.

1.5 SUBMITTALS

- A. Product Data: Provide manufacturer's technical data on products specified, including installation instructions.
- B. Sustainable Design Documentation Submittals: Refer to section 01 81 13.14 "Sustainable Design Requirements – LEED V4 BD+C".
 - 1. Product Data: Documentation for Low Emitting Materials
 - a. Low Emitting Materials for Paints and Coatings
- C. Shop Drawings: Indicate designs, colors, and locations.
- D. Samples: Submit three samples, 6 x 6 inches in size, illustrating finish color and texture.
- E. Qualification Data: Certificate issued by distributor indicating that installer has attended training class and is authorized to install specified product.
- F. Warranty: Sample copy of manufacturer's warranty stating obligations, remedies, limitations, and exclusions of warranty.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing work of this Section with a minimum of one year documented experience. Include list of at least three completed projects of similar scope with project names and addresses and names and addresses of architects and owners. Installers must have attended manufacturer's training class.
- B. Fire-Test-Response Characteristics: Provide finished system with the following surface-burning characteristics as determined per ASTM E 84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Flame Spread: 10 or less.
 - 2. Smoke Contribution: 10 or less.
- C. Mockups: Build mockups as indicated in Section 01 43 39 "Visual Mock-up Requirements".

1.7 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to the construction site in their original packaging with manufacturer's labels identifying manufacturer and product; color designation; lot number; and date of manufacture.
- B. Inspect materials upon delivery and immediately report to Architect damaged or defective materials.
- C. Store materials in a well ventilated area with minimum ambient temperature of 45° F. Prevent deterioration due to moisture, temperature changes, contamination, or other causes.

1.8 PROJECT CONDITIONS

- A. Environmental Requirements: Do not apply polished plaster when substrate or ambient air temperatures is under 45° F or over 95° F.

- B. Maintain these conditions 24 hours before, during, and after installation of polished plaster.

1.9 WARRANTY

- A. Period of Warranty: 10 years.

PART 2 - PRODUCTS

2.1 TEXTURED PLASTER FINISH

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Textured Plaster Finish as indicated in Section 09 00 01 "Finish Key" or comparable approved product meeting all requirements including sustainability requirements.
 - 1. Refer to Sections 01 25 00 "Substitution Procedures" and 01 60 00 "Product Requirements" for comparable product requirements.
- B. Polished Plaster System: Provide manufacturer's complete system of proprietary materials specifically formulated for compatibility with one another.
- C. Water: Clean, fresh, potable and free of mineral or organic matter which can affect plaster.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify the suitability of existing conditions before starting work. Do not begin Work of this Section until unsatisfactory conditions have been corrected.
- B. Acceptable Substrate Tolerances: Verify that substrates are true and level. Substrates shall be constructed to the following tolerances:
 - 1. ± 0.05 inches in 2 feet and ± 0.15 inches in 6 feet.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions for substrate preparation.
- B. Remove hardware, electrical switch and outlet plates, lighting fixtures and other items already in place that are not to receive plaster finish.
 - 1. After completion of work, reinstall items using workers skilled in the trades involved.
- C. Protect adjacent surfaces and items that are not to receive plaster finish, but which cannot be removed, from finish work. Use masking materials that will not damage protected items and surfaces.
- D. Clean substrates of substances that could impair bond including mold, mildew, oil, grease, salts, contamination and dirt using methods recommended by manufacturer.
- E. For gypsum board substrates, apply coats of joint compound over joints and fasteners to achieve a minimum of a Level 4 finish. Use ready-mixed or job-mixed, drying-type, all-purpose or topping compound, or proprietary product specifically

formulated for joint coating. Touch up and sand as needed to produce a surface free of visual defects, tool marks, or ridges, and conforming to a smooth flat surface. Apply Polished Plaster to Regular Gypsum Board that is fire resistant and complies with ASTM C 1396.

- F. Prepare all materials in accordance with manufacturer's recommendations.

3.3 INSTALLATION

- A. Prime Coat: Apply K40 primer coat. Allow to dry.
- B. Keycoat: Mix and apply K149 Keycoat in accordance with manufacturer's instructions. Allow to dry.
- C. Finish: Apply finish coats as recommended by manufacturer to achieve desired results. Number of coats and total dry mil thickness shall be as recommended by manufacturer for specified system. Allow to dry.
- D. Wax: Apply Ecowax to obtain sheen in accordance with manufacturer's instructions.
- E. Provide finish free of unsightly variations in texture and other defects.

3.4 CLEANING AND PROTECTION

- A. Remove temporary coverings used to protect adjacent surfaces and reinstall hardware, plates, lighting fixtures and other items previously removed.
- B. Clean and repair adjacent surfaces and items soiled or damaged during Work of this Section.
 - 1. Refer to Section 01 35 46 "Indoor Air Quality" and Section 01 74 23 "Final Cleaning" for additional requirements.
- C. Maintain and protect completed polished plaster surfaces until time of acceptance at Substantial Completion.

END OF SECTION 09 94 13

SECTION 09 96 00 - HIGH-PERFORMANCE COATINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes surface preparation and the application of high-performance coating systems.
- B. Related Requirements:
 - 1. Section 09 91 13 "Exterior Painting" for general field painting.
 - 2. Section 09 91 23 "Interior Painting" for general field painting.

1.2 DEFINITIONS

- A. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.
- B. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.
- C. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
 - 1. Include printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
- B. Sustainable Design Documentation Submittals: Refer to section 01 81 13.14 "Sustainable Design Requirements – LEED V4 BD+C".
 - 1. Product Data: Documentation for Low Emitting Materials
 - a. Low Emitting Materials for Paints and Coatings
 - 2. Product Certificates: Provide the following:
 - a. Corporate Sustainability Reporting (CSR's)
 - b. Health Product Declarations (HPD's)
- C. Samples for Initial Selection: For each type of topcoat product indicated.
- D. Samples for Verification: For each type of coating system and each color and gloss of topcoat indicated.
 - 1. Submit Samples on rigid backing, 8 inches square.
 - 2. Apply coats on Samples in steps to show each coat required for system.
 - 3. Label each coat of each Sample.
 - 4. Label each Sample for location and application area.
- E. Product List: Cross-reference to coating system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Coatings: 5 percent, but not less than 1 gal. of each material and color applied.

1.5 QUALITY ASSURANCE

- A. Mockups: Build mockups to verify selections made under Sample submittals in. Refer to Section 01 43 39 "Visual Mock-up Requirements" for additional requirements.
 - 1. Architect will select one surface to represent surfaces and conditions for application of each coating system.
 - a. Wall and Ceiling Surfaces: Provide samples of at least 100 sq. ft.
 - b. Other Items: Architect will designate items or areas required.
 - 2. Final approval of color selections will be based on mockups.
 - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
 - 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
 - 1. Maintain containers in clean condition, free of foreign materials and residue.
 - 2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

- A. Apply coatings only when temperature of surfaces to be coated and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply coatings when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.
- C. Do not apply exterior coatings in snow, rain, fog, or mist.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide High Performance Coating types as indicated in Section 09 00 01 "Finish Key" or

comparable approved product meeting all requirements including sustainability requirements.

1. Refer to Sections 01 2500 "Substitution Procedures" and 01 6000 "Product Requirements" for comparable product requirements.

2.2 HIGH-PERFORMANCE COATINGS, GENERAL

- A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists."
- B. Material Compatibility:
 1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
 3. Products shall be of same manufacturer for each coat in a coating system.
- C. Low Emitting Paints & Coatings
 1. Provide manufacture statements that confirm that the product used meets the California Department of Public Health (CDPH) Standard Method v1.1 2010 using the applicable exposure scenario.
 2. Refer to Section 01 81 13.14 "Sustainable Design Requirements - LEED v4 BD+C" for additional requirements.
- D. Health Product Declaration: Provide Health Product Declaration (HPD) with full disclosure of known hazards in compliance with the Health Product Declaration Open Standard
- E. Corporate Sustainability Report: Provide third-party verified Corporate Sustainability Report (CPD) including impacts of extraction operations and activities associated with the manufacturer's product and product's supply chain conforming the following:
 1. Global Reporting Initiative (GRI) Sustainability report
 2. Organization for Economic Co-operation and Development (OOECD) Guidelines for Multinational Enterprises.
 3. U.N. Global Compact: Communication of Progress
 4. ISO 26000: 2010 Guidance on Social Responsibility
 5. USGBC Approved Program: Other approved programs meeting the CSR criteria.
- F. Low-Emitting Materials: Interior paints and coatings shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers" and additional requirements found in Section 01 81 13.14 "Sustainable Design Requirements – LEED v4 BD+C".
- G. Colors: As indicated in Section 09 00 01 "Finish Key".

2.3 SOURCE QUALITY CONTROL

- A. Testing of Coating Materials: Owner reserves the right to invoke the following procedure:
 - 1. Owner will engage the services of a qualified testing agency to sample coating materials. Contractor will be notified in advance and may be present when samples are taken. If coating materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
 - 2. Testing agency will perform tests for compliance with product requirements.
 - 3. Owner may direct Contractor to stop applying coatings if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying coating materials from Project site, pay for testing, and recoat surfaces coated with rejected materials. Contractor will be required to remove rejected materials from previously coated surfaces if, on recoating with complying materials, the two coatings are incompatible.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - 1. Concrete: 12 percent.
 - 2. Fiber-Cement Board: 12 percent.
 - 3. Masonry (Clay and CMUs): 12 percent.
 - 4. Gypsum Board: 12 percent.
 - 5. Plaster: 12 percent.
- C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- D. Plaster Substrates: Verify that plaster is fully cured.
- E. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.
- F. Proceed with coating application only after unsatisfactory conditions have been corrected.
 - 1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and coating systems indicated.

- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean substrates of substances that could impair bond of coatings, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce coating systems indicated.
 - 2. Refer to Section 01 74 23 "Final Cleaning" for additional requirements.
- D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.
 - 1. Clean surfaces with pressurized water. Use pressure range of 1500 to 4000 psi at 6 to 12 inches.
 - 2. Abrasive blast clean surfaces to comply with SSPC-SP 7/NACE No. 4.
- E. Masonry Substrates: Remove efflorescence and chalk. Do not coat surfaces if moisture content, alkalinity of surfaces, or alkalinity of mortar joints exceeds that permitted in manufacturer's written instructions.
 - 1. Clean surfaces with pressurized water. Use pressure range of 100 to 600 psi at 6 to 12 inches.
- F. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer.
- G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- H. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied coatings.

3.3 APPLICATION

- A. Apply high-performance coatings according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."
 - 1. Use applicators and techniques suited for coating and substrate indicated.
 - 2. Coat surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, coat surfaces behind permanently fixed equipment or furniture with prime coat only.
 - 3. Coat backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.

4. Do not apply coatings over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of the same material are to be applied. Tint undercoats to match color of finish coat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through final coat, apply additional coats until cured film has a uniform coating finish, color, and appearance.
- D. Apply coatings to produce surface films without cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Produce sharp glass lines and color breaks.

3.4 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test coatings for dry film thickness.
 1. Contractor shall touch up and restore coated surfaces damaged by testing.
 2. If test results show that dry film thickness of applied coating does not comply with coating manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with coating manufacturer's written recommendations.
- B. Installer shall provide field quality control by certified staff and shall provide the following reports and checklists.
 1. BECxA shall provide initial BECx checklists. Contractor shall provide weekly updates verifying all locations have been inspected and are free of installation defects and damage.
 - a. BECx Checklists shall include specific locations of the work and specific location and description of any repairs.
 - b. BECx checklist shall be completed in its entirety and shall be provided weekly to the Construction Manager, Architect, and Owner.
 2. Provide field inspection reports within 5 working days of inspection.

3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing coating application, clean spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from coating operation. Correct damage to work of other trades by cleaning, repairing, replacing, and recoating, as approved by Architect, and leave in an undamaged condition.

- D. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces.

3.6 EXTERIOR HIGH-PERFORMANCE COATING SCHEDULE

- A. Concrete Substrates, Vertical Surfaces:
 - 1. Epoxy System MPI EXT 3.1D:
 - a. Prime Coat: Epoxy, matching topcoat.
 - b. Intermediate Coat: Epoxy, matching topcoat.
 - c. Topcoat: Epoxy, high build, low gloss, MPI #108.
- B. CMU Substrates:
 - 1. Epoxy System MPI EXT 4.2E:
 - a. Block Filler: Block filler, epoxy, MPI #116.
 - b. Intermediate Coat: Epoxy, matching topcoat.
 - c. Topcoat: Epoxy, high build, low gloss, MPI #108.
- C. Steel Substrates:
 - 1. Epoxy System MPI EXT 5.1F:
 - a. Prime Coat: Primer, epoxy, anti-corrosive, for metal, MPI #101.
 - b. Intermediate Coat: Epoxy, high build, low gloss, MPI #108.
 - c. Topcoat: Epoxy, high build, low gloss, MPI #108.
- D. Galvanized-Metal Substrates:
 - 1. Epoxy System MPI EXT 5.3C:
 - a. Prime Coat: Primer, epoxy, anti-corrosive, for metal, MPI #101.
 - b. Intermediate Coat: Epoxy, matching topcoat.
 - c. Topcoat: Epoxy, high build, low gloss, MPI #108.

3.7 INTERIOR HIGH-PERFORMANCE COATING SCHEDULE

- A. CMU Substrates:
 - 1. Epoxy System MPI INT 4.2F:
 - a. Block Filler: Block filler, latex, interior/exterior, MPI #4.
 - b. Intermediate Coat: Epoxy, matching topcoat.
 - c. Topcoat: Epoxy, high build, low gloss, MPI #108.
- B. Gypsum Board Substrates:
 - 1. Epoxy, High-Build System MPI INT 9.2N:
 - a. Prime Coat: Primer sealer, latex, interior, MPI #50.
 - b. Intermediate Coat: High-build epoxy, matching topcoat.
 - c. Topcoat: High-build epoxy, low gloss, MPI #108.
- C. Steel Substrates:
 - 1. Epoxy-Modified Latex System MPI INT 5.1K:
 - a. Prime Coat: Primer, rust inhibitive, water based, MPI #107.
 - b. Intermediate Coat: Epoxy-modified latex, interior, matching topcoat.
 - c. Topcoat: Epoxy-modified latex, semi-gloss (MPI Gloss Level 5), MPI #215.

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BP-S195
Terminal C
Airside Concourse

HIGH-PERFORMANCE COATINGS

SECTION 09 96 00

END OF SECTION 09 96 00

4. Complete fabrication and installation drawings for each sign type. Indicate dimensions, materials, finishes, fastening, anchorage, joining, sealing, backing, utility requirements, rough-in, and adjacent related site conditions.
5. Each sign type with all graphic elements.
6. Evacuation Map final graphics. The Environmental Graphics documentation will provide a template to be used for developing specific area plans and routes as coordinated with the DFS representative and Emergency Egress plans.
7. All letter styles shall be accurately reproduced.
8. Connections and routing for all power and data cabling in accordance with related Division 27 specifications.

1.4 SUBMITTALS

- A. Procedure: Prepare submittals in accordance with the requirements of the Special Conditions, and to include the following:
 1. Notes on Drawings shall clearly define any actions requiring review by the OAR.
 2. First article of production-run items, both large and small, will be reviewed by the OAR before production run is commenced.
 3. It shall be the responsibility of the Contractor to schedule all review meetings with the OAR.
- B. Submit physical samples of sufficient size and quantity to illustrate materials, finishes, equipment or workmanship, and to establish standards by which completed work will be judged. Samples must represent the functional characteristics of the product or material, with integrally related parts and attachment devices, colors, and finishes.
- C. All samples to have a place for stamp approval.
- D. Required samples for review:
 1. Full 6" x 6" set of all specified paint colors and finishes.
 2. Complete, full-size message in each typeface to demonstrate proper spacing (black text on white background: outline not accepted).
 3. Sample of each type of fastener to be used.
 4. Each type of exposed metal used for major elements of work with respective finish.
 5. Each type of adhesive vinyl film, including computer-cut designs, shown full-size on each of the specified ground colors.
 6. Each type of neon.
 7. Mock-ups as scheduled in this section. Mock-ups shall become the property of OAR and are not to be part of the completed work.
 8. Unless otherwise noted, one full size, complete, item must be prepared and installed by the fabricator as "first article" for each sign type. Upon inspection and approval by the OAR, the fabrication of subsequent articles may continue.

9. Other items as may be required by OAR, or as noted on the Contract Drawings or herein.
 - E. Extra Materials / Spares: Deliver to the appropriate OAR's Representative contact person, in manufacturer's original packaging and store at the Project where directed.
 1. Furnish (1) gallon of each finish paint color for touch-up purposes.
 2. Furnish (6) lamps of each type and size used in the signage (as applicable).
 3. Furnish spare keys to master keyed locks on directory or Kiosk signage
 - F. Supplementary Product Literature (manufacturer's literature describing the general properties of each product to be used in the Work): Submit for information along with Shop Drawings.
- 1.5 Permits by Signage Contractor
- A. Signage Contractor shall make all submittals for each permit via the OAR's Representative. Signage Contractor shall be responsible for paying all fees, making adjustments as required, or any task necessary for obtaining local building and installation Sign permits for the proper execution of the Work.
- 1.6 QUALITY ASSURANCE
- A. Mock-ups and Prototypes:
 1. Provide a mock-up (partial for large Signs; complete for smaller Signs) of each sign type at the fabrication facility or on-site for review.
 2. Utilize the same materials and installation methods in the mock-up as intended for the final Work. Schedule the installation so that the mock-up may be examined, and any necessary adjustments made, prior to commencing fabrication of the final Work. Replace unsatisfactory items as directed.
 3. When accepted, mock-up shall serve as the standard for materials, workmanship, and appearance for the Work throughout the project.
 - B. Work-In-Progress Approvals:
 1. Provide work-in-progress sign elements reviews. Scheduled or unscheduled viewings at the Fabrication Facility may be initiated by the OAR's Representative as necessary to ensure continued quality control and make any adjustments required during fabrication. Unsatisfactory items are to be corrected by the Signage Contractor as directed by the OAR.
 - C. Regulatory Requirements:
 1. Comply with applicable requirements of the Applicable Laws and Authorities. Obtain necessary approvals and permits from all such Authorities as required.
 - D. Markings and Labels:
 1. Locate markings, labels, manufacturer names and other identifications so as to be concealed from public view and as acceptable by the OAR's Representative.

2. No trade name or other identification shall appear on any item where the public will see it, except as specifically approved by the OAR's Representative in advance.
- E. Final Location of Signs:
1. The location of signs as shown on the Contract Drawing Location Plans is for general reference only and in some cases is not representative of the exact final location. Final locations of Signs shall be field located in coordination with the OAR.
 2. Signage Contractor shall arrange for meetings at the Project site to accommodate direction of final locations according to Project Construction Schedule.
- F. Lettering:
1. The Signage Contractor shall be responsible for the quality control of all lettering. All letterforms shall be crisp, sharp, free of nicks, ragged edges and discontinuous curves. All lettering shall conform to approved typeface, weight and letter spacing. No substitutions of typeface foundry, brand or version or implementation technique will be accepted without prior approval.
 2. Vinyl Die Cut Graphics: All camera-ready artwork shall be anagraph scanned for cutting on a Gerber Sign Maker II or approved equal.
 3. All cutting and routing shall be executed in such a manner that all edges and corners of finished letterforms are true and clean. Letterforms with rounded positive or negative corners, nicked, cut, or ragged edges, etc., will not be accepted. All letterforms shall be so aligned as to maintain a baseline parallel to the sign format. Margins must be maintained as specified in drawings.
 4. All Work under the Agreement shall be performed by skilled craftsmen under supervision of trained foremen, experienced in the trade of craft required to accomplish the Work and produce a product of high quality.
- G. Tactile Sign Messages
1. All tactile sign messages must comply with ADAAG 2006; Sections 703.2-703.4
 2. Character spacing shall be measured between the two closest points of adjacent raised characters within a message, excluding word spaces. Where characters have rectangular cross sections, spacing between individual raised characters shall be 1/8 inch (3.2 mm) minimum and 4 times the raised character stroke width maximum. Where characters have other cross sections, spacing between individual raised characters shall be 1/16 inch (1.6 mm) minimum and 4 times the raised character stroke width maximum at the base of the cross sections, and 1/8 inch (3.2 mm) minimum and 4 times the raised character stroke width maximum at the top of the cross sections. Characters shall be separated from raised borders and decorative elements 3/8 inch (9.5 mm) minimum.
 3. Braille shall be contracted Braille (Grade 2), domed and maintain a minimum 3/8 inch clear-space from other tactile elements.

4. Proof-reading of Braille messages is to be performed by the sign fabricator prior to fabrication.
 - H. High Quality of Workmanship:
 1. The Signage Contractor shall be responsible for the high quality of all materials and workmanship required for the execution of the Agreement including materials and workmanship of any firm or individual who act as Signage Contractor's Sub-Contractor.
 2. Signage Contractor shall be responsible for providing up-to-date drawings, specifications, graphic schedule, etc., to all sub-contractors.
 - I. Dimensions
 1. Written dimensions on drawings shall have precedence over scaled dimensions.
 2. Signage Contractor shall verify and be responsible for all dimensions and conditions shown by these drawings. Shop details must be approved by the OAR prior to fabrication.
 - J. Discrepancies
 1. Signage Contractor shall notify the OAR of any discrepancies in the Drawings, Sign Location Plan or Sign Message Schedule, in field dimensions or conditions and/or changes required in construction details.
 - K. Regulatory Requirements:
 1. Comply with applicable portions in ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.
 2. References
 - L. The City of Orlando Code of Ordinances - Chapter 64 - SIGNS of Ordinance No. 2016-47
 - M. U.S. Department of Homeland Security - Seal and Signature Usage Guidelines
 - N. National Association of Architectural Metal Manufacturers (NAAMM) "Metal Finishes Manual."
 - O. American Welding Society (AWS) – AWS D1.1 "Structural Welding Code, Steel," and AWS D1.2 "Structural Welding Code, Aluminum."
 - P. Underwriters Laboratories Inc. (UL) – Standards for Safety, UL Publication 48 "Electric Signs."
- 1.7 GRAPHICS/ARTWORK
- A. Contractor to provide artwork on: Via electronic file transfer as Acrobat PDF for graphic layouts included in the Drawings.
- 1.8 WARRANTY
- A. Signage Warranty

1. Submit to the OAR a 5-year written warranty (effective the date of final acceptance) covering all Signs, notarized by the Signage Contractor and Installer (if Sub-Contractor is used), agreeing to repair or replace the Defective Signs. Upon notification of such Defective Signs within the warranty period, make necessary repairs or replacement at the convenience of the OAR.
 - B. Linear Polyurethane Paint Factory Finish Warranty
 1. Submit to the OAR a 5 year written warranty, warranting that the factory-applied linear polyurethane finishes will not develop excessive fading or excessive non uniformity of color or shade, and will not crack, peel, pit, corrode or otherwise fail as a result of Defects in materials or workmanship within the following defined limits. Upon notification of such Defects within the Warranty Period, make necessary repairs or replacement at the convenience of the OAR.
 - C. "Excessive Fading"
 1. A change in appearance that is perceptible and objectionable as determined when visually compared with the original color range standards.
 - D. "Excessive Non-Uniformity"
 1. Non-uniform fading to the extent that adjacent panels have a color difference greater than the original acceptable range of color.
 - E. "Will Not Pit or Otherwise Corrode"
 1. No pitting or other type of corrosion, discernible from a distance of 10' (3 m), resulting from the natural elements in the atmosphere at the project site.
- 1.9 MAINTENANCE
- A. Maintenance and Operating Manuals
 1. Furnish complete manuals describing the materials, devices and procedures to be followed in operating, cleaning and maintaining the Work. Include manufacturers' brochures and parts lists describing the actual materials used in the Work, including metal alloys, finishes, electrical components and other major components.
 2. Assemble manuals for component parts into single binders identified for each system.
 - B. Instruction
 1. Prior to acceptance, establish with OAR an instruction and training program for OAR's personnel.
 2. Notify the OAR's in writing at least 7 days prior to commencement of the program providing an outline of topics indexed to the Maintenance and Operating Manual.
 3. Provide a trained instructor. Provide three (3) consecutive 4-hour periods of training scheduled during the normal 8-hour working day. Instruction and

training shall include, but shall not be limited to, procedures to be followed in the normal day-to-day maintenance and operation of the Work.

PART 2 - PRODUCTS

2.1 FABRICATION

- A. Signage shall be complete for proper installation as described in the Drawings.
- B. Finish work shall be firm, well anchored, in true alignment, properly squared, with smooth clean uniform appearance, without holes, cracks, discoloration, distortion, stains, or marks.
- C. Construct all work to eliminate burrs, dents, cutting edges, and sharp corners.
- D. Finish welds on exposed surfaces to be imperceptible in the finished work.
- E. Except as indicated or directed otherwise, finish all surfaces smooth.
- F. Surfaces, which are intended to be flat, shall be without dents, bulges, oil canning, gaps, or other physical deformities.
- G. Surfaces, which are intended to be curved, shall be smoothly free-flowing to required shapes.
- H. Except where approved otherwise by OAR, conceal all fasteners.
- I. Make access panels tight-fitting, light proof, and flush with adjacent surfaces.
- J. Conceal all identification labels and Underwriters Limited labels to conform to Underwriters Limited Codes.
- K. Carefully follow manufacturer's recommended fabricating procedures regarding expansion or contraction, fastening, and restraining of acrylic plastic.
- L. Exercise care to ensure that painted, polished, and plated surfaces are unblemished in the finished work.
- M. Isolate dissimilar materials. Exercise particular care to isolate nonferrous metals from ferrous metals.
- N. All illumination shall be even and without hot spots.
- O. Ease all exposed metal edges.
- P. Provide miscellaneous metal items required for completion of the work even though not shown or specified.
- Q. Refer to Drawings for sign color specifications.
- R. Paint finishes shall be Matthews Acrylic Polyurethane with Matthews Primers and Metal Pre-Treatments or OAR approved equal.
- S. Shop painting to be uniform on and around all sign elements to ensure sign elements will withstand all weather conditions.

- T. Mounting: Mounting plates shall be in conformance with manufacturer's written recommendations.

2.2 MATERIALS

- A. All Specified Metals
 - 1. Aluminum
- B. Aluminum shall be suitable for ornamental, architectural work. Surface finish shall be smooth, free of extrusion marks or imperfections. Alloy shall be selected to meet the structural requirements of the specific application.
 - 1. Stainless Steel
- C. Stainless steel shall be suitable for ornamental and architectural work. Surface finish shall be smooth, free of all extrusion marks or imperfections. Alloy shall be selected to meet the structural requirements of specific application. Structural metal for concealed framing shall be of galvanized rolled steel or equal as required to satisfy structural requirements.
- D. Aluminum exterior cabinets, spacers, backplates and frames shall be constructed from 0.25 inch aluminum, #4 horizontal brushed and clear anodized finish, unless otherwise specified on Drawings.
- E. Aluminum interior plaques shall be constructed from 0.125 inch aluminum, #4 horizontal brushed finish with semi-gloss linear polyurethane clear coat, unless otherwise specified on Drawings.
- F. Aluminum interior fabricated components shall be constructed from 0.125 inch thickness aluminum sheet.
- G. Adhesive used for installing Signs shall be manufactured by Dow Corning or equal. "VHB" tape such as Polyfoam or "Isotac" contact adhesive tape manufactured by 3M shall be used in conjunction with silicone adhesives for installation of wall signs, in minimum thicknesses available.
- H. Extruded aluminum shapes utilizing 6063-T6 aluminum alloys, unless otherwise specified on Drawings.
- I. Concrete Installation of anchoring devices into concrete slab shall be adjusted to avoid penetrating existing reinforcing conduit, etc. contained in the concrete slab. Coordinate with the Architect and Structural Engineer.
- J. Stainless steel exterior cabinets, spacers, backplates and frames shall be constructed from 0.125 inch stainless steel, #4 horizontal brushed and clear anodized finish, unless otherwise specified on Drawings.
- K. Stainless steel interior plaques shall be constructed from 0.125 inch thickness stainless steel sheet, #4 horizontal brushed finish with semi-gloss linear polyurethane clear coat, unless otherwise specified on Drawings.

- L. Stainless steel interior fabricated components shall be constructed from 0.0625 inch stainless steel, unless otherwise specified on Drawings.
- M. Stainless steel shall be suitable for ornamental and architectural work. Surface finish shall be smooth, free of all extrusion marks or imperfections. Alloy shall be selected to meet the structural requirements of specific application. Structural metal for concealed framing shall be of galvanized rolled steel or equal as required to satisfy structural requirements.
- N. Acrylic intended for non-illuminated use shall be 0.25 inch cast acrylic sheet with non-glare finish, unless otherwise specified on Drawings. Acrylic intended for edge-illuminated use shall be 10mm extruded acrylic sheet with embedded diffuser particles designed specifically for edge-lighting, unless otherwise specified on Drawings.
- O. Use Plexiglas II as manufactured by Rohm and Haas Co., or equal quality. Thickness shall be as indicated on Drawings or not less than 1/8" thick. Signage Contractor shall provide color and finish samples of all plastics for approval before fabrication; no substitution in color, thickness, or finish of plastics will be accepted without written approval from the OAR. All plastics shall be of uniform color, translucence and illumination, as supplied by manufacturer. Any exposed edges of acrylic shall be finished so as no saw marks are visible.
- P. Decal or Transfer: Provide special printed paper or vinyl suitable for reproducing the design onto material indicated, as required. Submit sample to the OAR for approval.
- Q. Aluminum posts shall be constructed from 2-inch square T52 tubes, 0.1875 wall thickness and #4 brushed and clear anodized finish with capped ends, unless otherwise specified on Drawings.
- R. Hardware / Hinges: Provide and install all incidental hardware necessary for the proper functioning of the Signs, including, but not restricted to, materials and products covered in this section. Provide stainless steel hinges for all hinged access panels. Provide pin tumbler locks for all access panels requiring locks. Provide stainless steel fasteners for assembling ferrous and non-ferrous metals.
- S. Bolts, nuts, screws, washers, anchors and other devices required to complete the Work. Signage Contractor shall use the same basic metal or alloy as the metal fastened, and finish to match in color and texture. Use stainless steel 300 series alloy where used to join dissimilar materials.
- T. All exposed fasteners to be 0.125 inch flathead stainless steel screws painted to match adjoining surfaces unless otherwise specified on drawings.
- U. Pin-mount supports shall be 3/16" to 1" diameter painted threaded rods as appropriate.
- V. Insulation /Material Isolation: Separate all ferrous and non-ferrous metals with non-conductive gaskets to prevent electrolysis. In addition to gaskets, provide stainless steel fasteners for some cases as required.

W. Welding Electrodes and Filler Metal

PART 3 - Provide the alloy and type of welding electrodes and filler metal required for strength, workability, compatibility and color match after grinding smooth and finishing the fabricated product.

- A. Applied interior vinyl graphics to be High Performance Cast Vinyl Sheeting, unless otherwise specified on Drawings. Applied exterior vinyl graphics to be High Performance Reflective Vinyl Sheeting, unless otherwise specified on Drawings.
- B. Additional Material/Processes: For materials or processes described in the preceding list, the material and/or process as detailed in the design documents shall be used as the meet or exceed equivalent.

3.2 ELECTRICAL COMPONENTS

- A. Electrical components must conform to applicable electrical codes and the following:
 - 1. All materials must be approved and listed by Underwriters Laboratories, Inc.
 - 2. Light Emitting Diode (LED) general lighting requirements:
- B. Provide sufficient LED wattage, quantities and spacing to ensure continuous, maximum illumination.
- C. Provide LED lighting prototypes to verify brightness and uniformity of lighting with designer.
 - LED lighting component, color and power requirements:
- D. Edge lighting – fabricated linear white LED's 24 VAC
- E. Back lighting – fabricated matrix white LED's 24 VAC
 - Heavy duty, non-keyed, flush mounted, fused or un-fused disconnects. Provide NEMA 1 for dry locations and proper enclosure for others.
 -
- F. Electrical Wiring and Equipment: Provide and install electrical materials such as ballasts, transformers, lamps, sockets, neon units, connectors, and all other equipment which shall be new and shall be approved by Underwriters Laboratories, Inc. The assembly of all components within the illuminated signs shall conform to all standards of Underwriters Laboratories, Inc. as published in the latest edition of "Standards for Sign Safety" and all illuminated signs shall bear the U.L. label. All wiring and equipment shall be concealed within the Sign structure.
- G. Conduit and Devices: Provide rigid steel conduit, junction boxes and associated devices in accordance with applicable codes as required.
- H. LED power supplies shall be used as required for internally illuminated cabinet signs, in quantity and arrangement as recommended by ballast manufacturer and accessible for maintenance and shown on Shop Drawings.
- I. Disconnect Switch: All Signs or Sign components with electrical service shall be equipped with an approved external disconnect switch, flush mounted on the

2. Primer for Aluminum: Two part component primer: One-coat Matthews 74-734 and 74-735 Metal Pretreat at .25 mils dry film thickness or one-coat Matthews 74-793 Spray Bond at .15 to .25 mils dry film thickness or Wyandotte / AKZO Grip-Guard Wash Primer (2Afy-31284) with Grip-Guard Wash Primer Hardener (10AFK-31285) combined and applied per manufacturer's specifications or approved equal (primer) for the application of the pre-approved and pre-formulated paint system.
 3. Primer for Steel: Two part component primer: One-coat Matthews 74-734 and 74-735 Metal Pretreat at .25 mils dry film thickness or Wyandotte / AKZO Grip-Guard Wash Primer (2Afy-31284) with Grip-Guard Wash Primer Hardener (10AFK-31285) combined and applied per manufacturer's specifications or approved equal (primer) for the application of the pre-approved and pre-formulated paint system.
 4. Clear Sealers: Crystal clear matte polyurethane sealers By Matthews Paint Co. or approved equal. Sealers are to resist rust and corrosion associated with exposure to salt air. As required and of highest quality available, applied per manufacturer's specifications.
- B. Anodized Aluminum Components / Panels: If required, Signage Contractor shall provide anodized (application of aluminum oxide film coating in clear or colored dye finish) aluminum panels or parts to match Executive Architect's color, grain, finish and specifications.
- C. Silk Screening Materials: Provide photo processed screening, arranged to furnish sharp and solid images without edge build up or bleeding of the coating. Pattern-cut screens may be used for non-repeat copy, provided that final image copy is equal to photoscreen quality. Provide only weather-resistant coating materials, compatible with the intended substrates. All silk-screened graphics are to be done with the finest screen size feasible for sharp, even reproduction.
- D. Vinyl Die-Cut and Pattern Cut-out Graphics: Use Scotchcal Opaque and Translucent film and Scotchcal Diamond Grade VIP Reflective film manufactured by 3M where specified or equivalent. Use pressure-sensitive, non-yellowing, non-peeling and weather resistant vinyl as specified. Use approved fonts and equipment as specified.

3.4 FABRICATION OF SIGNS AND SUPPORTS

- A. General: Provide custom manufactured Sign assemblies, components completely fabricated and finished at factory before delivery to Project. Construct to accurate detail and dimensions as shown and as review on approved Shop Drawings. Fit and assemble the Work at the shop and mark the components as required to facilitate assembly during installation. Exposed fasteners on finished faces will not be allowed, unless specifically indicated. Waviness and oil canning of surfaces is not acceptable. Minimum material thickness is to be 0.090 inches. Conceal wiring, conduct and other electrical items within sign enclosures.

- B. Lettering: Cut and rout in a manner to produce true and clean edges and corners of finished letterforms. Letterforms having rounded positive or negative corners, nicked, cut, or ragged edges are not acceptable. Align letter forms to maintain a baseline parallel to the sign format. Maintain margins as indicated on the Drawings.
- C. Seams and Joints: The Signage Contractor shall cut walls and floors carefully and neatly repair them in an acceptable manner. Signage Contractor shall consult the Architect of Record in cases where cutting into a structural portion of the building is required so that satisfactory reinforcement may be provided. Added joints shall be ground filled and finished flush and smooth with adjacent work. Such seams shall be invisible after final finish has been applied. Spot welded joints shall not be visible on exterior of signs after final finish has been applied. No gaps, light leaks, waves, or oil canning will be permitted in Work. If any of these are evident, the Signage Contractor will be required to correct its Work or construct a new Sign at its own expense.
- D. Metal Signs and Supports: Fabricate exposed surfaces uniformly flat and smooth, without distortion, pitting, or other blemishes. Form exposed metal edges to a smooth radius. Permanently bond the laminated metal components and honeycomb core with adhesive or sealant in accordance with product manufacturer's recommendations. Grind exposed welds and rough areas to make flush with adjacent smooth surfaces.
- E. Welding: Make welds continuous. Comply with American Welding Society, Aluminum Association, and Copper Development Association standards for the type of metal used.
- F. Fasteners: Use exposed fasteners only if shown on the Construction Documents. Perform drilling and tapping at shop.
- G. Dissimilar Materials: Where metal surfaces will be in contact with dissimilar materials, coat the surfaces with epoxy paint or plate with zinc chromate, or provide other means of dielectric separation as recommended by manufacturer to prevent galvanic corrosion (i.e. Neoprene gasket as an isolation membrane)
- H. Castings: Exposed surfaces shall be uniformly free from porosity and roughness. Edges shall be filled and ground smooth. Faces shall be chemically etched and mechanically polished for specified finish.
- I. Galvanizing: Provide for steel components in exterior construction, and where noted in Drawings shall be galvanized. Complete the shop fabrication prior to application of the zinc coating. Remove mill scale and rust, clean and pickle the units as required for proper pretreatment of the surfaces.
- J. Hardware: Provide all incidental hardware necessary for the proper functioning of signs. External hardware shall conform to the external appearance of the Sign.
- K. Supports and Backing in Walls: Signage Contractor shall provide engineered Sign supports anchored to building structure where required and to meet requirements of applicable building codes. Support or backing requiring installation within the

building wall construction shall be immediately relayed to the Architect of Record and OAR for field coordination. Signage Contractor shall meet with the Contractor to review all requirements.

- L. Access Doors and Frames: Access doors and frames shall be flush with the material in which they occur, unless otherwise specified. Access doors and frames shall be provided upon prior written approval of the Architect. Each trade providing access doors and frames shall verify the need for fire rated doors on the Construction Drawings. Access doors in walls, partitions or ceilings shall bear UL fire rated labels of same fire rating. If access doors and frames are required to be exposed to view, they shall be chrome, brass, stainless steel, or other finish to match other finishes in the spaces in which they are to be installed, unless otherwise specified. Obtain OAR's approval for location of each access door prior to placement.
- M. Acoustical Requirements: Certain partition, floor and ceiling assemblies are required to have sound absorption and sound transmission loss characteristics as required in the Specification sections or as indicated on the Construction Drawings. The Signage Contractor shall coordinate his work in constructing these assemblies and that of other contractors whose work adjoins, connects to, or penetrates these assemblies to assure that such work does not reduce acoustical characteristics of the assemblies.

3.5 SHOP APPLICATION OF SIGN FINISHES

- A. Sign Graphics: Provide the letters, numerals, symbols, and other graphics markings, using the finish materials shown. Apply the graphics neatly, uniformly proportioned and spaced, and accurate within the dimensions indicated. Prepare the substrate surfaces and apply finish materials in accordance with manufacturers' instructions.
- B. Metal Finishes: Remove scratches, abrasions, dents and other blemishes before applying finish. Apply the following to the fabricated Work, with texture and reflectivity as required to match the Architect's sample.
- C. Linear Polyurethane Finishes: Clean the surfaces as required for proper adhesion of coatings. Use 3M Co. "Scotch Brite" pads or equivalent with cleanser and water, and/or chemically treat as recommended by paint manufacturer to remove deleterious film or residue.
- D. Linear Polyurethane Paint: Provide pretreatment and primer in accordance with manufacturer's recommendation. Add ultra violet inhibitors to paint subject to sunlight exposure.
- E. Clear Linear Polyurethane Finish: Provide pretreatment, primer, and matte or semi-gloss finish coatings in accordance with manufacturer's recommendations. Apply 1.5 to 2.0 mils (0.0375 to 0.050 mm) dry film thickness.

3.6 GRAPHIC APPLICATION

- A. Preparation: Surfaces to receive the graphic markings shall be clean, dry, and otherwise made ready for application of the materials. Accurately measure and lay out the required marking configurations as indicated on drawings.

- B. Vinyl Die-cut and Pattern-cut Graphics: Use pressure sensitive, non-yellowing, non-peeling and weather resistant vinyl adhesive letters or images, custom flood coated as required, die cut from ScotchCal or ScotchLite as manufactured by 3M Company or equivalent. Apply in strict accordance with manufacturer's instructions. Make uniformly smooth and free from bubbles, wrinkles, stretching and blemishes.
- C. Painted or Silk-screened Graphics: All graphics shall be applied using photo processed screens from camera ready art, arranged to furnish sharp and solid images without build-up or bleeding of the coating. Comply with coating manufacturer's application instructions. Provide proper type of primer to suit each substrate and obtain a permanent bond. Verify compatibility of each substrate with the coatings to be used in the Work. Apply the markings with neat edges, minimum 3 mils (0.075 mm) dry film thickness and as required to obtain solid markings without voids.
- D. Acid-Etched Graphics and Typography: Acid-etched typography and graphic imagery must be an average of 1/16" deep, with clean, crisp, sharp edges; ragged or soft (polished out) edges will be rejected. Acid baths used for etching should be fresh and used in an environment and temperature that will provide the highest quality etched images. Color fill as indicated by the S/P color and finish schedule, keeping inks and fills true to the edges of letterforms / graphics.

PART 4 - EXECUTION

4.1 VERIFICATION OF CONDITIONS

- A. Inspect all surfaces to receive signage and report all defects that would interfere with signage installation.
- B. Starting Work implies acceptance of surfaces as satisfactory
- C. Verify all conditions and sign dimensions in field. Contractor to review and study architectural, landscape, lighting, electrical and related plans to insure that all proposed signs can be installed and supported. Verification of conditions and sign dimensions to be completed prior to sign fabrication and reviewed with the architect.

4.2 DEMOLITION

- A. Existing signage to be removed and responsibly discarded.
- B. Installation of new signage to be installed immediately after any demolition.
- C. Temporary signage, if necessary, is to conform with GOAA's Graphic Standards for Temporary Signage
- D. Unused data and/or electrical feeds to be coordinated with OAR for proper terminations.
- E. Any surfaces damaged should be repaired and painted/patched to match adjacent surface.
- F. Concrete and floor surfaces to be repaired in coordination with the OAR.

4.3 INSTALLATION

- A. Install signage upon acceptance by the OAR of material and substantial completion of job site area to receive such materials.
- B. Special Precautions: Guard against damaging existing pavements and planting where signage is to be installed.
- C. Footings beneath topping surface shall be installed and located prior to top surface installation.
- D. Prior to installation, check all components, nuts, bolts, and other connections for proper alignment, fit and any damage. Replace damaged or defective components.
- E. Prior to installation, confirm all electrical locations and requirements with the OAR.

4.4 CLEAN UP

- A. Keep areas of work clean, neat and orderly at all times. Clean surfaces, inside and out. Use approved cleaners if necessary to remove dirt.
- B. Protective coverings and strippable films shall be removed at a time that will afford the greatest protection of the furniture. Surfaces shall be cleaned to remove excess glazing and sealant compounds, dirt, and other substances.
- C. Upon completion of work and before final acceptance, remove tools, surplus materials, apparatus, and debris from the site. Leave the site in a neat, clean condition, acceptable to the Engineer. Wash, clean, and leave paved areas without stains.

4.5 FINAL INSPECTION AND ACCEPTANCE

- A. Upon completion of work, the OAR will perform a final inspection for acceptance.
- B. All unused mock-ups and unused submittals shall be removed from site prior to final acceptance.
- C. Submit operation manuals, tools, and keys as specified in this Section.

END OF SECTION 10 14 00

SECTION 10 1410 – VEHICLE DIRECTIONAL SIGNAGE (NON-ELECTRIFIED) – PARKING GARAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes following types of signs:
 - 1. Reflective vehicular directional and information signs.
 - 2. Retroreflective regulatory signs (R- Signs).
 - 3. PVC Pipe Clearance Signs (PVC- Signs).
- B. Related Sections include following:
 - 1. Division 01 Section “Temporary Facilities & Controls” for temporary project identification signs.
 - 2. Division 09 Sections “Exterior Painting” for painting by others of surfaces to which signs specified herein may be applied. Painting of signs is included in this Section.

1.3 SUBMITTALS

- A. Sustainable Design Documentation Submittals: Refer to section 01 8113.14 “Sustainable Design Requirements – LEED V4 BD+C”.
 - 1. Product Data: Documentation for Leadership Extraction Practices in the following:
 - a. Leadership Extraction Practices for Recycled Content
 - 2. Product Certificates: Provide the following:
 - a. Environmental Product Declarations (EPD’s)
- B. General: Submit following in accordance with Conditions of Contract and Division 01 Specification Sections.
- C. Product Data: Include manufacturer’s construction details relative to materials, dimensions of individual components, profiles, and finishes for each type of sign required.
- D. Shop Drawings: Provide shop drawings for fabrication and erection of signs. Include plans, elevations, and large-scale sections of typical members and other components. Show mounting methods, mounting heights, anchors, grounds, reinforcement, accessories, layout, spacing, dimensions and installation details.

1. Provide message list, typestyles, graphic elements, including tactile characters and Braille and artwork as shown on drawings, and layout of lettering. Include large scale details of sign layout.
 2. Wiring Diagrams from manufacturer of electrified signs for power, signal and control wiring.
- E. Samples: Provide following samples of each sign component for verification of compliance with requirements indicated.
1. Samples of each sign material type on not less than 6-in. squares of extrusion, sheet or plate, showing full range of colors to be provided.
 2. Dimensional characters and castings: Full size sample showing character, material, texture, finish, color, style and attachment method.
- F. Maintenance Data: For signage cleaning and maintenance requirements to be included in maintenance manual.
- G. See requirements of Division 01 Section "Submittal Procedures" Part 1 heading "Submittal Procedures" for limits to re-submittals.
- H. See requirements of Division 01 Section "Submittal Procedures" Part 2 heading "Requests for Information" for RFI procedures.

1.4 QUALITY ASSURANCE

- A. Qualifications: Manufacturers: Only pre-approved manufacturers as listed herein allowed. Sign manufacturer shall have completed a minimum of 3 projects in last 3 years with similar materials and methods of manufacture as required for this project.
- B. Where warranties are required, manufacturer and/or installers shall be authorized by the entity providing the warranty.
- C. All completed signs shall be free from defects in materials and workmanship and effectively present specified or permitted message under both day and night viewing conditions. Sign faces shall be reasonably smooth, shall exhibit uniform color and brightness over entire background surface and shall not appear mottled, streaked, or stained when viewed either in ordinary daylight or incidental beams of automobile headlamps.
- D. Support structures for signs that are free-standing or extending from any exterior surface of the building, including but not limited to the roof level parking signs on cantilever supports, shall be designed by a licensed professional engineer in the State of Florida in accordance with ASCE 7-98's requirements for wind loads.
- E. Regulatory Requirements:
1. Comply with Americans with Disabilities Act (ADA) and state and local codes as adopted by authorities having jurisdiction.
 2. MUTCD:
 - a. Regulatory and Warning signs shall be fully compliant with all requirements of the Manual on Uniform Traffic Control Devices (MUTCD) except that sign size may be modified due to space constraints.

- F. Single-Source Responsibility: For each separate required type of sign as defined herein, obtain signs from a single firm specializing in this type of work so that there will be undivided responsibility for such work.
- G. Design Criteria: Drawings indicate sizes, profiles, and dimensional requirements of signs. Other signs with deviations from indicated dimensions and profiles may be considered, provided deviations do not change design concept. Burden of proof of equality is on proposer.
- H. Coordinate sign placement with structural configuration and lighting location. Before sign installation, arrange meeting with Engineer/Architect and lighting installer at site to review sign placement. Additional compensation not allowed for relocating signs after installation if relocation required due to conflicts with lighting or structure.
- I. Trade Names: Do not display manufacturer's name, trade name, trademarks, or similar markings on exterior or visible surfaces.
- J. Sign Quantity Count: Sign Fabricator shall be responsible for determining the final quantity count of all signs, as indicated on the Signage Schedule and Location Plans, prior to fabrication.
- K. Provide written 5 year full replacement warranty to Owner that all signage will be free of defects due to workmanship and materials including, but not limited to, fading, peeling, delamination, and installation. With no additional cost to Owner, repair all defects that develop during warranty period and all damage to other Work due to such defects. NOTE: Additional warranties apply to specific sign types and products, as specified herein.
- L. Finishes Warranty: Submit five-year written warranty, signed by the Contractor and Installer, warranting that the architectural signage finishes will not develop excessive fading or excessive non-uniformity of color or shade and will not crack, peel, pit or corrode or otherwise fail as a result in defects, within the warranty period, make necessary repairs or replacement at the convenience of the owner or facility's management.
 - 1. "Excessive Fading": A change in appearance which is perceptible and objectionable as determined by the Designer when visually compared with the original color range standards.
 - 2. "Excessive Non-Uniformity": Non-Uniform fading during the period of the guarantee, to the extent that adjacent panels have a color difference greater than the original acceptance range of color.
 - 3. "Will Not Pit or Otherwise Corrode": No Pitting or other type of corrosion discernible from a distance of 10'-0", resulting from the natural elements in the atmosphere at the project site.
- M. Replacement or Repairs: The owner or facilities management shall have the right to continue use of the defective part until such time that the part is replaced or repaired without loss or inconvenience to the owner or facility's management. Warranties shall also state that the replaced or repaired part shall have a warranty period equal to the remaining warranty period for the replaced or repaired part plus an additional one year.

1.5 PROJECT CONDITIONS

- A. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication to ensure proper fitting and mounting. Where sizes of signs may be affected by dimensions of surfaces on which they are installed, verify dimensions by field measurement. Show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay.

1.6 COORDINATION

- A. For signs to be supported by or anchored to permanent construction, provide installers with specific requirements for anchorage devices. Furnish templates for installation.
- B. Coordinate location of remote transformers with building construction. Ensure that transformers are accessible after completion of Work.

1.7 MAINTENANCE

- A. Maintenance Instruction: Furnish maintenance manual to instruct the owner or facility's management personnel in procedures to be followed in cleaning and maintaining the signage. Provide manufacturer's brochures describing the actual materials used in the Work, including metal alloys and finishes.
 - 1. Include a list of cleaning materials appropriate for continued cleaning of signs. Include written instructions for proper maintenance, service access, replacement procedures, etc. Include recommended methods for removal of residual adhesives from wall surfaces after removal of adhesive mounted signs.
- B. Extra Materials: Deliver to the owner or facility's management in manufacturer's original packaging and store at the project site where directed.
 - 1. Furnish one quart of each finish paint color for touch-up purposes.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design Product: Where named products are specified, subject to compliance with requirements specific to this project, provide either named product or an equivalent product by other manufacturers specified.
- B. Manufacturers: Subject to compliance with requirements specific to this project, accepted manufacturers listed in Part 2 are considered to have been prequalified in conformance with paragraph 1.4.A and B of this section. Acceptable manufacturers include, but are not limited to the following:
 - 1. Manufacturers of panel signs:
 - a. ABC Architectural Signing System, Division of Nelson-Harkins Industries.

- b. Alcan Composites, Benton, KY.
- c. Allenite, A Division of Allen Marking Products, Inc.
- d. Andco Industries Corp.
- e. APCO Graphics, Inc.
- f. Architectural Graphics, Inc.
- g. ASI Sign Systems, Inc.
- h. Best Manufacturing Co.
- i. Interstate Highway Sign Corp.
- j. Henry Graphics.
- k. Jarob Design, Inc.
- l. Pannier Graphics.
- m. Tapco.
- n. Vomar.

2.2 MATERIALS

A. Graphics:

- 1. Graphics shall be highest quality with sharp lines and smooth curves. Images shall be uniform colors and free from streaks or spotting.
- 2. Silk screening: Where specified or permitted, silk screening shall be highest quality, with sharp lines, no sawtooths, or uneven ink coverage.
 - a. Screens shall be photographically reproduced.
 - b. Background ink shall be process inks as recommended by manufacturer of substrate employed.
 - c. Ink application through screens: 1 flood pass and 1 print pass. Images: uniform color and ink thickness; free from squeegee marks and lines.
 - d. Signs: dry in adequate racks with 2 in. spacing for ample air flow and forced air drying and curing.
 - e. Package signs only after they have dried completely per ink manufacturer's time allowances.
 - f. Where reflective messages are specified or permitted to be reverse silk-screened with a non-reflective, opaque background, the sheeting material shall be 3M Scotchlite Engineer Grade Reflective Sheeting Series 3200 or equivalent meeting US Department of Transportation Standard Specification for Construction of Roads and Bridges on Federal Highway Products, 1985 FP-85, Type II, Section 718.01.
 - g. Where reflective messages are specified or permitted to be reverse silk-screened with a reflective, transparent background, the sheeting material shall be 3M Scotchlite High Intensity Grade Sheeting Series 3930 or equivalent meeting US Department of Transportation Standard Specification for Construction of Roads and Bridges on Federal Highway Products, 1985 FP-85, Type IIIA, Section 718.01.
- 3. Pressure applied graphics:
 - a. Where pressure-applied graphics applied to a painted background are specified or permitted, the paint shall be flat, opaque acrylic polyurethane as recommended by manufacturer of substrate and graphic media.

- b. Where pressure-applied, reflective graphics on an opaque painted background are specified or permitted, letters shall be digitally produced, and cut by electronic cutting machines from 3M Scotchlite Electrocut Engineer Grade Sheeting Series 3260 material, colors as noted on drawings or equivalent. Edges shall be sealed per manufacturer recommendation.
 - c. Where pressure-applied, reflective graphics on a reflective background are specified or permitted, the sheeting material shall be 3930 Hi Intensity Prismatic or equivalent meeting US Department of Transportation Standard Specification for Construction of Roads and Bridges on Federal Highway Products, 1985 FP-85, Type IIIA, Section 718.01. The letters shall be digitally produced, and cut by electronic cutting machines from 3M Scotchlite Electronic Cutable Film Series 1170, colors as noted on drawings or equivalent.
 - d. Where pressure-applied, non-reflective graphics are specified, letters shall be digitally produced, and cut by computer-driven processes from 3M Scotchcal Electrocut 7725 film.
 - e. Where electronically cut letters and symbols are specified, the inside corners shall be rounded using the largest radius consistent with acceptable appearance. Minimum radius shall be 1/8 inch on a 3 inch letter. Use prespacing tape as recommended by manufacturer of sheeting as a carrier for letters, numerals and symbols.
4. Digital Imaging: Where digital imaging for original art and multicolored graphics are specified.
- a. Where first surface, reflective graphics are specified, the image shall be electronically produced and electrostatically printed onto the transfer media and then heat transferred onto 3M Scotchlite Plus Sheeting Series 680 using IJ680-10 technology. Image to be protected with 3M recommended graphic protective clear coating. Not to be used for regulatory signs.
 - b. Where first surface non-reflective graphics are required, the image shall be electronically produced and electrostatically printed onto the transfer media and then heat transferred onto 3M Scotchprint flexible reflective graphic film IJ180-10 technology. Image to be protected with 3M recommended graphic protective clear coating.
 - c. Where second surface, non-reflective graphics are required, the image shall be produced using 3M Scotchprint Electronic Graphics System using Scotchcal 7725 marking film and lamination.
5. Where specified, dry film transfer shall be produced digitally using computer-driven Dry Thermal Transfer system over 3M high intensity reflective vinyl substrates.
6. All products specified to employ 3M sheeting, films, or other components shall be guaranteed and backed by 3M MCS Warranty or equivalent.

B. Inks and Paints:

- 1. All inks and paints shall be a type made for surface material to which it is applied, and recommended by manufacturer. Exact identification shall be noted on shop drawings, with data describing application method, if other than air-

- drying. Prohibited: paint or ink that will fade, discolor, or delaminate due to UV or heat exposure.
2. All colors for which color match specified shall be approved by Engineer/Architect prior to production.
 3. Acceptable manufacturers and suppliers of inks for silk-screening shall be only those materials recommended by the manufacturer of the sheeting and as required for 3M MCS warranty, or equivalent, where applicable.
 4. Paints: all materials best quality. Products of DuPont DeNemours & Company, Pittsburgh Plate Glass Company, Glidden, Matthews or Sherwin-Williams acceptable.
 - a. Opaque background for pressure applied graphics: Two-part acrylic polyurethane, low gloss. Care shall be taken to provide proper curing so that outgassing does not occur after application of sheeting and/or graphics.
 - b. Painted finish on Sintra panels: Types of paints known compatible with Sintra material.
 - 1) Vinyls
 - 2) Acrylic Lacquers
 - 3) Two part polyurethanes
 - 4) Surface preparation:
 - a) Surface to be painted must remain dry, clean and grease free.
 - b) Surface to be cleaned with a rag moistened with isopropyl alcohol prior to painting.
 - 5) Apply with a brush, roller or conventional air spray equipment.
 - 6) Vinyl and Vinyl/acrylic solvent based Screen printing inks are very compatible.
 - c. Painted graphics on steel doors: Refer to Painting specification. Ferrous metal paint selection for door base. Graphics paint to be compatible with base paint.
 - d. Base for painted graphics on concrete, stucco, masonry and concrete masonry units to be prepared per Paint specifications. Graphics two part acrylic polyurethane, low gloss.
 - e. High gloss enamel base: Graphics medium to be determined by installer. Primer may be required.
 5. Applied color whether ink or paint shall conform to color and accelerated weathering requirements of FP-79 and shall not be removable when tested by Film Adhesion Test and by Film Hardness Test.
- C. Blank Panels: Comply with requirements indicated for materials, thickness, finish, color, design, shape, size, and details of construction.
1. General:
 - a. Produce smooth, even, level sign panel surfaces, constructed to remain flat under installed conditions within a tolerance of plus or minus 0.0625 in. measured diagonally.
 - b. The back side and edges of all panel signs shall be painted with acrylic polyurethane, color to match the specified background color.
 - c. Edge Condition: Square cut.

- d. Corner Condition: Square cut for all signs except Regulatory and Warning signs. Regulatory and Warning sign corners shall be rounded per MUTCD.
- 2. Aluminum:
 - a. Provide aluminum sheet of 6061-T6 or 5052-H38 alloys and temper recommended by aluminum producer or finisher for use type and finish indicated, and with not less than strength and durability properties specified in ASTM B209 for 5005-H15.
 - b. Aluminum extrusions shall be of alloy and temper recommended by aluminum producer for type of use and finish and with not less than strength and durability properties specified in ASTM B221 for 6063-T5.
 - c. Panels shall be etched, degreased, flat, and free of ragged edges. Radius corners by stamping. All signs of same size shall be totally uniform in size. Surface shall be completely clear of dust and dirt before finishes applied.
 - d. Panels to receive 3M sheeting and/or paint shall be treated with an anodizing conversion coating to provide resistance to corrosion and white rust formation. Conversion coating may be:
 - 1) Chromate, meeting ASTM B449 class 2. Coating weight should be 10 to 35 mg per sq ft with a median of 25 mg per square foot. Coating shall not be dusty and shall be tightly bonded within itself and to the aluminum substrate.
 - 2) Non-chromate coatings must meet the requirements for ASTM B449 class 1 chromate coatings. The non-chrome coating shall be adherent and non-powdery. Adhesion of air dried acrylic coating shall meet ASTM D 3359 or ASTM D 4541 and must be equivalent to that of the coating on chromate coated aluminum of the same alloy.
 - e. Fabricate aluminum signs with adequately sized, full-length stiffener members as indicated on Drawings.
- 3. DiBond (T.M.); or approved equal.
 - a. Provide aluminum composite panel, one or both sides platinum white stove-lacquered or one side metallic-aluminum, reverse mill finish.
 - 1) Outer layers are aluminum; inner core is polyethylene.
 - b. Provide sign panels with overall thickness in accordance with the following:
 - 1) Wall or Column surface mounted signs: 2mm (0.079").
 - 2) Overhead signs less than 5'-0" long: 3 mm (0.12").
 - 3) Overhead signs greater than 5'-0" long: 4mm (0.16").
 - c. Product shall be compatible with temperature ranges varying from -50°C to +80°C.
 - d. Product shall have a minimum modulus of elasticity of 70,000 N/mm².
 - e. Product shall have water absorption in % according to Din 53 495-0, 01.
 - f. Product shall have linear thermal expansion dimensional change of 2.4 mm/m at 100k temperature difference.

- g. Manufacturer/Supplier – Alcan Composites USA, Inc.
208 W. 5th Street
P.O. Box 507
Benton, KY 42025

4. Sintra (T.M.); or approved equal.

- a. Provide a foamed, closed cell polyvinyl chloride (PVC) product.
b. Provide sign panels in accordance with the following thicknesses:
1) Wall or column surface mounted signs: min. 6mm (0.236").
2) Overhead signs less than 5'-6" long: min. 13mm (0.512").
3) Overhead signs greater than 5'-6" long min 19mm (0.748").
c. Foamed PVC panels are NOT to be used in areas exposed to direct sunlight.
d. Primer and paint used shall be as recommended by the manufacturer. Paint finish shall be an "eggshell" finish.
e. Material Identification and Information:

<u>Material</u>	<u>Percent % by Weight</u>
Polyvinyl Chloride	75-85%
Antimony Trioxide	<3.0%
Cadmium Compounds	<1.0%
Lead Compounds	<2.0%
Titanium Dioxide	<5.0%
Calcium Carbonate	<5.0%
Other	5-10%
Melting Point	>350 degrees F.

- f. Manufacturer/Supplier– Alcan Composites USA, Inc.,
208 W. 5th Street
P.O. Box 507
Benton, KY 42025,

D. Vehicular signs with reflective graphics and retroreflective message on an opaque background.

1. Base materials:

- a. Aluminum with either reverse silk screened graphics or pressure-applied retroreflective letters.
b. DiBond with either reverse silk screened graphics or pressure applied retroreflective letters.
c. Sintra with either reverse silk screened graphics or pressure-applied retroreflective letters.

- d. FRP, but only with painted background and pressure applied retroreflective letters.
- 2. Background color for all vehicular directional signs, to meet MUTCD standard green, pantone color 342.
- 3. Graphics and Copy: Any of the following methods of producing graphics and copy may be employed.
 - a. Pressure applied retroreflective white letters/symbols. Use 3M High Intensity Prismatic White Sheeting 3930.
 - b. Silk screened; background inks shall be opaque, with retroreflective message.
- E. Regulatory and Warning vehicular signs with retroreflective graphics and message on a retroreflective background.
 - 1. All regulatory and warning signs to fully comply with MUTCD standards.
 - 2. Base material: Aluminum.
 - 3. R and W signs shall have retroreflective messages and retroreflective background using either silk screening or pressure applied retroreflective letters and symbols.
 - 4. Retroreflective colors determined by 23 CFR Appendix to Subpart F of Part 655, Alternate Method to Determining the Color of Retro-reflective Sign Materials and pavement marking materials.
 - a. Federal Highway Authority (FHWA) Reflective Sheeting Identification Guide using ASTM D 4956-04.
 - b. Sheeting Types I through IX.
 - c. The daytime color of non-fluorescent retroreflective materials may be measured in accordance with ASTM Method E 1349, Standard Test Method for Reflectance Factor and Color by Spectrophotometry using Bi-directional Geometry of ASTM Test Method E 1347. Standard Test Method for Color and Color-Difference Measurement by Tristimulus Colorimetry.
 - d. The geometric conditions to be used in both test methods are 0/45 or 45/0 circumferential illumination or viewing. The CIE standard illuminant used in computing the colorimetric coordinates shall be D 65.
 - e. For fluorescent retroreflective materials ASTM E991 may be used to determine the chromaticity provided that the D65 illumination meets the requirements for E 991.
 - f. The following 3M Diamond Grade DG³ Reflective Sheeting materials meet the MUTCD retroreflective requirements:
 - 1) White – DG³4090
 - 2) Red - DG³4092
 - 3) Blue – DG³4095
 - 4) Yellow - DG³4091
 - 5) Green – DG³4097
 - 6) Brown – DG³4099
 - 7) Fluorescent Yellow – DG³4081
 - 8) Fluorescent Yellow Green – DG³4083
 - 9) Fluorescent Orange - DG³4084

- F. PVC- Signs: PVC pipe clearance signs shall have pressure applied decals on black PVC pipe, rectangular retroreflective yellow base sticker 3M Diamond Grade yellow sheeting DG³ 4091 with black border, rounded corners, and black text. See drawings.
1. Electronically cut letters: 3M Scotchlite 3840 reflective sheeting.
 2. 10 in. diameter, Schedule 40 PVC pipe, Corrosion Fluid Products Corporation, Addison, IL, or accepted equivalent. Color black.
 3. If black PVC is not available, Paint: "Spraylat" Lacryl B No. 482 High Hiding Black. Meet Lacryl system specifications for painting on PVC.
- G. Fasteners and Supports:
1. Bolts, nylon insert lock nuts: ASTM A 320, Grade B stainless steel.
 2. Rivets for signs: ASTM B 316, Alloy 6063-T61 or equivalent. Aluminum alloy blind rivets of self-plugging variety may be substituted for solid aluminum alloy rivets, subject to acceptance by Engineer/Architect.
 3. Use concealed fasteners fabricated from metals not corrosive to sign material and mounting surface.
 4. Anchors and Inserts: Use nonferrous metal or hot dipped galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use toothed steel or lead expansion bolt devices for drilled in place anchors. Furnish inserts, as required, to be set into concrete or masonry work.
 5. Sign posts: ASTM A 499 Grade 60 or ASTM A 576, Grade 1080 and meeting mechanical properties specified in ASTM A 499 for Grade 60 steel.
 6. Posts shall be zinc coated per ASTM A 123. Posts shall be straight, with smooth, uniform finish, free from defects affecting strength, durability, or appearance. Punch bolt holes such that post face shall be smooth and even. All holes and ends shall be burr free. After all fabrication, flow coat posts with durable, exterior type, rust inhibiting paint. Paint color: black, unless otherwise indicated on Drawings.
 7. Adhesives, where used for wall mounted signs, shall be per the sign material manufacturer's recommendations.
 8. For DiBond signs, fasteners and mountings shall follow manufacturer's recommendations. Minimum edge distance of 0.75" or 2.5 times the diameter of the fastener being used is recommended as the distance from the center of the hole to the edge of the panel. Large flat washers shall be used to prevent crushing of the sign material.
- H. Cantilever Sign Supports:
1. Pipe for poles and arms: steel pipe, ASTM A53, Grade B, Type E or S.
 2. Gusset, flange, and base plates: ASTM A 36.
 3. Castings: Free of sharp edges and irregularities. Pole top and end cap castings: ASTM A 126, Class A.
 4. Bolts: Connect arm connection flanges with galvanized high strength steel bolts, nuts, and washers per ASTM A 325. Hot dip galvanize fasteners per ASTM A 153. Galvanized nuts shall be tapped oversized per ASTM A 563, and Supplementary requirement S1, "Lubricant and Test for Coated Nuts."
 5. Welding: Applicable requirements of Sections of Division 05.

PART 3 - EXECUTION

3.1 SURFACE PREPARATION OF SUBSTRATE FOR PAINTED SIGNS

- A. Prepare and clean in strict accordance with paint manufacturer's instructions and as specified here, for each substrate condition.
- B. Clean surfaces to be painted before applying paint or surface treatments. Remove oil and grease prior to mechanical cleaning. Program cleaning and painting so contaminants from cleaning process will not fall onto wet, newly painted surfaces.
- C. Cementitious Surfaces:
 - 1. Prepare surfaces to be painted by removing all efflorescence, chalk, dust, dirt, grease, oils, and, by roughening as required, glaze.
 - 2. Determine alkalinity and moisture content of surfaces to be painted by appropriate testing. If surfaces found to be sufficiently alkaline to cause blistering and burring of finish paint, correct before painting. Do not paint on surfaces with moisture content exceeds manufacturer's limits.
- D. Ferrous Metals: Clean uncoated ferrous surfaces of oil, grease, dirt, loose mill scale, and other foreign substances by solvent or mechanical cleaning. Clean previously coated metals in accordance with manufacturer recommendation.

3.2 MATERIALS PREPARATION FOR PAINTED SIGNS

- A. Mix and prepare painting materials per manufacturer's directions.
- B. Store materials not in use in tightly covered containers. Keep all containers clean, free of foreign materials and residue.
- C. Stir materials before applying to produce uniform mixture, and stir as required during application. Do not stir surface film into material. Remove film and strain material before using if necessary.

3.3 INSTALLATION

- A. General: Locate signs where shown using mounting methods of type described and in compliance with manufacturer's instructions. Install sign units level, plumb, and at height shown, with sign surfaces free from appearance defects.
- B. For drilled anchors in concrete, verify location of embedded reinforcing steel, post-tensioning, or pre-stressing cables prior to installation.
- C. Wall Mounted Panel Signs: Attach to wall surfaces with Hilti "Hit" anchors or ITW Ramset/Red Head Hammer Set anchors into concrete or masonry surfaces as shown on Drawings. DO NOT OVERDRIVE anchors, as overdriven anchors will damage sign faces and spall concrete.
- D. Bracket Mounted Units: Provide manufacturer's standard brackets, fittings, and hardware as appropriate for mounting signs which project at right angles from walls or ceilings. Attach brackets securely to walls or ceilings with concealed fasteners and anchors per manufacturer's directions.

- E. Installation of signs shall conform to requirements of Americans with Disabilities Act (ADA) and/or state or local accessibility standards.

3.4 CLEANING AND PROTECTION

- A. At completion of installation, clean soiled sign surfaces in accordance with manufacturer's instructions. Protect units from damage until acceptance by Owner.
- B. Cleanup: During progress of Work, remove from site all discarded materials and rubbish at end of each day.
- C. Upon completion of painting, clean all paint spattered surfaces. Remove spattered paint by proper methods of washing and scraping, using care not to scratch or otherwise damage finished surfaces.
- D. Protection: Protect work of other trades, whether to be painted or not, against damage by painting and finishing. Correct any damage by cleaning, repairing, or replacing, and repainting, as acceptable to Engineer/Architect.
- E. Provide "Wet Paint" signs as required.

END OF SECTION

ORLANDO INTERNATIONAL AIRPORT
BP-S195
Terminal C
Airside Concourse

VEHICLE DIRECTIONAL SIGNAGE (NON-ELECTRIFIED) – PARKING

SECTION 10 1410

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections (including all sustainability requirements), apply to this Section.

1.2 SUMMARY

- A. Section includes vertical solid color reinforced composite toilet partitions and associated trim.
- B. Related Sections include the following:
 - 1. Section 06 10 00 "Rough Carpentry" for Blocking.
 - 2. Section 10 28 00 "Toilet, Bath and Laundry Accessories."

1.3 DEFINITIONS

- A. Solid surface is defined as nonporous, homogeneous material maintaining the same composition throughout the part with a composition of acrylic polymer, aluminum trihydrate filler and pigment.

1.4 SUBMITTALS

- A. A. Product data:
 - 1. For each type of product indicated.
- B. B. Shop drawings:
 - 1. Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices and other components.
 - a. Show full-size details, edge details, thermoforming requirements, attachments, etc.
 - b. Show locations and sizes of cutouts and holes for plumbing fixtures, soap holders and other items installed in solid surface.
- C. Samples:
 - 1. For each type of product indicated.
 - a. Submit minimum 6-inch by 6-inch sample in specified gloss.
 - b. Cut sample and seam together for representation of inconspicuous seam.
 - c. Indicate full range of color and pattern variation.
 - 2. Approved samples will be retained as a standard for work.
- D. Product data:
 - 1. Indicate product description, fabrication information and compliance with specified performance requirements.
- E. Sustainable Design Submittals:

1. Product Data: Refer to section 01 81 13.14 "Sustainable Design Requirements – LEED V4 BD+C" for Leadership Extraction Practices for the following:
 - a. Extended Producer Responsibility
 - b. Recycled content
 2. Product Certificates: Refer to section 01 81 13.14 "Sustainable Design Requirements – LEED V4 BD+C" for the following:
 - a. Environmental Product Declarations (EPD's)
 - b. Corporate Sustainability Reporting (CSR's)
 - c. Health Product Declarations (HPD's)
 3. Adhesives and Sealants: Refer to section 01 81 13.14 "Sustainable Design Requirements – LEED V4 BD+C" subparagraph "Documentation on Low Emitting Materials" for Volatile Organic Chemical Emission requirements.
- F. Product certificates:
1. For each type of product, signed by product manufacturer.
- G. Fabricator/installer qualifications:
1. Provide copy of certification number.
- H. Manufacturer certificates:
1. Signed by manufacturers certifying that they comply with requirements.
- I. Maintenance data:
1. Submit manufacturer's care and maintenance data, including repair and cleaning instructions.
 - a. Maintenance kit for finishes shall be submitted.
 2. Include in project closeout documents.

1.5 QUALITY ASSURANCE

- A. Qualifications:
1. Shop that employs skilled workers who custom fabricate products similar to those required for this project and whose products have a record of successful in-service performance.
- B. Fabricator/installer qualifications:
1. Work of this section shall be by a certified fabricator/installer, certified in writing by the manufacturer.
- C. Applicable standards:
1. Standards of the following, as referenced herein:
 - a. American National Standards Institute (ANSI)
 - b. American Society for Testing and Materials (ASTM)
 - c. National Electrical Manufacturers Association (NEMA)
 2. Fire test response characteristics:
 - a. Provide with the following Class A (Class I) surface burning characteristics as determined by testing identical products per UL 723 (ASTM E84) or another testing and inspecting agency acceptable to authorities having jurisdiction:
 - 1) Flame Spread Index: 25 or less.
 - 2) Smoke Developed Index: 450 or less.
- D. Pre-installation conference:

1. Conduct conference at project site.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver no components to project site until areas are ready for installation.
- B. Store components indoors prior to installation.
- C. Handle materials to prevent damage to finished surfaces.
 1. Provide protective coverings to prevent physical damage or staining following installation for duration of project.

1.7 WARRANTY

- A. Provide manufacturer's 10-year warranty against defects in materials.
 1. Warranty shall provide material and labor to repair or replace defective materials.
 2. Damage caused by physical or chemical abuse or damage from excessive heat will not be warranted.

1.8 MAINTENANCE

- A. Provide maintenance requirements as specified by the manufacturer.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers:
 1. Basis-of-Design Product: Subject to compliance with requirements, provide Bobrick Washroom Equipment, Inc.; Sierra Series or comparable product by one of the following manufacturers meeting all requirements including sustainability requirements.
 - a. DuPont Company
 - b. Ampco Products, LLC
 - c. ASI Partitions Corp.

2.2 MATERIALS

- A. Solid color reinforced composite (SCRC) material for stiles, panels, doors, and screens with antigraffiti coating, thermoset and integrally fused into homogenous piece.
- B. Toilet partitions:
 1. Pilasters of 1-inch solid surface material:
 - a. Floor mounted.
 2. All mounting hardware to be internally mounted in panels and pilasters and to be concealed after assembly of partitions.
- C. Urinal screens:
 1. Panels to be wall mounted.
 2. All mounting hardware to be concealed after installation of panel.

D. Thickness: $\frac{3}{4}$ inch.

E. Performance Requirements:

1. Graffiti Resistance (ASTM D 6578): Passed cleanability test; 5 staining agents.
2. Scratch Resistance (ASTM D 2197): Maximum load value exceeds 10 kilograms.
3. Impact Resistance (ASTM D 2794): Maximum impact force exceeds 30 inch-pounds.
4. Smoke Developed Index (ASTM E 84): Less than 450.
5. Flame Spread Index (ASTM E 84): Less than 75.
6. National Fire Protection Association/International Building Code Interior Wall and Ceiling Finish: Class B.
7. Uniform Building Code: Class II.

2.3 2.3 ACCESSORIES

A. Joint adhesive:

1. Manufacturer's standard one- or two-part adhesive kit to create inconspicuous, nonporous joints.

B. Sealant:

1. Manufacturer's standard mildew-resistant silicone sealant in colors matching components.

C. Adhesives and sealants shall comply with the requirements in section 01 81 13.14 "Sustainable Design Requirements – LEED v4 BD+C" subparagraph "Documentation on Low Emitting Materials" for Volatile Organic Chemical Emissions.

2.4 FACTORY FABRICATION

A. Shop assembly

1. Shop fabricate components to greatest extent practical to sizes and shapes indicated, in accordance with approved shop drawings and manufacturer's printed instructions and technical bulletins.
2. Form joints between components using manufacturer's standard joint adhesive without conspicuous joints.
 - a. Reinforce with strip of solid polymer material, 2" wide.
3. Provide factory cutouts for plumbing fittings and bath accessories as required or as indicated on the drawings.
4. Rout and finish component edges with clean, sharp returns.
 - a. Rout cutouts, radii and contours to template.
 - b. Smooth edges.
 - c. Repair or reject defective and inaccurate work.

2.5 FINISH

A. Refer to Section 09 00 01 "Finish Key" for product color and finish.

2.6 HARDWARE

- A. Hinges:
 - 1. Manufacturer's standard self-closing type that can be adjusted to hold doors open at any angle up to 90 degrees.
- B. Latch and keeper:
 - 1. Manufacturer's standard surface-mounted latch unit designed for emergency access and with combination rubber-faced door strike and keeper.
 - a. Provide units that comply with accessibility requirements of authorities having jurisdiction at compartments indicated to be accessible to people with disabilities.
- C. Coat hook:
 - 1. Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent door from hitting compartment-mounted accessories.
- D. Door bumper:
 - 1. Manufacturer's standard rubber-tipped bumper at out-swinging doors and entrance screen doors.
- E. Door pull:
 - 1. Manufacturer's standard unit at out-swinging doors that complies with accessibility requirements of authorities having jurisdiction.
 - 2. Provide units on both sides of doors at compartments indicated to be accessible to people with disabilities.
- F. All hardware is supplied by fabricator and it's integrally mounted into the partitions at the time of manufacture.
- G. Exposed hardware:
 - 1. Stainless steel type 304.
 - 2. Mild steel: Not allowed.
- H. Urinal screens:
 - 1. No visible mounting hardware is allowed.
 - 2. Concealed hardware:
 - a. Stainless steel type 304:
 - 1) This material to be used in all panel-to-wall connections.
 - b. Mild steel: Not allowed.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with fabricator present for compliance with requirements for installation tolerances, and other conditions affecting performance of work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install components plumb, level and rigid, scribed to adjacent finishes, in accordance with approved shop drawings and product data.

1. Provide product in the largest pieces available.
2. Form field joints using manufacturer's recommended adhesive, with joints inconspicuous in finished work.
 - a. Exposed joints/seams shall not be allowed.
3. Reinforce field joints with solid surface strips extending a minimum of 1 inch on either side of the seam with the strip being the same thickness as the top.
4. Cut and finish component edges with clean, sharp returns.
5. Rout radii and contours to template.
6. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

3.3 3.3 REPAIR

- A. Repair or replace damaged work, which cannot be repaired to architect's satisfaction.

3.4 CLEANING AND PROTECTION

- A. Keep components clean during installation.
- B. Remove adhesives, sealants and other stains.

END OF SECTION 10 21 13

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections (including all sustainability requirements), apply to this Section.

1.2 SUMMARY

- A. Section includes vertical detention stainless-steel modesty panels and associated trim.
- B. Related Sections include the following:
 - 1. Section 06 10 00 "Rough Carpentry" for Blocking.
 - 2. Section 10 28 00 "Toilet, Bath and Laundry Accessories."

1.3 SUBMITTALS

- A. A. Product data:
 - 1. For each type of product indicated.
- B. B. Shop drawings:
 - 1. Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices and other components.
 - a. Show full-size details, edge details, thermoforming requirements, attachments, etc.
- C. Samples:
 - 1. For each type of product indicated.
- D. Product data:
 - 1. Indicate product description, fabrication information and compliance with specified performance requirements.
- E. Sustainable Design Submittals:
 - 1. Product Data: Refer to section 01 81 13.14 "Sustainable Design Requirements – LEED V4 BD+C" for Leadership Extraction Practices for the following:
 - a. Recycled content
- F. Maintenance data:
 - 1. Submit manufacturer's care and maintenance data, including repair and cleaning instructions.
 - 2. Include in project closeout documents.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Deliver no components to project site until areas are ready for installation.
- B. Store components indoors prior to installation.

C. Handle materials to prevent damage to finished surfaces.

1. Provide protective coverings to prevent physical damage or staining following installation for duration of project.

1.5 WARRANTY

A. Provide manufacturer's warranty against defects in materials.

1. Warranty shall provide material and labor to repair or replace defective materials.
2. Damage caused by physical or chemical abuse will not be warranted.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Modesty panel: 13-gauge stainless steel with a continuous 13-gauge stainless steel edge band.
- B. Mounting angles: 13-gauge stainless steel.
- C. Tube supports shall be made of 10-gauge stainless steel with slab bracket and ceiling bracket. (Shipped loose)
- D. Base plate: 5-inches x 6-inches x 1/4-inch stainless steel.
 1. Anchor base plate to floor and ceiling with 3/8"-16 x 1-inch break-off head security screws.

2.2 Mounting Angles

- A. Tube support mounting angles: 1-inch x 3/4-inch x 13 gauge stainless steel angles.
- B. Wall mounting angles: 1-1/2-inches x 1-1/2-inches x 3/16-inch stainless steel angle clips 5-inches long.

2.3 Finish

- A. All surfaces of the modesty panel, mounting angles, base plate and tube support shall be directional belt sanded (satin).

2.4 Fabrication

- A. Mounting angles shall be welded along panel and dressed smooth.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with fabricator present for compliance with requirements for installation tolerances, and other conditions affecting performance of work.

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

3.2 INSTALLATION

- A. Install components plumb, level and rigid, scribed to adjacent finishes, in accordance with approved shop drawings and product data.

3.3 REPAIR

- A. Repair or replace damaged work, which cannot be repaired to architect's satisfaction.

3.4 CLEANING AND PROTECTION

- A. Keep components clean during installation.
- B. Remove adhesives, sealants and other stains.

END OF SECTION 10 21 14

SECTION 10 22 13 - WIRE MESH PARTITIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections (including all sustainability requirements), apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Standard-duty wire mesh partitions.
 - 2. Wire mesh ceilings.

1.3 DEFINITIONS

- A. Intermediate Crimp: Wires pass over one and under the next adjacent wire in both directions, with wires crimped before weaving and with extra crimps between the intersections.
- B. Lock Crimp: Deep crimps at points of the intersection that lock wires securely in place.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Sustainable Design Documentation Submittals: Refer to section 01 81 13.14 "Sustainable Design Requirements – LEED V4 BD+C".
 - 1. Product Data: For Leadership Extraction Practices in the following:
 - a. Leadership Extraction Practices for Recycled Content
 - 2. Product Certificates: Provide the following:
 - a. Environmental Product Declarations (EPD's)
- C. Shop Drawings:
 - 1. Include plans, elevations, sections, details, and attachments to other work.
 - 2. Indicate clearances required for operation of doors.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Welding certificates.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For wire mesh partition hardware to include in maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Door Locks: Furnish 5 percent of quantity installed for each type indicated, but no fewer than two locks.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: Fabricator of products.
- B. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - 2. AWS D1.3, "Structural Welding Code - Sheet Steel."

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver wire mesh items to provide protection during transit and Project-site storage. Use vented plastic.
- B. Inventory wire mesh partition door hardware on receipt, and provide secure lockup for wire mesh partition door hardware delivered to Project site.
 - 1. Tag each item or package separately with identification, and include basic installation instructions with each item or package.

1.10 FIELD CONDITIONS

- A. Field Measurements: Verify actual dimensions of construction contiguous with wire mesh units by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design Manufacturers: Subject to compliance with requirements, provide Standard Wire and Steel Works products or a comparable product by one of the following :
 - 1. Acorn Wire & Iron Works, LLC.
 - 2. American Woven Wire Corporation.
 - 3. Central Wire and Iron.
 - 4. King Wire Partitions, Inc.
 - 5. Miller Wire Works, Inc.

2.2 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Wire mesh units shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated.
 - 1. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft. at any location on a panel.

2. Total load of 200 lbf applied uniformly over each panel.
3. Concentrated load and total load need not be assumed to act concurrently.

2.3 MATERIALS

- A. Recycled Content of Steel Products: Post-consumer recycled content plus one-half of pre consumer recycled content not less than 25 percent. Refer to Section 01 81 13.14 "SUSTAINABLE DESIGN REQUIREMENTS - LEED V4 BD+C" for recycled content requirements.
- B. Steel Wire: ASTM A 510.
- C. Steel Plates, Channels, Angles, and Bars: ASTM A 36/A 36M.
- D. Steel Sheet: Cold-rolled steel sheet, ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.
- E. Steel Pipe: ASTM A 53/A 53M, Schedule 40, unless another weight is indicated or required by structural loads.
- F. Steel Tubing: ASTM A 500/A 500M, cold-formed structural-steel tubing or ASTM A 513, Type 5, mandrel-drawn mechanical tubing.
- G. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with G60 zinc (galvanized) or A60 zinc-iron-alloy (galvannealed) coating designation.
- H. Panel-to-Panel Fasteners: Manufacturer's standard steel bolts, nuts, and washers.
- I. Post-Installed Anchors: Capable of sustaining, without failure, a load equal to 6 times the load imposed when installed in unit masonry and 4 times the load imposed when installed in concrete, as determined by testing according to ASTM E 488/E 488M, conducted by a qualified independent testing agency.
 1. Material for Interior Locations: Carbon-steel components are zinc plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, unless otherwise indicated.
 2. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.
- J. Power-Driven Fasteners: ICC-ES AC70.
- K. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.

2.4 STANDARD-DUTY WIRE MESH PARTITIONS

- A. Mesh: 0.135-inch-diameter, intermediate-crimp steel wire woven into 2-inch square openings.

- B. Posts for 90-Degree Corners: 1-1/4-by-1-1/4-by-1/8-inch steel angles or square tubes with holes for 1/4-inch-diameter bolts aligning with bolt holes in vertical framing; with floor anchor clips.
- C. Posts for Other-Than-90-Degree Corners: Steel pipe or tubing with holes for 1/4-inch-diameter bolts aligning with bolt holes in vertical framing; with floor anchor clips.
 - 1. Partitions up to 12 Feet High: 1-1/4-inch OD by 1/8 inch.
 - 2. Partitions up to 20 Feet High: 2-1/2-inch OD by 1/8 inch.
- D. Adjustable Corner Posts: Two 1-1/4-by-5/8-by-0.080-inch cold-rolled, C-shaped steel channels connected by steel hinges at 36 inches o.c., with holes for 1/4-inch-diameter bolts aligning with bolt holes in vertical framing.
- E. Line Posts: 3-inch-by-4.1-lb or 3-1/2-by-1-1/4-by-0.127-inch steel channels; with 1/4-inch steel base plates.
- F. Three-Way Intersection Posts: 1-1/4-by-1-1/4-by-1/8-inch steel tubes or channels, with holes for 1/4-inch-diameter bolts aligned for bolting to adjacent panels.
- G. Four-Way Intersection Posts: 1-1/4-by-1-1/4-by-1/8-inch steel tubes, with holes for 1/4-inch-diameter bolts aligned for bolting to adjacent panels.
- H. Floor Shoes: Metal, not less than 2 inches high; sized to suit vertical framing, drilled for attachment to floor, and with set screws for leveling adjustment.
- I. Swinging Doors: Fabricated from same mesh as partitions, with framing fabricated from 1-1/4-by-1/2-by-1/8-inch steel channels or 1-1/4-by-5/8-by-0.080-inch cold-rolled, C-shaped steel channels, banded with 1-1/4-by-1/8-inch flat steel bar cover plates on four sides, and with 1/8-inch-thick angle strike bar and cover on strike jamb.
 - 1. Hinges: Full-surface type, 3-by-3-inch steel, three per door; bolted, riveted, or welded to door and jamb framing.
 - 2. Cylinder Lock: Unless noted otherwise, Mortise type with cylinder specified in Section 08 71 00 "Door Hardware"; operated by key outside and lever inside; mounted in lower section of door.
 - 3. Electrified Cylinder Lock: At locations indicated, Electrified mortise type with cylinder specified in Section 08 71 00 "Door Hardware" and security equipment specified in Section 28 13 00 "Physical Access Control System"; operated by key outside and lever inside; mounted in lower section of door.
 - a. Basis of Design Lockset: Corbin-Russwin ML20900 ECL Series.
 - b. Provide armored cabling for all exposed cable.
 - 4. Door Position Switches: at locations indicated, Sentrol 2707AD High Security Concealed Magnetic Contacts.
 - a. Provide surface mount switches on secure side of hatch.
 - 5. Inactive Leaf Hardware: Cane bolt at bottom and chain bolt at top.

- J. Sliding Doors: Fabricated from same mesh as partitions, with framing fabricated from 1-1/2-by-3/4-by-1/8-inch steel channels, banded with 1-1/2-by-1/8-inch flat steel bar cover plates on four sides.
 - 1. Hardware: Two, four-wheel roller-bearing carriers, box track, and bottom guide channel for each door.
 - 2. Padlock Lug: Mortised into door framing and enclosed with steel cover.
- K. Accessories:
 - 1. Sheet Metal Base: 0.060-inch-thick steel sheet.
 - 2. Adjustable Filler Panels: 0.060-inch-thick steel sheet, capable of filling openings from 2 to 12 inches.
 - 3. Wall Clips: Manufacturer's standard, steel sheet; allowing up to 1 inch of adjustment.
- L. Finish: Hot-dip galvanized unless otherwise indicated.

2.5 WIRE MESH CEILINGS

- A. Mesh, Framing, and Stiffeners: Fabricated from same mesh and framing as wire mesh partition panels.
- B. Perimeter Partition Supports: 1-1/2-by-1-1/2-by-1/8-inch steel angle, with holes for 1/4-inch-diameter bolts aligned for bolting to top of wire mesh partitions and to sides of wire mesh ceiling panels.
- C. Wall Supports: 1-1/2-by-1-1/2-by-1/8-inch steel angle punched for attachment to wall and wire mesh ceiling panels.
- D. Intermediate Supports: Steel I-beams or rectangular tubes, as recommended by manufacturer.
- E. Intermediate Support Posts: 2-by-2-by-1/8-inch steel tubes.
- F. Finishes: Match adjacent wire mesh partitions.

2.6 FABRICATION

- A. General: Fabricate wire mesh items from components of sizes not less than those indicated. Use larger-sized components as recommended by wire mesh item manufacturer. Furnish bolts, hardware, and accessories required for complete installation with manufacturer's standard finishes.
 - 1. Fabricate wire mesh items to be readily disassembled.
 - 2. Welding: Weld corner joints of framing and remove spatter.
- B. Standard-Duty Wire Mesh Partitions: Fabricate wire mesh partitions with cutouts for pipes, ducts, beams, and other items indicated. Finish edges of cutouts to provide a neat, protective edge.
 - 1. Mesh: Securely clinch mesh to framing.
 - 2. Framing: Fabricate framing with mortise and tenon corner construction.

- a. Provide horizontal stiffeners as indicated or, if not indicated, as required by panel height and as recommended by wire mesh partition manufacturer. Weld horizontal stiffeners to vertical framing.
 - b. Fabricate three- and four-way intersections using manufacturer's standard connecting clips and fasteners.
 - c. Fabricate partition and door framing with slotted holes for connecting adjacent panels.
 3. Fabricate wire mesh partitions with 3 to 4 inches of clear space between finished floor and bottom horizontal framing.
 4. Fabricate wire mesh partitions with bottom horizontal framing flush with finished floor.
 5. Doors: Align bottom of door with bottom of adjacent panels.
 - a. For doors that do not extend full height of partition, provide transom over door, fabricated from same mesh and framing as partition panels.
 6. Hardware Preparation: Mortise, reinforce, drill, and tap doors and framing as required to install hardware.
- C. Wire Mesh Ceilings: Fabricate wire mesh partitions with cutouts for pipes, ducts, beams, and other items indicated. Finish edges of cutouts to provide a neat, protective edge.
 1. Mesh: Securely clinch mesh to framing.
 2. Framing: Fabricate framing with mortise and tenon corner construction.
 - a. Provide stiffeners as indicated or, if not indicated, as required by panel span and as recommended by wire mesh ceiling manufacturer. Weld stiffeners to framing.
- D. Wire Mesh Stairway Partitions: Provide door jamb framing on each side of doors. Attach tamper shields centered behind exit devices.

2.7 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.
 1. Do not quench or apply post-galvanizing treatments that might interfere with paint adhesion.

2.8 PRIVACY SLATS

- A. High Density Polyethylene (HDPE) extruded slats intended to fit between wire mesh picketts.
- B. Integral color with UV inhibitor.
 1. Color as selected by Architect from Manufacturer's full line.
- C. Top or bottom locking mechanism to maintain consistent top edge height.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine floors for suitable conditions where wire mesh items will be installed.
- C. Examine walls to which wire mesh items will be attached for properly located blocking, grounds, and other solid backing for attachment of support fasteners.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 WIRE MESH PARTITIONS ERECTION

- A. Anchor wire mesh partitions to floor with 3/8-inch-diameter postinstalled expansion anchors at 12 inches o.c. through anchor clips located at each post and corner. Shim anchor clips as required to achieve level and plumb installation.
 - 1. Anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if indicated on Shop Drawings.
- B. Anchor wire mesh partitions to floor with 3/8-inch-diameter postinstalled expansion anchors at 12 inches o.c. through floor shoes located at each post and corner. Adjust wire mesh partition posts in floor shoes to achieve level and plumb installation.
 - 1. Anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if indicated on Shop Drawings.
- C. Anchor wire mesh partitions to walls at 12 inches o.c. through back corner panel framing and as follows:
 - 1. For concrete and solid masonry anchorage, use expansion anchors.
 - 2. For hollow masonry anchorage, use toggle bolts.
 - 3. For wood stud partitions, use lag bolts set into wood backing between studs. Coordinate with carpentry work to locate backing members.
 - 4. For steel-framed gypsum board assemblies, use lag bolts set into wood backing between studs. Coordinate with stud installation to locate backing members.
 - 5. For steel-framed gypsum board assemblies, fasten brackets directly to steel framing or concealed reinforcements using self-tapping screws of size and type required to support structural loads.
- D. Secure top capping bars to top framing channels with 1/4-inch-diameter "U" bolts spaced not more than 28 inches o.c.
- E. Provide line posts at locations indicated or, if not indicated, as follows:
 - 1. On each side of sliding-door openings.
 - 2. For partitions that are 7 to 9 feet high, spaced at 15 to 20 feet o.c.
 - 3. For partitions that are 10 to 12 feet high, located between every other panel.

- 4. For partitions that are more than 12 feet high, located between each panel.
- F. Provide seismic supports and bracing as indicated or, if not indicated, as recommended by manufacturer and as required for stability, extending and fastening members to supporting structure.
- G. Where standard-width wire mesh partition panels do not fill entire length of run, provide adjustable filler panels to fill openings.
- H. Install doors complete with door hardware.
- I. Install service windows complete with window hardware.
- J. Weld or bolt sheet metal bases to wire mesh partitions where indicated.
- K. Bolt accessories to wire mesh partition framing.

3.3 WIRE MESH CEILINGS ERECTION

- A. Anchor wall support angle to walls at 12 inches o.c. and as follows:
 - 1. For concrete and solid masonry anchorage, use expansion anchors.
 - 2. For hollow masonry anchorage, use toggle bolts.
 - 3. For wood stud partitions, use lag bolts set into wood backing between studs. Coordinate with carpentry work to locate backing members.
 - 4. For steel-framed gypsum board assemblies, use lag bolts set into wood backing between studs. Coordinate with stud installation to locate backing members.
 - 5. For steel-framed gypsum board assemblies, fasten brackets directly to steel framing or concealed reinforcements using self-tapping screws of size and type required to support structural loads.
- B. Attach wire mesh ceiling panels to wall support angles with bolts at 12 inches o.c.
- C. Attach wire mesh ceiling panels to wire mesh partitions with slotted angles bolted to sides of ceiling panels and to top of partitions at 12 inches o.c.
- D. Attach wire mesh ceiling panels to intermediate supports as recommended by manufacturer.
- E. Provide seismic supports and bracing as indicated or, if not indicated, as recommended by manufacturer and as required for stability, extending and fastening members to supporting structure.

3.4 ADJUSTING AND CLEANING

- A. Adjust doors and gates to operate smoothly and easily, without binding or warping. Adjust hardware to function smoothly. Confirm that latches and locks engage accurately and securely without forcing or binding.

- B. Remove and replace defective work, including doors and framing that are warped, bowed, or otherwise unacceptable.
- C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas, and repair galvanizing to comply with ASTM A 780/A 780M.
- D. Refer to Section 01 74 23 "Final Cleaning" for additional requirements.

END OF SECTION 10 22 13

SECTION 10 22 26 - OPERABLE PARTITIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections (including all sustainability requirements), apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Manually operated, individual glass panel partitions.
 - 2. Manually operated, acoustical panel partitions.
- B. Related Sections include the following:
 - 1. Division 03 Sections for concrete tolerances required.
 - 2. Division 05 Sections for primary structural support, including pre-punching of support members by structural steel supplier per glass operable partition supplier's template.
 - 3. Division 06 Sections for wood framing and supports and all blocking at head and jambs as required.
 - 4. Division 08 Sections for lock cylinders and keying requirements.
 - 5. Division 09 Sections for wall and ceiling framing at head and jambs.

1.3 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who is certified in writing by the glass operable partition manufacturer, as qualified to install the manufacturer's partition systems for work similar in material, design, and extent to that indicated for this Project.
- B. Preparation of the opening shall conform to the criteria set forth per ASTM E557 "Standard Practice for Architectural Application and Installation of Operable Partitions."

1.4 SUBMITTALS

- A. Product Data: Material descriptions, construction details, finishes, installation details, and operating instructions for each type of operable glass panel partition, component, and accessory specified.
- B. Sustainable Design Documentation Submittals: Refer to section 01 81 13.14 "Sustainable Design Requirements – LEED V4 BD+C".
 - 1. Product Data: Documentation for Leadership Extraction Practices in the following:
 - a. Leadership Extraction Practices for Recycled Content

- C. Shop Drawings: Show location and extent of operable glass panel partitions. Include plans, elevations, sections, details, attachments to other construction, and accessories. Indicate dimensions, weights, conditions at openings and at storage areas, and required installation, storage, and operating clearances. Indicate location and installation requirements for hardware and track including floor tolerances required and direction of travel. Indicate blocking to be provided by others.
- D. Setting Drawings: Show imbedded items and cutouts required in other work, including support beam punching template.
- E. Samples: Color samples demonstrating full range of finishes available for selection by architect. Verification samples will be available in same thickness and material indicated for the work.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Clearly mark packages and panels with numbering systems used on Shop Drawings. Do not use permanent markings on panels.
- B. Protect panel and glazing materials during delivery, storage, and handling to comply with manufacturer's direction and as required to prevent damage to the glass and hardware.

1.6 WARRANTY

- A. Manufacturer's Special Project Warranty on Glass Panels: Provide written warranty signed by the manufacturer of glass operable partitions agreeing to replace those panels with manufacturing defects.
 - 1. Manufacturing defects are defined as any defect materially obstructing vision through the glass, and mechanical failure of hardware which prevents the proper operation of the panels after appropriate installation.
 - 2. Warranty period: Two (2) year from date of installation.

PART 2 - PRODUCTS

2.1 OPERABLE GLASS PANELS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Modernfold, Inc., Glass Wall Model FSW-G and FSW-C with single point fixings or comparable approved product meeting all requirements.
 - 1. Refer to Sections 01 2500 "Substitution Procedures" and 01 6000 "Product Requirements" for comparable product requirements.
- B. Operation
 - 1. Manually operated and top-supported series of individual glass panels. Panels use two-piece, clamp-on top and bottom rail that fastens together from alternating sides.
- C. Construction

1. Provide top reinforcement as required to support panel from suspension components and provide reinforcement for hardware attachment. Fabricate panels with concealed fasteners. Finished in-place partition shall be rigid, level, plumb, aligned with uniform joints and appearance; free of bow, warp, twist, deformation, surface and finish irregularities.
2. Dimensions: Fabricate operable glass panel partitions with manufacturer's standard panel sizes to form an assembled system of dimensions indicated on Drawings, and verified by field measurements.
 - a. Maximum panel width: 39-inches
 - b. Standard rail thickness: 1-7/8-inches
3. Top and Bottom Rails: Continuous two-piece assemblies with removable end caps. Rails fasten together from alternate sides of partition allowing for field adjustment to job site conditions. Snap-on covers are furnished to facilitate installation.
4. Bottom Rail Locking System: Floor bolts are used to stabilize panels from movement in all directions.

D. Materials

1. Aluminum: Alloy and temper recommended by aluminum producer and finisher for type of use, corrosion resistance, and finish indicated; ASTM B221 (ASTM B221M) for extrusions; manufacturer's standard strengths and thicknesses for type of use.
2. Glass: Compliant with safety standards specified in ANSI Z97.1 CPSC16, CFR1201, ASTM C1036 and ASTM C1048.
 - a. Thickness: 1/2-inch or 3/8-inch; tempered.
 - b. Color: Clear

E. Panel Finishes: Provide top and bottom fittings with satin stainless steel clad finish.

F. Suspension System

1. Suspension Tracks: Extruded aluminum with a minimum wall thickness of 0.235 inches. Incorporate cast aluminum or mitered intersections, switches, and curves in stacking area. Provide alignment pins for track, intersections, switches and curves insuring both fit and roller surface integrity.
 - a. Exposed track soffit: Factory-finished aluminum with white powder coat.
2. Carriers: Two stainless steel trolleys with vinyl roller surfaces. Trolley design incorporates eight (8) wheels of varying dimensions. Automatic indexing of panels into stack area is provided by pre-programmed switches and trolleys without electrical, pneumatic, or mechanical activation.

2.2 OPERABLE ACOUSTICAL PANELS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Modernfold, Inc., Acousti-Seal #911, 1-Hour UL rated, manually operated individual panel operable partition or comparable approved product meeting all requirements.
 1. Refer to Sections 01 2500 "Substitution Procedures" and 01 6000 "Product Requirements" for comparable product requirements.

- B. Operation
 - 1. Series of individual flat panels, manually operated, top supported with operable floor seals.
 - 2. Final Closure
 - a. Horizontally expanding panel edge with removable crank.
- C. Panel Construction
 - 1. Nominal 3-inch thick panels in manufacturer's standard 48-inch widths. All panel horizontal and vertical framing members fabricated from minimum 16-gage formed steel with overlapped and welded corners for rigidity. Top channel shall be reinforced to support suspension system components.
 - 2. Panel Skin Options: Roll-formed 21-gage steel wrapping around panel edge, lock formed and welded directly to the frame for unitized construction.
 - 3. Acoustical ratings of panels:
 - 1) 50 STC
 - 4. Hinges for Closure Panels: Full leaf butt hinges attached directly to panel frame with welded hinge anchor plates within panel to further support hinge mounting to frame.
 - 5. Panel Trim: No vertical trim required or allowed on edges of panels; minimal groove appearance at panel joints.
- D. Panel Finishes
 - 1. Panel face finish shall be (select as required): Full height steel markerboard work surface.
- E. Sound Seals
 - 1. Vertical Interlocking Sound Seals between panels: Roll-formed steel astragals, with reversible tongue and groove configuration in each panel edge for universal panel operation.
 - 2. Horizontal Top Seals: Continuous contact, vinyl wrapped ceramic.
 - 3. Horizontal Bottom Seals (select one): Automatic operable seals providing nominal 2-inch (51 mm) operating clearance with an operating range of +1/2-inch (13 mm) to -1-1/2-inch (38 mm) which automatically drop as panels are positioned, without the need for tools or cranks.
- F. SUSPENSION SYSTEM (Select One)
 - 1. Suspension Tracks: Minimum 11-gage, 0.12-inch roll-formed steel track supported by adjustable steel hanger brackets, supporting the load-bearing surface of the track, connected to structural support by pairs of 3/8-inch diameter threaded rods. Aluminum track is not allowed.
 - a. Exposed track soffit: Steel, integral to track, and pre-painted off-white.
 - 2. Carriers: Two all-steel trolleys with steel-tired ball bearing wheels. Non-steel tires are not acceptable. Suspension system shall provide automatic indexing of panels into stack area using preprogrammed switches and trolleys without electrical, pneumatic, or mechanical activation.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Comply with ASTM E557, operable glass partition manufacturer's written installation instructions, Drawings, and approved Shop Drawings.
- B. Install operable glass partitions and accessories after other finishing operations, including painting, have been completed.
- C. Match operable glass partitions by installing panels from marked packages in numbered sequence indicated on Shop Drawings.
- D. Broken, cracked, chipped, deformed, or unmatched panels are not acceptable.

3.2 CLEANING AND PROTECTION

- A. Clean metal and glass surfaces upon completing installation of operable glass partitions to remove dust, loose fibers, fingerprints, adhesives, and other foreign materials according to manufacturer's written instructions.
- B. Provide final protection and maintain conditions in a manner acceptable to manufacturer and Installer that insure operable glass partitions are without damage or deterioration at time of Substantial Completion.

3.3 3.3 ADJUSTING

- A. Adjust operable glass partition to operate smoothly, easily, and quietly, free from binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Lubricate hardware and other moving parts.

3.4 3.4 EXAMINATION

- A. Examine flooring, structural support, and opening, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of operable glass partitions. Proceed with installation only after unsatisfactory conditions have been corrected.
 - 1. Insure finished floor under operable glass partition is level ± 0.13 -inch in ten (10) feet non-cumulative.

3.5 3.5 DEMONSTRATION

- A. Demonstrate proper operation and maintenance procedures to Owner's representative.
- B. Provide Operation and Maintenance Manual to Owner's representatives.

END OF SECTION 10 22 26

SECTION 10 26 00 - WALL AND DOOR PROTECTION

PART 1 - GENERAL

1.1 SUMMARY

1.2 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections (including all sustainability requirements), apply to this Section.
- B. Section Includes:
 - 1. Wall guards.
 - 2. Impact-resistant handrails.
 - 3. Corner guards.
 - 4. Interior bollards.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, impact strength, dimensions of individual components and profiles, and finishes.
 - 2. Include fire ratings of units recessed in fire-rated walls and listings for door-protection items attached to fire-rated doors.
- B. Sustainable Design Documentation Submittals: Refer to section 01 81 13.14 "Sustainable Design Requirements – LEED V4 BD+C".
 - 1. Product Data: Documentation for Leadership Extraction Practices in the following:
 - a. Leadership Extraction Practices for Recycled Content
 - 2. Product Data: Documentation for Low Emitting Materials
 - a. Low Emitting Materials for Adhesives and Sealants
- C. Shop Drawings: For each type of wall and door protection showing locations and extent.
 - 1. Include plans, elevations, sections, and attachment details.
- D. Samples for Initial Selection: For each type of impact-resistant wall-protection unit indicated, in each color and texture specified.
 - 1. Include Samples of accent strips and accessories to verify color selection.
- E. Samples for Verification: For each type of exposed finish on the following products, prepared on Samples of size indicated below:
 - 1. Wall Guards: 12 inches long. Include examples of joinery, corners, end caps, and field splices.
 - 2. Corner and End-Wall Guards: 12 inches long. Include example top caps.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of handrail.
- B. Material Certificates: For each type of exposed plastic material.

- C. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of wall and door protection product to include in maintenance manuals.
1. Include recommended methods and frequency of maintenance for maintaining best condition of plastic covers under anticipated traffic and use conditions. Include precautions against using cleaning materials and methods that may be detrimental to finishes and performance.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Wall-Guard Covers: Full-size plastic covers of maximum length equal to 2 percent of each type, color, and texture of cover installed, but no fewer than two, 96-inch-long units.
 2. Mounting and Accessory Components: Amounts proportional to the quantities of extra materials. Package mounting and accessory components with each extra material.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store wall and door protection in original undamaged packages and containers inside well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.
1. Maintain room temperature within storage area at not less than 70 deg F during the period plastic materials are stored.
 2. Keep plastic materials out of direct sunlight.
 3. Store plastic wall- and door-protection components for a minimum of 72 hours, or until plastic material attains a minimum room temperature of 70 deg F.
 - a. Store wall-guard covers in a horizontal position.

1.8 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of wall- and door-protection units that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
 - a. Structural failures including detachment of components from each other or from the substrates, delamination, and permanent deformation beyond normal use.
 - b. Deterioration of metals, metal finishes, plastics, and other materials beyond normal use.
 2. Warranty Period: Five years from date of Substantial Completion.

2.1 MANUFACTURERS

- A. Source Limitations: Obtain wall-products of each type from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Surface Burning Characteristics: Comply with ASTM E 84 or UL 723; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: 25 or less.
 - 2. Smoke-Developed Index: 450 or less.

2.3 WALL GUARDS

- A. Bumper Rail: Standard-duty, PVC-free assembly consisting of continuous snap-on plastic cover installed over concealed retainer; designed to withstand impacts.
 - 1. 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:
 - a. Babcock-Davis.
 - b. Construction Specialties, Inc.
 - c. Nystrom, Inc.
 - d. WallGuard.com.
 - 2. Cover: Extruded rigid plastic, minimum 0.078-inch wall thickness; as follows:
 - a. Profile: Flat profile, nominal 4 inches high by 1 inch deep.
 - b. Color and Texture: As selected by Architect from manufacturer's full range.
 - 3. Continuous Retainer: Minimum 0.080-inch-thick, one-piece, extruded aluminum.
 - 4. Retainer Clips: Manufacturer's standard impact-absorbing clips.
 - 5. Bumper: Continuous, resilient bumper cushion(s).
 - 6. End Caps and Corners: Prefabricated, injection-molded plastic; matching color cover; field adjustable for close alignment with snap-on cover.
 - 7. Accessories: Concealed splices and mounting hardware.
 - 8. Mounting: Surface mounted directly to wall.
- B. Stainless Steel Wainscot:
 - 1. Refer to Section 09 00 01 "Finish Key".
 - 2. Mounting: Adhesive:
 - a. Provide manufacture statements that confirm that the product used meets the California Department of Public Health (CDPH) Standard Method v1.1 2010 and South Coast Quality Management District (SCAQMD) rule 1168 2005 using the applicable exposure scenario.
 - 1) Refer to Section 01 81 13.14 "Sustainable Design Requirements - LEED v4 BD+C" for additional requirements.

- A. Surface-Mounted, Metal Corner Guards: Fabricated as one piece from formed metal with formed edges; with 90- or 135-degree turn to match wall condition.
 - 1. Material: Stainless-steel sheet, Type 304.
 - a. Thickness: Minimum 0.0781 inch.
 - b. Finish: Directional satin, No. 4.
 - 2. Wing Size: As indicated.
 - 3. Corner Radius: 1/8 inch.
 - 4. Mounting: As indicated.
 - a. Adhesive:
 - 1) Provide manufacture statements that confirm that the product used meets the California Department of Public Health (CDPH) Standard Method v1.1 2010 and South Coast Quality Management District (SCAQMD) rule 1168 2005 using the applicable exposure scenario.
 - 2) Refer to Section 01 81 13.14 "Sustainable Design Requirements - LEED v4 BD+C" for additional requirements.
 - b. Screws: Flat head, countersunk, stainless steel.
- B. Flush-Mount, Stainless Steel Corner Guards: Fabricated as one piece from formed metal; with 90-degree turn to match wall condition.
 - 1. Material: Stainless-steel sheet, Type 304.
 - a. Thickness: Minimum 16-gauge.
 - b. Finish: Directional satin, No. 4.
 - 2. Wing Size: As indicated.
 - 3. Corner Radius: 1/8 inch.
 - 4. Mounting: Screw to wall structure as indicated by manufacturer.

2.5 END-WALL GUARDS

- A. Surface-Mounted, Metal, End-Wall Guards: Fabricated from one-piece, formed or extruded metal that covers entire end of wall; with formed edges.
 - 1. Material: Stainless-steel sheet, Type 304.
 - a. Thickness: Minimum 0.0781 inch.
 - b. Finish: Directional satin, No. 4.
 - 2. Wing Size: Nominal 1-1/2 by 1-1/2 inches.
 - 3. Corner Radius: 1/8 inch.
 - 4. Mounting: Adhesive.
 - a. Provide manufacture statements that confirm that the product used meets the California Department of Public Health (CDPH) Standard Method v1.1 2010 and South Coast Quality Management District (SCAQMD) rule 1168 2005 using the applicable exposure scenario.

2.6 INTERIOR BOLLARDS

- A. Floor Anchored, fixed, heavy duty, stainless steel bollard.
- B. Basis-of-Design Product: Subject to compliance with requirements, provide Alvarado Mfg. Co., Inc.; The C-Post or comparable approved product meeting all requirements including sustainability requirements.

1. Refer to Sections 01 2500 "Substitution Procedures" and 01 6000 "Product Requirements" for comparable product requirements.
- C. Post
 1. Material: 11-gauge rolled steel, chrome plated finish.
 2. Size: 3-inch diameter.
 3. Height: 36-inches.
 4. Base Cover: 5-1/2-inches diameter.
 - a. Material: match post.
- D. Floor Anchor: Manufacturer's standard expansion anchors, 4 anchors per bollard.

2.7 MATERIALS

- A. Plastic Materials: Chemical- and stain-resistant, high-impact-resistant plastic with integral color throughout; extruded and sheet material as required, thickness as indicated.
- B. Fasteners: Aluminum, nonmagnetic stainless-steel, or other noncorrosive metal screws, bolts, and other fasteners compatible with items being fastened. Use security-type fasteners where exposed to view.
- C. Adhesive: As recommended by protection product manufacturer.
 1. Provide products that do not contain excessive levels of VOC's in accordance with the California Air Resources Board (CARB) 2007, Suggested Control Measure (SCM) for Architectural Coatings or the South Coast Quality Management District(SCAQMD) Rule 1113 June 2011.

2.8 FABRICATION

- A. Fabricate wall protection according to requirements indicated for design, performance, dimensions, and member sizes, including thicknesses of components.
- B. Factory Assembly: Assemble components in factory to greatest extent possible to minimize field assembly. Disassemble only as necessary for shipping and handling.
- C. Quality: Fabricate components with uniformly tight seams and joints and with exposed edges rolled. Provide surfaces free of wrinkles, chips, dents, uneven coloration, and other imperfections. Fabricate members and fittings to produce flush, smooth, and rigid hairline joints.

2.9 FINISHES

- A. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

3.1 EXAMINATION

- A. Examine substrates and wall areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine walls to which wall and door protection will be attached for blocking, grounds, and other solid backing that have been installed in the locations required for secure attachment of support fasteners.
 - 1. For wall and door protection attached with adhesive, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Complete finishing operations, including painting, before installing wall and door protection.
- B. Before installation, clean substrate to remove dust, debris, and loose particles.

3.3 INSTALLATION

- A. Installation Quality: Install wall and door protection according to manufacturer's written instructions, level, plumb, and true to line without distortions. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished Work.
- B. Mounting Heights: Install wall and door protection in locations and at mounting heights indicated on Drawings. If not indicated on Drawings, install at heights indicated below:
 - 1. Bumper Rails: 36-inches above finished floor.
- C. Accessories: Provide splices, mounting hardware, anchors, trim, joint moldings, and other accessories required for a complete installation.
 - 1. Provide anchoring devices and suitable locations to withstand imposed loads.
 - 2. Where splices occur in horizontal runs of more than 20 feet, splice aluminum retainers and plastic covers at different locations along the run, but no closer than 12 inches apart.
 - 3. Adjust end caps as required to ensure tight seams.

3.4 CLEANING

- A. Immediately after completion of installation, clean plastic covers and accessories using a standard ammonia-based household cleaning agent.
- B. Remove excess adhesive using methods and materials recommended in writing by manufacturer.
- C. Refer to Section 01 74 23 "Final Cleaning" for additional cleaning requirements.

ORLANDO INTERNATIONAL AIRPORT
BP-S195
Terminal C
Airside Concourse
END OF SECTION 10 26 00

WALL AND DOOR PROTECTION

SECTION 10 26 00

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections (including all sustainability requirements), apply to this Section.

1.2 SUMMARY

- A. This Section includes Fiberglass composite panels.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Coordination Drawings: Drawn to scale and coordinating installation with adjacent attachment to building structure.
- C. Samples: For each material.
- D. Product test reports.
- E. Research/evaluation reports.
- F. Maintenance data.

1.4 STANDARDS

- A. UNDERWRITERS LABORATORY UL 752 11th Edition dated Sept. 5, 2005 Standard for Bullet Resistant Equipment
- B. Submit for approval prior to fabrication catalog cuts, brochures, specifications, UL LISTING VERIFICATION, proof of possession of PRODUCT LIABILITY INSURANCE in an amount not less than five million U.S. dollars, and printed data in sufficient detail to indicate compliance with the contract documents and the manufacturer's instructions for the installation of Bullet Resistant Fiberglass. Furnish verification of compliance with ASTM E119-00e ONE HOUR FIRE RATING from a recognized testing laboratory.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver the materials to the project with the manufacturer's U. L. Labels intact and legible. Handle the material with care to prevent damage. Store the materials inside under cover, stack flat and off the floor.

1.6 WARRANTY

- A. All materials and workmanship shall be warranted against defects for a period of two (2) years from the date of receipt at the project site.

2.1 BULLET RESISTANT FIBERGLASS MATERIAL

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Safeguard security services, LTD Armortex; Armotex O.F. 300 fiberglass composite panels, Ballistic Level, UL-Level 3.
 - 1. Diebold, Inc.
 - 2. Ross Engineering
 - 3. Norshield Security Products
- B. U. L. Listed Level 3 bullet resistant fiberglass not manufactured with starch – oil ballistic grade cloth will be in excess of 1 3/8" in thickness and or exceed 15 lbs. per square foot and is not acceptable.

2.2 SECURITY LEVEL

- A. The Bullet Resistant Fiberglass Composite panel(s) must be U. L. LISTED, RATED FOR LEVEL 3.

PART 3 - EXECUTION

3.1 SUPPORTING MEMBERS

- A. Prior to installing the bullet resistive material, the contractor shall verify that all supports have been installed as required by the contract documents and the architectural drawings.

3.2 JOINTS

- A. All joints shall be reinforced by a back-up layer of bullet resistive material. The bullet resistance of the joint, as reinforced, shall be at least equal to that of the panel. Minimum width of reinforcing layer at joint shall be 4" (2" on each panel or a 2" minimum overlap).
- B. All internal 90 Degree corners provide lap for the entire depth of bullet resistive material.

3.3 APPLICATION

- A. Armor shall be installed in accordance with the manufacturer's printed recommendations. Armor panels shall be adhered using an industrial adhesive, mastic, screws or bolts. Method of application shall maintain the bullet resistive rating at junctures with the concrete floor slab, the concrete roof slab, the bullet resistive door frames, the bullet resistive window frames, and all required penetrations.

END OF SECTION 10 26 41

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections (including all sustainability requirements), apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Public-use washroom accessories.
 - 2. Underlavatory guards.
 - 3. Custodial accessories.
- B. Related Requirements:
 - 1. Section 09 30 13 "Ceramic Tiling" for ceramic toilet and bath accessories.

1.3 COORDINATION

- A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.
- B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
 - 2. Include anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
 - 3. Include electrical characteristics.
- B. Sustainable Design Documentation Submittals: Refer to section 01 81 13.14 "Sustainable Design Requirements – LEED V4 BD+C".
 - 1. Product Data: Documentation for Leadership Extraction Practices in the following:
 - a. Leadership Extraction Practices for Recycled Content
 - 2. Product Data: Documentation for Low Emitting Materials
 - a. Low Emitting Materials for Adhesives and Sealants
 - 3. Product Certificates: Provide the following:
 - a. Environmental Product Declarations (EPD's)
 - b. Corporate Sustainability Reporting (CSR's)
- C. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.
 - 1. Identify locations using room designations indicated.

2. Identify accessories using designations indicated.

1.5 INFORMATIONAL SUBMITTALS

A. Sample Warranty: For manufacturer's special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For accessories to include in maintenance manuals.

1.7 WARRANTY

A. Manufacturer's Special Warranty for Mirrors: Manufacturer agrees to repair or replace mirrors that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, visible silver spoilage defects.
2. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 WASHROOM AND SHOWER ROOM ACCESSORIES

A. Source Limitations: Obtain public-use washroom accessories from single source from single manufacturer.

B. Products: Subject to compliance with requirements, provide one of the following:

Key	Description	Manufacturer	Product No.
GB	Grab Bar – 42" 1-1/2" diameter stainless steel	Bradley Bobrick	812 B-6806
GB	Grab Bar – 36" 1-1/2" diameter stainless steel	Bradley Bobrick	812 B-6806
GBS	Security Grab Bar – 42" 1-1/2" diameter stainless steel	Bradley	SA70
	Mop/broom holder – 4 holders	Bradley	9954
	Hose bracket – 11-1/2" diameter	Westward	48PG05
SCD	Seat cover dispenser - recessed	Bradley Bobrick	584 B-301
MI	Tilted glass mirror with shelf - 18"x36"	Bradley Bobrick	7405 B-166
MI	Mirror – accessible	Bobrick	B-290
SD	Soap dispenser – recessed	Bobrick	B-306
SD	Soap dispenser – surface mounted	deb	CTF16LC
SD	Soap dispenser – surface (wall) mounted	OFCI	---
TPD	Toilet paper dispenser, surface mounted double 9" rolls	Bradley Bobrick	5425 B-2892
SND	Sanitary napkin disposal – surface mounted	Bradley Bobrick	4721/4722 - 15 B-254
SND	Sanitary napkin disposal – recessed	Bradley Bobrick	4732-1015 B-353
SND	Sanitary napkin disposal – partition mounted dual access	Bradley Bobrick	4721-15 B-354
SNV	Sanitary napkin vendor – surface mounted	Bradley	4A20 (FREE)

		Bobrick	B-2706 50
SNV	Sanitary napkin vendor – recessed	Bradley Bobrick	402 B-3706-50
PTD	Automated paper towel dispenser and waste receptacle– recessed, 12 gallon	Georgia Pacific, enMotion	59491 with 59466
PTD	Automated paper towel dispenser – recessed	Georgia Pacific	59466 59471
PTD	Paper towel dispenser – non-automatic, surface mounted	TBD	TBD
	Fold down utility shelf - surface mounted	Bradley Bobrick	790 B-287
	Circular waste chute - 6” diameter	Bradley Bobrick	P10 – 696 B-352
	Retractable stanchion – recessed, full opening or 10 ft	Visiontron	700
	Hooks and shelf - 6	Bradley Bobrick	9124 B-298 shelf B-985 hook strip
MIF	Mirror, custom – full size	Bradley Bobrick	705 series B-290 2472
	Folding child seat – surface mounted	Koala Brocar	KB102-00 103-BQS
WH	Robe hook - single	Bradley Bobrick	931 B-76717
WH	Robe hook - double	Bradley Bobrick	932 B-76727
	Garment rack/hooks – surface mounted with 3 hooks	Ex-Cell Kaiser	703 SA or 724 CHR
	Pull down step	Step & Wash	SNW-SS 975B
CS	Changing table, height adjustable - 440# capacity	Max-Ability	PRESSALIT CARE 2000
	Door stop	Bobrick	B-687
	Shower curtain rod	Bobrick	B-6047
	Hookless shower curtain – 10 mil minimum PEVA, hemmed edges, corrosion-resistant flexible rings.		White
	Shower seat, folding	Bobrick	B-5181
CS	Changing table, child	Bradley Koala	9612 KB100-00 or KB-110-SSWM
	Soap dish, recessed	Bradley Bobrick	9352 and 9353 B-4390
	Towel bar, surface mounted	Bobrick	B-530-24
	Ionizer (1 per 8 sanitary fixtures)	Biozone	AC series
	Sharps Disposal – Recessed Unit	Bradley Bobrick	989 B-35016

2.2 UNDERLAVATORY GUARDS

A. Underlavatory Guard:

1. 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:
 - a. Plumberex Specialty Products, Inc.
 - b. Truebro by IPS Corporation.
2. Description: Insulating pipe covering for supply and drain piping assemblies that prevents direct contact with and burns from piping; allow service access without removing coverings.
3. Material and Finish: Antimicrobial, molded plastic, white.

2.3 CUSTODIAL ACCESSORIES

- A. Source Limitations: Obtain custodial accessories from single source from single manufacturer.
- B. Mop and Broom Holder:
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Bradley Corporation; 9954.
- C. Hose Bracket:
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Westward (Grainger) Hose Hanger, Reel Dia. 11-1/2 inches. #48PG05.

2.4 MATERIALS

- A. Stainless Steel: ASTM A 666, Type 304, 0.031-inch minimum nominal thickness unless otherwise indicated.
- B. Steel Sheet: ASTM A 1008/A 1008M, Designation CS (cold rolled, commercial steel), 0.036-inch minimum nominal thickness.
- C. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.
- D. Chrome Plating: ASTM B 456, Service Condition Number SC 2 (moderate service).
- E. Mirrors: ASTM C 1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.

2.5 FABRICATION

- A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.
- B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

3.1 INSTALLATION

- A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
- B. Grab Bars: Install to withstand a downward load of at least 250 lbf, when tested according to ASTM F 446.

3.2 ADJUSTING AND CLEANING

- A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.
- B. Remove temporary labels and protective coatings.
- C. Clean and polish exposed surfaces according to manufacturer's written instructions.
- D. Refer to Section 01 74 23 "Final Cleaning" for additional cleaning requirements.

END OF SECTION 10 28 00

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections (including all sustainability requirements), apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Defibrillator cabinets, accessories, and installation.
 - 2. Automated external defibrillators (AED's)

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for AED cabinets.
 - 1. Include roughing-in dimensions, details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type, trim style, and panel style.
 - 2. Automated External Defibrillator
- B. Sustainable Design Documentation Submittals: Refer to section 01 81 13.14 "Sustainable Design Requirements – LEED V4 BD+C".
 - 1. Product Data: Documentation for Leadership Extraction Practices in the following:
 - a. Leadership Extraction Practices for Recycled Content
- C. Shop Drawings: For defibrillator cabinets. Include plans, elevations, sections, details, and attachments to other work.
- D. Samples: For each type of exposed finish required.
- E. Samples for Initial Selection: For each type of exposed finish required.
- F. Samples for Verification: For each type of exposed finish required, prepared on Samples 6 by 6 inches square.
- G. Product Schedule: For defibrillator cabinets. Indicate whether recessed, semi recessed, or surface mounted. Coordinate final fire-protection cabinet schedule with fire-extinguisher schedule to ensure proper fit and function. Use same designations indicated on Drawings.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For AED cabinets and AED's to include in maintenance manuals.

1.5 QUALITY ASSURANCE

- A. 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.
- B. Pre-installation Conference: Conduct conference at Project site.
 - 1. Review methods and procedures related to AED cabinets including, but not limited to, the following:
 - a. Schedules and coordination requirements.
- C. Qualifications:
 - 1. Installer experienced in performing work of this section who has specialized in installation of work similar to that required for this project.
 - 2. Manufacturer Qualifications: Manufacturer capable of providing field service representation during construction and approving application method.

1.6 DELIVERY, STORAGE & HANDLING

- A. Delivery:
 - 1. Deliver materials in manufacturer's original packaging with identification labels intact.
- B. Storage and Protection:
 - 1. Store materials protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer.

1.7 SEQUENCING

- A. Sequence With Other Work: Comply with defibrillator cabinet manufacturer's written recommendations for sequencing construction operations.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.
- B. Stainless-Steel Sheet: ASTM A 666, Type 304.
- C. Tempered Float Glass: ASTM C 1048, Kind KT, Condition A, Type I, Quality q3, 1/8 inch, Class I (clear).

2.2 AED CABINET

- A. Cabinet Type: Suitable for mounting AED with emergency telephone and alarm.
- B. Basis of Design manufacturer: J. L. Industries, Inc., a division of Activar Construction Products Group; or a comparable product by one of the following:
 - 1. Larsen's Manufacturing Company.
 - 2. Potter Roemer LLC
- C. Cabinet Interior Size: 14 inches wide by 14 inches high by 6-3/4 inches deep, as required to incorporate AED and specified features. All cabinet components and

equipment shall be accessible, removable and replaceable with the cabinet door in a 90 degree position.

- D. Cabinet Material: Stainless-steel sheet.
- E. Recessed Cabinet: Cabinet box recessed in walls of sufficient depth to suit style of trim.
- F. Cabinet Trim Material: Stainless-steel sheet.
- G. Door Material: Stainless-steel sheet.
- H. Door Style: Provide limited visibility window.
- I. Door Glazing: Tempered float glass.
- J. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.
 - 1. Provide manufacturer's standard.
 - 2. Provide continuous hinge, of same material and finish as trim, permitting door to open 180 degrees.
- K. Accessories:
 - 1. Identification: Manufacturer's standard.
- L. Finishes:
 - 1. Manufacturer's standard baked-enamel paint for the interior of cabinet.
 - 2. Stainless Steel: No. 4.
- M. Cabinet Interior Features:
 - 1. Emergency Phone Box.
 - 2. Cable Access Box
 - 3. Raceway
- N. Alarm:
 - 1. Circuitry Board.
 - 2. Alarm Circuitry
 - 3. Alarm Key Switch and Key:
 - 4. Control for Visual Alarm, Audio Alarm and Relay Closures:
- O. Power Requirements for Alarm Board, Siren and LED:

2.3 AUTOMATED EXTERNAL DEFIBRILLATOR (AEDS)

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Philips Heartstart OnSite Defibrillator or comparable approved product meeting all requirements.
 - 1. Refer to Sections 01 2500 "Substitution Procedures" and 01 6000 "Product Requirements" for comparable product requirements.

2.4 FABRICATION

- A. AED Cabinets: Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.
 - 1. Weld joints and grind smooth.
 - 2. Provide factory-drilled mounting holes.
- B. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles selected.
- C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

2.5 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces of AED cabinets from damage by applying a strippable, temporary protective covering before shipping.
- C. Finish AED cabinets after assembly.
- D. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.6 STAINLESS-STEEL FINISHES

- A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
- B. Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.
 - 1. Directional Satin Finish: No. 4.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine walls and partitions for suitable framing depth and blocking where recessed cabinets will be installed.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare recesses for recessed fire protection cabinets as required by type and size of cabinet and trim style.

3.3 INSTALLATION

- A. General: Install AED cabinets in locations and at mounting heights, at heights acceptable to the Fire Department and according to the Florida Building Code – Accessibility, Fifth Edition.
- B. AED Cabinets: Fasten cabinets to structure, square and plumb.

3.4 ADJUSTING AND CLEANING

- A. Remove temporary protective coverings and strippable films, if any, as cabinets are installed unless otherwise indicated in manufacturer's written installation instructions.
- B. Adjust cabinet doors to operate easily without binding.
- C. On completion of cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.
- D. Touch up marred finishes, or replace cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by AED cabinet and mounting bracket manufacturers.
- E. Replace AED cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 10 43 13

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections (including all sustainability requirements), apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Fire-protection cabinets for the following:
 - a. Portable fire extinguishers.
 - b. Fire hose valves.
- B. Related Requirements:
 - 1. Section 10 44 16 "Fire Extinguishers."
 - 2. Section 21 12 00 "Fire-Suppression Standpipes" for fire-hose connections.

1.3 PREINSTALLATION CONFERENCE

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review methods and procedures related to fire-protection cabinets including, but not limited to, the following:
 - a. Schedules and coordination requirements.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product. Show door hardware, cabinet type, trim style, and panel style. Include roughing-in dimensions and details showing recessed-, semirecessed-, or surface-mounting method and relationships of box and trim to surrounding construction.
 - 1. Show location of knockouts for hose valves.
- B. Sustainable Design Documentation Submittals: Refer to section 01 81 13.14 "Sustainable Design Requirements – LEED V4 BD+C".
 - 1. Product Data: Documentation for Leadership Extraction Practices in the following:
 - a. Leadership Extraction Practices for Recycled Content
- C. Shop Drawings: For fire-protection cabinets. Include plans, elevations, sections, details, and attachments to other work.
- D. Samples: For each type of exposed finish required.
- E. Samples for Initial Selection: For each type of exposed finish required.
- F. Samples for Verification: For each type of exposed finish required, prepared on Samples 6 by 6 inches square.

- G. Product Schedule: For fire-protection cabinets. Indicate whether recessed, semirecessed, or surface mounted. Coordinate final fire-protection cabinet schedule with fire-extinguisher schedule to ensure proper fit and function. Use same designations indicated on Drawings.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For fire-protection cabinets to include in maintenance manuals.

1.6 COORDINATION

- A. Coordinate size of fire-protection cabinets to ensure that type and capacity of fire extinguishers and hose valves indicated are accommodated.
- B. Coordinate sizes and locations of fire-protection cabinets with wall depths.

1.7 SEQUENCING

- A. Apply vinyl lettering on field-painted fire-protection cabinets after painting is complete.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Fire-Protection Cabinets: Listed and labeled to comply with requirements in ASTM E 814 for fire-resistance rating of walls where they are installed.
- B. 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.

2.2 FIRE-PROTECTION CABINET FEC

- A. Cabinet Type: Suitable for fire extinguisher.
 - 1. Basis of Design manufacturer: J. L. Industries, Inc., a division of Activar Construction Products Group; or a comparable product by one of the following:
 - a. Larsens Manufacturing Company.
 - b. Potter Roemer LLC.
- B. Cabinet Construction: Nonrated and rated to match wall construction.
 - 1. Fire-Rated Cabinets: Construct fire-rated cabinets with double walls fabricated from 0.043-inch-thick cold-rolled steel sheet lined with minimum 5/8-inch-thick fire-barrier material. Provide factory-drilled mounting holes.
- C. Cabinet Material (Public Areas): Stainless-steel sheet.
 - 1. Shelf: Same metal and finish as cabinet.
- D. Cabinet Material (Non-Public and Exterior Areas): Aluminum.
 - 1. Shelf: Same metal and finish as cabinet.
- E. Recessed Cabinet (Public Areas):

1. Trimless with Concealed Flange: Surface of surrounding wall finishes flush with exterior finished surface of cabinet frame and door, without overlapping trim attached to cabinet. Provide recessed flange, of same material as box, attached to box to act as drywall bead.
- F. Semirecessed Cabinet (Non-Public Areas): One-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend).
 1. Rolled-Edge Trim: 2-1/2-inch backbend depth.
- G. Surface-Mounted Cabinet: Cabinet box fully exposed and mounted directly on wall with no trim.
- H. Cabinet Trim Material: Same material and finish as door.
- I. Door Material (Public Areas): Stainless-steel sheet.
- J. Door Material (Non-Public Areas): Aluminum sheet.
- K. Door Style (Public Areas): Flush opaque panel, frameless, with no exposed hinges.
- L. Door Style (Non-Public Areas): Vertical duo panel with frame.
- M. Door Glazing: Tempered break glass.
- N. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.
 1. Provide projecting door pull and friction latch.
 2. Provide continuous hinge, of same material and finish as trim, permitting door to open 180 degrees.
- O. Accessories:
 1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire-protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
 2. Break-Glass Strike: Manufacturer's standard metal strike, complete with chain and mounting clip, secured to cabinet.
 3. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as directed by Architect.
 - a. Identify fire extinguisher in fire-protection cabinet with the words "FIRE EXTINGUISHER."
 - 1) Location: Applied to solid opaque panel doors and on cabinet glazing at vertical duo doors.
 - 2) Application Process: Pressure-sensitive vinyl letters.
 - 3) Lettering Color: Red.
 - 4) Orientation: Vertical.
- P. Materials:
 1. Aluminum: ASTM B 221, with strength and durability characteristics of not less than Alloy 6063-T5 for aluminum sheet. ASTM B 221 for extruded shapes.
 - a. Finish: Baked enamel or powder coat.
 - b. Color: Match Architect's sample.

2. Stainless Steel: ASTM A 666, Type 304.
 - a. Finish: No. 4 directional satin finish.
3. Tempered Break Glass: ASTM C 1048, Kind FT, Condition A, Type I, Quality q3, 1.5 mm thick.

2.3 FIRE-PROTECTION CABINET FVC

- A. Cabinet Type: Suitable for fire-hose valve.
 1. Basis of Design manufacturer: J. L. Industries, Inc., a division of Activar Construction Products Group; or a comparable product by one of the following:
 - a. Larsens Manufacturing Company.
 - b. Potter Roemer LLC.
- B. Cabinet Construction: Nonrated and rated to match wall construction.
 1. Fire-Rated Cabinets: Construct fire-rated cabinets with double walls fabricated from 0.043-inch-thick cold-rolled steel sheet lined with minimum 5/8-inch-thick fire-barrier material. Provide factory-drilled mounting holes.
- C. Cabinet Material: Stainless-steel sheet.
 1. Shelf: Same metal and finish as cabinet.
- D. Recessed Cabinet (Public Areas):
 1. Trimless with Concealed Flange: Surface of surrounding wall finishes flush with exterior finished surface of cabinet frame and door, without overlapping trim attached to cabinet. Provide recessed flange, of same material as box, attached to box to act as drywall bead.
- E. Semirecessed Cabinet (Non-Public Areas): One-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend).
 1. Rolled-Edge Trim: 2-1/2-inch backbend depth.
- F. Surface-Mounted Cabinet: Cabinet box fully exposed and mounted directly on wall with no trim.
- G. Cabinet Trim Material: Same material and finish as door.
- H. Door Style: Fully glazed panel with frame.
- I. Door Glazing: Tempered float glass (clear).
- J. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.
 1. Provide projecting door pull and friction latch.
 2. Provide continuous hinge, of same material and finish as trim, permitting door to open 180 degrees.
- K. Accessories:
 1. Break-Glass Strike: Manufacturer's standard metal strike, complete with chain and mounting clip, secured to cabinet.
 2. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as directed by Architect.

- a. Identify fire extinguisher in fire-protection cabinet with the words "FIRE EXTINGUISHER."
 - 1) Location: Applied to solid opaque panel doors and on cabinet glazing at vertical duo doors.
 - 2) Application Process: Pressure-sensitive vinyl letters.
 - 3) Lettering Color: Red.
 - 4) Orientation: Vertical.

L. Materials:

- 1. Aluminum: ASTM B 221, with strength and durability characteristics of not less than Alloy 6063-T5 for aluminum sheet. ASTM B 221 for extruded shapes.
 - a. Finish: Baked enamel or powder coat.
 - b. Color: Match Architect's sample.
- 2. Stainless Steel: ASTM A 666, Type 304.
 - a. Finish: No. 4 directional satin finish.
- 3. Tempered Break Glass: ASTM C 1048, Kind FT, Condition A, Type I, Quality q3, 1.5 mm thick.

2.4 FABRICATION

- A. Fire-Protection Cabinets: Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.
 - 1. Weld joints and grind smooth.
 - 2. Provide factory-drilled mounting holes.
 - 3. Prepare doors and frames to receive locks.
 - 4. Install door locks at factory.
- B. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles.
- C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

2.5 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's AMP 500, "Metal Finishes Manual for Architectural and Metal Products," for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces of fire-protection cabinets from damage by applying a strippable, temporary protective covering before shipping.
- C. Finish fire-protection cabinets after assembly.
- D. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

3.1 EXAMINATION

- A. Examine roughing-in for hose valves and cabinets to verify actual locations of piping connections before cabinet installation.
- B. Examine walls and partitions for suitable framing depth and blocking where recessed and semirecessed cabinets will be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare recesses for recessed and semirecessed fire-protection cabinets as required by type and size of cabinet and trim style.

3.3 INSTALLATION

- A. General: Install fire-protection cabinets in locations and at mounting heights indicated or, if not indicated, at heights acceptable to authorities having jurisdiction.
- B. Fire-Protection Cabinets: Fasten cabinets to structure, square and plumb.
 - 1. Unless otherwise indicated, provide recessed fire-protection cabinets. If wall thickness is inadequate for recessed cabinets, provide semirecessed fire-protection cabinets.
 - 2. Provide inside latch and lock for break-glass panels.
 - 3. Fasten mounting brackets to inside surface of fire-protection cabinets, square and plumb.
- C. Identification: Apply vinyl lettering at locations indicated.

3.4 ADJUSTING AND CLEANING

- A. Remove temporary protective coverings and strippable films, if any, as fire-protection cabinets are installed unless otherwise indicated in manufacturer's written installation instructions.
- B. Adjust fire-protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.
- C. On completion of fire-protection cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.
- D. Touch up marred finishes, or replace fire-protection cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by fire-protection cabinet and mounting bracket manufacturers.
- E. Replace fire-protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.
- F. Refer to Section 01 74 23 "Final Cleaning" for additional cleaning requirements.

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Terminal C
Airside Concourse
END OF SECTION 10 44 13

FIRE PROTECTION CABINETS

SECTION 10 44 13

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections (including all sustainability requirements), apply to this Section.

1.2 SUMMARY

- A. Section includes portable, hand-carried fire extinguishers and mounting brackets for fire extinguishers.
- B. Related Requirements:
 - 1. Section 10 44 13 "Fire Protection Cabinets."

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review methods and procedures related to fire extinguishers including, but not limited to, the following:
 - a. Schedules and coordination requirements.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include rating and classification, material descriptions, dimensions of individual components and profiles, and finishes for fire extinguisher.
- B. Product Schedule: For fire extinguishers. Coordinate final fire-extinguisher schedule with fire-protection cabinet schedule to ensure proper fit and function. Use same designations indicated on Drawings.

1.5 INFORMATIONAL SUBMITTALS

- A. Warranty: Sample of special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For fire extinguishers to include in maintenance manuals.

1.7 COORDINATION

- A. Coordinate type and capacity of fire extinguishers with fire-protection cabinets to ensure fit and function.

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Failure of hydrostatic test according to NFPA 10.
 - b. Faulty operation of valves or release levers.
 - 2. Warranty Period: Six years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."
- B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.
 - 1. Provide fire extinguishers approved, listed, and UL.

2.2 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

- A. Fire Extinguishers: Type, size, and capacity for each fire-protection cabinet and mounting bracket indicated.
 - 1. Basis of Design manufacturer: J. L. Industries, Inc., a division of Activar Construction Products Group; or a comparable product by one of the following:
 - a. Ansul Incorporated; Tyco International.
 - b. Fire End & Croker Corporation.
 - c. Kidde Residential and Commercial Division.
 - d. Potter Roemer LLC.
 - e. Pyro-Chem; Tyco Fire Suppression & Building Products.
 - 2. Valves: Manufacturer's standard.
 - 3. Handles and Levers: Manufacturer's standard.
 - 4. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B, and bar coding for documenting fire-extinguisher location, inspections, maintenance, and recharging.
- B. Multipurpose Dry-Chemical Type in Steel Container (Public Areas): UL-rated 2A:10-B:C, 5-lb nominal capacity, with monoammonium phosphate-based dry chemical in enameled-steel container.
- C. Multipurpose Dry-Chemical Type in Aluminum Container (Non-Public Areas): UL-rated 4-A:80-B:C, 10-lb nominal capacity, with monoammonium phosphate-based dry chemical in enameled-aluminum container.

2.3 MOUNTING BRACKETS

- A. Mounting Brackets: Manufacturer's standard steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or red baked-enamel finish.

- B. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.
 - 1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.
 - a. Orientation: Vertical.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine fire extinguishers for proper charging and tagging.
 - 1. Remove and replace damaged, defective, or undercharged fire extinguishers.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install fire extinguishers and mounting brackets in locations indicated and in compliance with requirements of authorities having jurisdiction.
 - 1. Mounting Brackets: 54 inches above finished floor to top of fire extinguisher UON.
- B. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

END OF SECTION 10 44 16

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections (including all sustainability requirements), apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Welded corridor lockers.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of metal locker.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of metal locker.
- B. Sustainable Design Documentation Submittals: Refer to section 01 81 13.14 "Sustainable Design Requirements – LEED V4 BD+C".
 - 1. Product Data: Documentation for Leadership Extraction Practices in the following:
 - a. Leadership Extraction Practices for Recycled Content
- C. Shop Drawings: For metal lockers.
 - 1. Include plans, elevations, sections, details, and attachments to other work.
 - 2. Show locker trim and accessories.
 - 3. Include locker identification system and numbering sequence.
- D. Samples: For each color specified, in manufacturer's standard size.
- E. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available.
- F. Product Schedule: For lockers. Use same designations indicated on Drawings.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For adjusting, repairing, and replacing locker doors and latching mechanisms to include in maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Full-size units of the following metal locker hardware items equal to 10 percent of amount installed for each type and finish installed, but no fewer than five units:
 - a. Locks.
 - b. Identification plates.
 - c. Hooks.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver metal lockers until spaces to receive them are clean, dry, and ready for their installation.

1.9 FIELD CONDITIONS

- A. Field Measurements: Verify actual dimensions of recessed openings by field measurements before fabrication.

1.10 COORDINATION

- A. Coordinate sizes and locations of bases for metal lockers.
- B. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of work specified in other Sections to ensure that metal lockers can be supported and installed as indicated.

1.11 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of metal lockers that fail in materials or workmanship, excluding finish, within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures.
 - b. Faulty operation of latches and other door hardware.
 - 2. Damage from deliberate destruction and vandalism is excluded.
 - 3. Verify available warranties and warranty periods for units and components.
 - 4. Warranty Period for Welded Metal Lockers: Lifetime from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain metal lockers and accessories from single source from single locker manufacturer.
 - 1. Obtain locks from single lock manufacturer.

- A. Accessibility Requirements: For lockers indicated to be accessible, comply with applicable provisions in the Florida Building Code Fifth Edition (2014) – Accessibility.

2.3 WELDED CORRIDOR LOCKERS

- A. 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:
1. AJW Architectural Products.
 2. ASI Storage Solutions; ASI Group.
 3. DeBourgh Mfg. Co.
- B. Doors: One piece; fabricated from 0.075-inch nominal-thickness steel sheet; formed into channel shape with double bend at vertical edges and with right-angle single bend at horizontal edges.
1. Reinforcement: Manufacturer's standard reinforcing angles, channels, or stiffeners for doors more than 15 inches wide; welded to inner face of doors.
 2. Door Style: Unperforated panel.
- C. Body: Assembled by welding body components together. Fabricate from unperforated steel sheet with thicknesses as follows:
1. Tops, Bottoms, and Sides: 0.060-inch nominal thickness.
 2. Backs: 0.048-inch nominal thickness.
 3. Shelves: 0.060-inch nominal thickness, with double bend at front and single bend at sides and back.
- D. Frames: Channel formed; fabricated from 0.060-inch nominal-thickness steel sheet; lapped and factory welded at corners; with top and bottom main frames factory welded into vertical main frames. Form continuous, integral, full-height door strikes on vertical main frames.
1. Cross Frames between Tiers: Channel formed and fabricated from same material as main frames; welded to vertical main frames.
- E. Hinges: Welded to door and attached to door frame with no fewer than two factory-installed rivets per hinge that are completely concealed and tamper resistant when door is closed; fabricated to swing 180 degrees.
1. Hinges: Manufacturer's standard, steel, continuous or knuckle type.
- F. Recessed Door Handle and Latch: Stainless-steel cup with integral door pull, recessed so locking device does not protrude beyond door face; pry and vandal resistant.
1. Multipoint Latching: Finger-lift latch control designed for use with built-in combination locks or padlocks; positive automatic latching and prelocking.
 - a. Latch Hooks: Equip doors 48 inches and higher with three latch hooks and doors less than 48 inches high with two latch hooks; fabricated from 0.120-inch nominal-thickness steel sheet; welded to full-height door strikes; with resilient silencer on each latch hook.

- b. Latching Mechanism: Manufacturer's standard, rattle-free latching mechanism and moving components isolated to prevent metal-to-metal contact, and incorporating a prelocking device that allows locker door to be locked while door is open and then closed without unlocking or damaging lock or latching mechanism.
- G. Locks: Combination padlocks (provided by others).
- H. Identification Plates: Manufacturer's standard, etched, embossed, or stamped aluminum plates, with numbers and letters at least 3/8 inch high.
- I. Hooks: Manufacturer's standard ball-pointed type, aluminum or steel; zinc plated.
- J. Coat Rods: Manufacturer's standard.
- K. Continuous Zee Base: Fabricated from, manufacturer's standard thickness, but not less than 0.060-inch nominal-thickness steel sheet.
 - 1. Height: 4 inches.
- L. Continuous Sloping Tops: Fabricated from 0.048-inch nominal-thickness steel sheet, with a pitch of approximately 20 degrees.
 - 1. Closures: Vertical-end type.
- M. Recess Trim: Fabricated from 0.048-inch nominal-thickness steel sheet.
- N. Filler Panels: Fabricated from 0.048-inch nominal-thickness steel sheet.
- O. Boxed End Panels: Fabricated from 0.048-inch nominal-thickness steel sheet.
- P. Materials:
 - 1. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B, suitable for exposed applications.
- Q. Finish: Baked enamel or powder coat.
 - 1. Color: As selected by Architect from manufacturer's full range.

2.4 LOCKS

- A. Combination Padlocks: Provided by Owner.

2.5 FABRICATION

- A. Fabricate metal lockers square, rigid, without warp, and with metal faces flat and free of dents or distortion. Make exposed metal edges safe to touch and free of sharp edges and burrs.
 - 1. Form body panels, doors, shelves, and accessories from one-piece steel sheet unless otherwise indicated.
 - 2. Provide fasteners, filler plates, supports, clips, and closures as required for complete installation.
- B. Fabricate each metal locker with an individual door and frame; individual top, bottom, and back; and common intermediate uprights separating compartments.

Factory weld frame members of each metal locker together to form a rigid, one-piece assembly.

- C. Equipment: Provide each locker with an identification plate and the following equipment:
 - 1. Double-Tier Units: One double-prong ceiling hook and two single-prong wall hooks.
- D. Welded Construction: Factory preassemble metal lockers by welding all joints, seams, and connections; with no bolts, nuts, screws, or rivets used in assembly of main locker groups. Factory weld main locker groups into one-piece structures. Grind exposed welds flush.
- E. Accessible Lockers: Fabricate as follows:
 - 1. Locate bottom shelf no lower than 15 inches above the floor.
 - 2. Where hooks, coat rods, or additional shelves are provided, locate no higher than 48 inches above the floor.
- F. Continuous Base: Formed into channel or zee profile for stiffness, and fabricated in lengths as long as practical to enclose base and base ends of metal lockers; finished to match lockers.
- G. Continuous Sloping Tops: Fabricated in lengths as long as practical, without visible fasteners at splice locations; finished to match lockers.
 - 1. Sloping-top corner fillers, mitered.
- H. Recess Trim: Fabricated with minimum 2-1/2-inch face width and in lengths as long as practical; finished to match lockers.
- I. Filler Panels: Fabricated in an unequal leg angle shape; finished to match lockers. Provide slip-joint filler angle formed to receive filler panel.
- J. Boxed End Panels: Fabricated with 1-inch-wide edge dimension, and designed for concealing fasteners and holes at exposed ends of nonrecessed metal lockers; finished to match lockers.
 - 1. Provide one-piece panels for double-row (back-to-back) locker ends.
- K. Finished End Panels: Designed for concealing unused penetrations and fasteners, except for perimeter fasteners, at exposed ends of nonrecessed metal lockers; finished to match lockers.
 - 1. Provide one-piece panels for double-row (back-to-back) locker ends.
- L. Center Dividers: Full-depth, vertical partitions between bottom and shelf; finished to match lockers.

2.6 ACCESSORIES

- A. Fasteners: Zinc- or nickel-plated steel, slotless-type, exposed bolt heads; with self-locking nuts or lock washers for nuts on moving parts.
- B. Anchors: Material, type, and size required for secure anchorage to each substrate.

1. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls for corrosion resistance.
2. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine walls, floors, and support bases, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install lockers level, plumb, and true; shim as required, using concealed shims.
 1. Anchor locker runs at ends and at intervals recommended by manufacturer, but not more than 36 inches o.c. Using concealed fasteners, install anchors through backup reinforcing plates, channels, or blocking as required to prevent metal distortion.
 2. Anchor single rows of metal lockers to walls near top and bottom of lockers.
 3. Anchor back-to-back metal lockers to floor.
- B. Welded Lockers: Connect groups together with standard fasteners, with no exposed fasteners on face frames.
- C. Equipment:
 1. Attach hooks with at least two fasteners.
 2. Attach door locks on doors using security-type fasteners.
 3. Identification Plates: Identify metal lockers with identification indicated on Drawings.
 - a. Attach plates to each locker door, near top, centered, with at least two aluminum rivets.
- D. Trim: Fit exposed connections of trim, fillers, and closures accurately together to form tight, hairline joints, with concealed fasteners and splice plates.
 1. Attach recess trim to recessed metal lockers with concealed clips.
 2. Attach filler panels with concealed fasteners. Locate filler panels where indicated on Drawings.
 3. Attach sloping-top units to metal lockers, with closures at exposed ends.
 4. Attach boxed end panels using concealed fasteners to conceal exposed ends of nonrecessed metal lockers.
 5. Attach finished end panels using fasteners only at perimeter to conceal exposed ends of nonrecessed metal lockers.

- A. Clean, lubricate, and adjust hardware. Adjust doors and latches to operate easily without binding. Verify that integral locking devices operate properly.

3.4 PROTECTION

- A. Protect metal lockers from damage, abuse, dust, dirt, stain, or paint. Do not permit use during construction.
- B. Touch up marred finishes, or replace metal lockers that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by locker manufacturer.

END OF SECTION 10 51 13

SECTION 10 17 13 - EXTERIOR SUN CONTROL DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections (including all sustainability requirements), apply to this Section.

1.2 SUMMARY

- A. Section includes: Shop fabricated metal screen panels to mount on the exterior of the building.
- B. Related Requirements
 - 1. Section 05 21 00 "Structural Steel Framing" for structural attachment

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include, section properties, load and span tables, dimensions, and finishes.
- B. Sustainable Design Documentation Submittals: Refer to section 01 81 13.14 "Sustainable Design Requirements – LEED V4 BD+C".
 - 1. Product Data: Documentation for Leadership Extraction Practices in the following:
 - a. Leadership Extraction Practices for Recycled Content
 - 2. Product Certificates: Provide the following:
 - a. Environmental Product Declarations (EPD's)
- C. Shop drawings shall be submitted showing panel placement, profiles, material thicknesses, finishes, layout, anchorage and openings as dimensioned on the Architectural drawings.
- D. Samples for Initial Selection
 - 1. Provide color samples for finish selection.
- E. Samples for Verification
 - 1. Provide a full width sample of each panel showing material and finish.

1.5 QUALITY ASSURANCE

- A. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.
 - 1. Refer to Section 01 43 39 "Visual Mock-up Requirements" for requirements.
 - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. The panels shall be protected from damage during storage, and handling.
- B. Screen panels shall be elevated above the ground, sloped to provide drainage, and protected from the weather with a ventilated covering. Moisture must not be allowed to accumulate between or on panels; contractor shall monitor, protect, and handle accordingly. All banded bundles shall be broken open so that air can circulate between the metal surfaces.

PART 2 - PRODUCTS

2.1 SUNSCREEN PANELS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide EPIC Metals Corporation, Type EST4 Panels or comparable approved product meeting all requirements including sustainability requirements.
 - 1. Refer to Sections 01 25 00 "Substitution Procedures" and 01 60 00 "Product Requirements" for comparable product requirements.
- B. Design Depth: 2-1/2"

2.2 MATERIAL

- A. The screen panels shall be cold-formed from steel coils conforming to ASTM A653, Grade 40, or equal, having a minimum yield strength of 40,000 psi.
- B. Before forming, the steel coils shall have received a hot-dip protective coating of zinc conforming to ASTM A924, Class G90, as defined in ASTM A653.

2.3 FABRICATION

- A. Screen panels shall be cold-formed by the continuous roll forming process in depth shown on drawings. Break-formed panels are not acceptable.
 - 1. The surfaces between the dovetail ribs shall be perforated.
 - 2. Finished Paint Option- Both surfaces of the screen panels shall be factory coated and oven cured. The finish shall be applied after perforating and forming are complete. The same color shall be used on both sides of panel. Painting prior to perforating is not acceptable. Air dry coatings are not acceptable.
 - a. Color: As selected by Architect from Manufacturer's full line.

2.4 ACCESSORIES

- A. Trim or accessories shall be provided as indicated on the Architectural design drawings.

PART 3 - EXECUTION

3.1 GENERAL

- A. The screen panels shall be installed in strict accordance with the manufacturer's instructions, approved erection drawings, and all applicable safety regulations.

3.2 BEFORE INSTALLATION

- A. The supporting frame and other work relating to the screen panels shall be examined to determine if this work has been properly aligned and completed.
- B. All components of the screen panels shall be protected from damage during storage and handling.

3.3 INSTALLATION

- A. Before being permanently fastened, screen panels shall be placed on the supporting frame and adjusted to final position with ends accurately aligned and adequately bearing on the supporting frame. Consistent coverage shall be maintained so that panels located in adjacent bays will be properly aligned.
- B. Cutting of screen panels to suit jobsite conditions shall be performed in a neat and professional manner, (no cutting torches). Only those openings indicated on the structural drawings shall be cut. Other openings shall be cut and reinforced by those requiring the openings as approved by the Structural Engineer. Exposed raw edges must be touched-up with coatings that have an equal endurance to that of the original coating.
- C. Panels shall be fastened to all supporting members with an approved fastener as specified manufacturer. Care must be taken to maintain the coverage prior to fastening the screen panels.
- D. Construction loads shall not be applied to screen panels until after the panels are permanently fastened to supporting members, and side laps are attached. The construction loads shall not exceed the capacity of the panels.
- E. Items such as signage, light fixtures, flashing, etc. shall not be attached to screen panels without specific approval of the Architect and Structural Engineer.
- F. Accessories and any supplied reinforcement for small openings shall be fastened as indicated on the manufacturer's erection drawings.

3.4 AFTER INSTALLATION

- A. Construction loads that could damage the screen panels such as heavy concentrated loads and impact loads shall be avoided. Protection or planking shall be used in all high traffic areas.
- B. Galvanizing and other coatings that are damaged must be field repaired using appropriate methods and shall be the responsibility of the contractor.
- C. Cleaning surfaces of the screen panels shall be the responsibility of the contractor.

END OF SECTION 10 17 13

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections (including all sustainability requirements), apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Labor, materials and supervision to install debris containment netting to the building structure.

1.3 QUALITY ASSURANCE

- A. Obtain all technical information on products and installation from the manufacturer.
- B. Utilize manufacturer authorized Installers who are knowledgeable in installations.
- C. Installer shall visit the site to gather all information of existing site conditions.
- D. Single Source Responsibility: Netting and all parts / accessories of the debris containment netting shall be from one manufacturer.

1.4 SUBMITTALS

- A. Product Data: Submit all descriptive information from the manufacturer including catalogs, installation instructions and other descriptive material.
- B. Provide Warranty: Material and installation.
- C. Provide Samples: Each type of debris containment netting used, including proposed fastening methods and hardware.
- D. Provide certified installer statement.

1.5 PRODUCT HANDLING

- A. Protect products from damage before, during and after the installation.

1.6 PROJECT CONDITIONS

- A. Coordination: Furnish all anchor devices required to fasten system to and around existing building structure. Coordinate installation with existing conditions and within on-site tolerances.
- B. Visit site and field measure prior to fabrication and delivery of materials.

1.7 WARRANTY

- A. Debris containment netting shall carry a minimum 10-year guarantee against U.V. breakdown for black netting.
- B. Installation shall be guaranteed for 2 years.
- C. Installation shall be performed by a certified authorized installer.
 - 1. Proof of Certification required.

PART 2 - PRODUCTS

2.1 DEBRIS CONTAINMENT NETTING

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Spider, "Spider ContainNet" or comparable approved product meeting all requirements.
 - 1. Refer to Sections 01 2500 "Substitution Procedures" and 01 6000 "Product Requirements" for comparable product requirements.

2.2 DEBRIS CONTAINMENT NETTING SYSTEM

- A. Material: 1250 high tenacity U.V. stabilized knotless polypropylene netting.
 - 1. Flame resistant (270°F melting point), Rot-proof, non-conductive.
 - 2. Color: Black.
- B. Break Strength: ISO 1806 protocol mesh tested in excess of 40 lbs.
- C. Netting Size: 2".
 - 1. Color: Black
- D. Liner Mesh Size: 3/8"
 - 1. Color: Black
- E. Hardware: All metal hardware or products shall be stainless steel.
- F. Maintenance Access: Provide manufacturer's standard access system for lighting fixtures and other equipment.

2.3 MOUNTING SYSTEMS

- A. Solid Steel: For corner attachments use eye bolts with lock nuts and multipurpose cable brackets with powder actuated fire-in-pins for intermediate attachments.
- B. Steel I-Beams: For corner attachments, use eye bolts with lock nuts. For intermediate attachments, use appropriate size girder clips.
- C. Sheet Metal: Use multipurpose cable brackets with self-tapping screws for both corner and intermediate attachments.
- D. Brick, Concrete and Stone: For corner attachments, use expanding corner net bolts. For intermediate attachments, use one of the following attachments: open or closed net loop, net spike, split pin with anchor rivet or multipurpose cable bracket.

PART 3 - EXECUTION

- A. Examine the installation area and note any detrimental or hazardous work conditions. Notify Architect and Construction Manager of unacceptable conditions.
- B. Do not proceed with installation until unacceptable conditions are corrected.

3.2 SURFACE PREPARATION

- A. Surfaces should be thoroughly cleaned and free of dirt, rust, peeling paint or other debris.
- B. Remove or repair articles that may damage debris containment netting after installation, including loose parts on the structure.

3.3 INSTALLATION

- A. Install debris containment netting as recommended by the manufacturer. Debris containment netting shall fit the area to be protected to prevent items falling from BHS equipment and work platforms from reaching occupied spaces below BHS system.
- B. Provide access for light fixtures and other equipment requiring periodic maintenance,
- C. Debris containment netting shall be installed tightly and securely to ensure a long-lasting installation that is visually hard to see.

3.4 INSPECTION

- A. Visually inspect Debris containment netting for any signs of poor installation, including loose screws, fasteners or un-removed debris.
- B. Immediately correct and repair deficient installation.

END OF SECTION 10 71 53

SECTION 10 73 16 - ALUMINUM CANOPIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections (including all sustainability requirements), apply to this Section.

1.2 SECTION INCLUDES

- A. Flat metal canopies.

1.3 RELATED SECTIONS

- A. Section 05 50 00 "Metal Fabrications".

1.4 SUBMITTALS

- A. Product Data: Submit manufacturer's product information, specifications and installation instructions for building components and accessories, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- B. Sustainable Design Documentation Submittals: Refer to section 01 81 13.14 "Sustainable Design Requirements – LEED V4 BD+C".
 - 1. Product Data: Documentation for Leadership Extraction Practices in the following:
 - a. Leadership Extraction Practices for Recycled Content
 - 2. Product Certificates: Provide the following:
 - a. Environmental Product Declarations (EPD's)
- C. Shop Drawings: Submit complete shop drawings including all necessary plan dimensions, elevations and details. Contractor shall verify all dimensions and provide elevations at each column, finish floor, and related soffit before releasing to shop drawings for fabrication.
- D. Delegated-Design Submittal: Submit design calculations signed by a Registered Professional Engineer. Design calculations shall state that the system design complies with the wind requirements of ANSI/ASCE 7-88, the stability criteria of applicable building code, and other governing criteria.
 - 1. For system engineering of components and system engineering of attachment to structure to resist environmental loads.
- E. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

- F. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) square representing actual product, color, and patterns.

1.5 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Products shall be wholly produced by a recognized manufacturer with at least 10 years' experience in the design and fabrication of specified systems.
 - 1. Systems shall be mechanically fastened - welding is not acceptable.
- B. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
 - 1. Refer to Section 01 43 39 "Visual Mock-Up Requirements" for additional requirements.

1.6 PRE-INSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store products in manufacturer's unopened packaging bearing the brand name and manufacturer's identification until ready for installation.
- B. Handling: Handle materials to avoid damage.

1.8 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

1.9 SEQUENCING

- A. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

1.10 WARRANTY

- A. Manufacturer shall warrant systems, including material and workmanship, from defects for a period of one year from substantial completion.
- B. Installer shall warrant entire scope of installation including: connections, flashing, sealing, and other items related to installation for a period of one year from substantial completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by the following or comparable approved product meeting all requirements including sustainability requirements:
 - 1. Dittmer Architectural Aluminum.
 - 2. Refer to Sections 01 2500 "Substitution Procedures" and 01 6000 "Product Requirements" for comparable product requirements.

2.2 PERFORMANCE REQUIREMENTS:

- A. System Performance: Provide aluminum canopy system that has been designed, produced, fabricated and installed to withstand normal temperature changes as well as live loading, dead loading and wind loading in compliance with Florida Building Code requirements for geographic area in which work is located.
- B. Sizes shown on drawings are to be considered minimum.
- C. Structure shall be capable of sustaining severe icing, hail, hurricane force winds and supporting a concentrated load such as being walked upon.
- D. Sustainability Requirements:
 - 1. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of pre-consumer recycled content not less than 25 percent.
 - a. Refer to Section 01 81 13.14 "Sustainable Design Requirements - LEED v4 BD+C" for additional information and requirements for recycled content.
 - 2. Environmental Product Disclosure: Provide an Environmental Product Declarations (EPD) that conforms with one of the following:
 - a. Product specific declarations in accordance with ISO 1404
 - b. Environmental Product Declarations conforming to ISO 14025, 14040, 14044 and EN 15804 or ISO 21930
 - c. Industry Wide Product Specific Type III EPD Third Party Certification

2.3 MATERIALS

- A. All aluminum extrusions shall be alloy 6063 heat treated to a T-6 temper.
- B. High-Performance Organic Finish: 2-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 1. Color and Gloss: Match Architect's sample.
- C. Fasteners:
 - 1. Deck Screws (rivets not permitted): Type 18-8 non-magnetic stainless steel sealed with a neoprene "O" ring beneath 5/8" outside dimension, conical washer.
 - 2. Fascia Rivets: Size 3/16" by 1/2" grip range aluminum rivets with aluminum mandrel.

3. Bolts: All bolts, nuts and washers to be 18-8 non-magnetic stainless steel.
 4. Tek Screws: not permitted.
- D. Acrylic Glazing:
1. Acrylic glazing and sidewall panels, where indicated, shall be acrylic panels equal to Rohm & Haas, "Plexiglas" Type G. Color to be selected by Architect. Panel thickness to be a minimum of $\frac{1}{4}$ ".

2.4 FABRICATION

- A. Comply with indicated profiles, dimensional requirements and structural requirements.
- B. Use sections true to details with clean, straight sharply defined profiles and smooth surfaces of uniform color and texture, free from defects impairing strength and durability.
- C. All welding to be done by heli-arc process.
- D. Bents shall consist of shop welded one piece units. When size of bents do not permit shipment as a welded unit, concealed mechanical joints may be used.
- E. Mechanical joints shall consist of stainless steel bolts with a minimum of two (2) bolts per fastening. Bolts and nuts shall be installed in a concealed manner utilizing $\frac{1}{2}$ " thick by $1 \frac{1}{2}$ " aluminum bolt bars welded to structural members. All such mechanical joints must be detailed on shop drawings showing all locations.
- F. Roof Deck: Extruded aluminum shapes, interlocking self-flashing sections. Shop fabricate to lengths and panel widths required for field assembly. Depth of sections to comply with structural requirements. Provide shop induced camber in deck units with spans greater than 16'-0" to offset dead load deflections. Internal dams are to be used at non-draining ends of deck.
- G. Expansion joints, design structure for thermal expansion and contraction. Provide expansion joints as required.
- H. Exposed rivets used to fasten bottom of fascia to deck to have finish to match fascia.
- I. Apply a shop applied dip-coat of clear acrylic enamel to each column end terminating in concrete to insulate from electrolytic reaction. Column ends shall be pierced to "key" grout to bent for maximum uplift protection.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.

- B. If substrate preparation is the responsibility of another installer, notify Architect and Construction Manager of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 FIELD DIMENSIONS

- A. General contractor shall field confirm bent locations, dimensions and elevations shown on shop drawings prior to fabrication.

3.4 CANOPY INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install protective covers in positions indicated in plans and approved shop drawings.
- C. Protective cover shall be erected true to line, level, plumb, and leak free.
- D. Extreme care shall be taken to protect finish during handling and erection.

3.5 PROTECTION

- A. Products shall be cleaned promptly after completion of installation.
- B. Protect installed products until completion of project.
- C. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 10 73 16

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections (including all sustainability requirements), apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Labor, materials and supervision to install bird control netting to the building structure.
- B. Related Requirements:
 - 1. Division 23 Sections for mechanical equipment.
 - 2. Division 26 sections for light fixtures.

1.3 QUALITY ASSURANCE

- A. Obtain all technical information on products and installation from the manufacturer.
- B. Utilize manufacturer authorized Installers who are knowledgeable in installations.
- C. Installer shall visit the site to gather all information of existing site conditions.
- D. Single Source Responsibility: Netting and all parts / accessories of the bird netting shall be from one manufacturer.

1.4 SUBMITTALS

- A. Product Data: Submit all descriptive information from the manufacturer including catalogs, installation instructions and other descriptive material.
- B. Provide Warranty: Material and installation.
- C. Provide Samples: Each type of bird netting used, including proposed fastening methods and hardware.
- D. Provide certified installer statement.

1.5 PRODUCT HANDLING

- A. Protect products from damage before, during and after the installation.

1.6 PROJECT CONDITIONS

- A. Coordination: Furnish all anchor devices required to fasten system to and around existing building structure. Coordinate installation with existing conditions and within on-site tolerances.
- B. Visit site and field measure prior to fabrication and delivery of materials.

- A. $\frac{3}{4}$ " bird netting shall carry a minimum 10-year guarantee against U.V. breakdown for black netting.
- B. Installation shall be guaranteed for 2 years.
- C. Installation shall be performed by a certified authorized installer.
 - 1. Proof of Certification required.

PART 2 - PRODUCTS

2.1 BIRD NETTING PRODUCT

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Bird-B-Gone, Inc., Bird Net 2000 or comparable approved product meeting all requirements.
 - 1. Refer to Sections 01 2500 "Substitution Procedures" and 01 6000 "Product Requirements" for comparable product requirements.

2.2 BIRD NETTING SYSTEM

- A. Material: U.V. stabilized knotted polyethylene net.
 - 1. Flame resistant (270°F melting point), Rot-proof, non-conductive.
 - 2. Color: Black.
- B. Break Strength: ISO 1806 protocol mesh tested in excess of 40 lbs.
- C. Sizes: $\frac{3}{4}$ ".
- D. Hardware: All metal hardware or products shall be stainless steel.
- E. Maintenance Access: provide manufacturer's standard access system for lighting fixtures and other equipment.

2.3 MOUNTING SYSTEMS

- A. Solid Steel: For corner attachments use eye bolts with lock nuts and multipurpose cable brackets with powder actuated fire-in-pins for intermediate attachments.
- B. Steel I-Beams: For corner attachments, use eye bolts with lock nuts. For intermediate attachments, use appropriate size girder clips.
- C. Sheet Metal: Use multipurpose cable brackets with self-tapping screws for both corner and intermediate attachments.
- D. Brick, Concrete and Stone: For corner attachments, use expanding corner net bolts. For intermediate attachments, use one of the following attachments: open or closed net loop, net spike, split pin with anchor rivet or multipurpose cable bracket.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine the installation area and note any detrimental or hazardous work conditions. Notify Architect and Construction Manager of unacceptable conditions.
- B. Do not proceed with installation until unacceptable conditions are corrected.

3.2 SURFACE PREPARATION

- A. Surfaces should be thoroughly cleaned and free of bird droppings, nesting materials, rust peeling paint or other debris.
- B. Remove or repair articles that may damage bird netting after installation, including overhanging foliage, brush and loose parts on the structure.

3.3 INSTALLATION

- A. Install bird net as recommended by the manufacturer. Bird net shall fit the area to be protected perfectly so pest birds cannot enter the protected area, and so the netting blends with the architecture.
- B. Provide access for light fixtures and other equipment requiring periodic maintenance,
- C. Bird net shall be installed tightly and securely to ensure a long-lasting installation that is visually hard to see.

3.4 INSPECTION

- A. Visually inspect bird net for any signs of poor installation, including loose screws, fasteners or un-removed debris.
- B. Immediately correct and repair deficient installation.

END OF SECTION 10 81 13

SECTION 11 13 16 - LOADING DOCK SEALS AND SHELTERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections (including all sustainability requirements), apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Transparent strip door curtains

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings:
 - 1. Include plans, elevations, sections, details, and attachments to other work.
 - 2. Detail assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of anchors and field connection.
- C. Samples: For each type of fabric indicated.

1.4 FIELD CONDITIONS

- A. Field Measurements: Verify actual dimensions of dock openings and contiguous construction by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 TRANSPARENT-STRIP DOOR CURTAINS

- A. General: Door curtains consisting of overlapping strips suspended from top of opening to form a sealed door curtain. Provide strips of length required to suit opening height and with sufficient unit number to close opening width with overlap indicated.
- B. Strip Material: Curved, clear, transparent, extruded PVC. Fabricate strips for manufacturer's standard method of attachment to overhead mounting system indicated.
 - 1. Strip Width and Thickness: 6 inches wide and 0.060 inch thick.
 - 2. Overlap: None.

- C. Header Mounting: Consisting of an angle bolted or welded to opening lintel; equip angle with permanently attached mounting pins and a steel-angle or -plate retaining strip attached to angle with wing nuts.
- D. Steel Finish: Hot-dip galvanize components to comply with the following:
 - 1. ASTM A 123/A 123M for iron and steel support mounting.
 - 2. ASTM A 153/A 153M or ASTM F 2329 for iron and steel hardware and anchors.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for electrical systems for inflatable units to verify actual locations of connections before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Dock Seals: Attach dock-seal support frames securely to building structure in proper relation to openings, dock bumpers, and dock levelers to ensure compression of dock seals when trucks are positioned against dock bumpers.

3.3 ADJUSTING

- A. After completing installation, inspect exposed factory finishes and repair damaged finishes.

END OF SECTION 11 13 16

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections (including all sustainability requirements), apply to this Section.

1.2 SUMMARY

- A. Section Includes:

- 1. Manufacturing, delivery, installation and commissioning of a complete pedestrian exit lane breach control corridor. The exit lane breach control (ELBC) corridor shall consist of the wall support structure, glass walls, ceiling support structure, ceiling, fully automatic doors, automatic gate, pedestrian guide rails, video analytic intruder detection, I/O for remote operation, activation sensors, safety sensors and all required hardware for securely anchoring the assembled unit to the finished floor.

- B. Related Requirements:

- 1. Section 08 71 00 "Door Hardware" for lock cylinders for exit lane breach control corridor doors when in lockdown mode.
 - 2. Section 08 80 00 "Glazing" for general requirements for handling and installation of factory-installed glazing products specified in this Section.
 - 3. Section 09 66 23 "Resinous Matrix Terrazzo Flooring" for finished flooring products installed in conjunction with installation of exit lane breach control corridor.
 - 4. Section 09 68 16 "Sheet Carpeting" for finished flooring products installed in conjunction with installation of exit lane breach control corridor.
 - 5. Section 21 13 13 "Wet Sprinkler Systems" for sprinkler system requirements related to installation of exit lane breach control corridor.
 - 6. Division 26 sections for electrical power conductors, cables, and conduits for electrical service to exit lane breach control corridor, including disconnect switches, and for conduit for low-voltage power and control wiring required for work of this Section.

1.3 REFERENCE STANDARDS

- A. American Society of Civil Engineers/Structural Engineering Institute (ASCE/SEI): www.asce.org:
 - 1. ASCE/SEI 7 Minimum Design Loads for Buildings and Other Structure
- B. American Architectural Manufacturer's Association (AAMA): www.aama.org:
 - 1. AAMA 2603 Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels
- C. ASTM International (ASTM): www.astm.org:
 - 1. ASTM B633 Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel

2. ASTM C1048 Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass
 3. ASTM C1172 Standard Specification for Laminated Architectural Flat Glass
 4. ASTM F1941 Standard Specification for Electrodeposited Coatings on Threaded Fasteners
- D. Code of Federal Regulations (CFR):
1. 16 CFR 1201 Safety Standard for Architectural Glazing Materials
- E. International Code Council (ICC): www.iccsafe.org:
1. ICC A117.1 Accessible and Usable Buildings and Facilities (ANSI)
 2. ICC-ES AC193 Mechanical Anchors in Concrete Elements
 3. ICC-ES AC308 Post-installed Adhesive Anchors in Concrete Elements
- F. Safety Glazing Certification Council (SGCC): www.sgcc.org:
1. Certified Products Directory
- G. U.S. Architectural & Transportation Barriers Compliance Board: www.access-board.gov:
1. Americans with Disabilities Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Pre-installation Conference: Conduct conference online prior to delivery of components. Include representatives of Contractor, Owner, Architect, system Installer, Installers of electrical and data connections, and others affecting or affected by the Work. Review the following:
1. Requirements of Contract Documents.
 2. Project access.
 3. Temporary security requirements.
 4. Work restrictions.
 5. Schedule coordination.
 6. Staging requirements.
 7. Temporary facilities and controls.
 8. Delivery, storage, and handling.
- B. Coordination:
1. Coordinate installation of exit lane breach control corridor with installation of floor, wall, and ceiling construction and connections to building services.
 2. Coordinate installation of anchors and blocking indicated on approved exit lane breach control corridor shop drawings.

1.5 ACTION SUBMITTALS

- A. Product Data: For exit lane breach control corridor structure and detection system.
- B. Shop Drawings: For exit lane breach control corridor.
1. Include plans, elevations, sections, and details. Show compliance with accessibility requirements through dimensioned diagrams.
 2. Installation-specific dimensioning, including coordination of related new ceiling, wall, and floor-mounted elements specified elsewhere.

3. Locations and requirements for recesses and attachments to other work, including general construction, anchorage methods and locations, and service connections and locations.
4. Include diagrams for power, signal, and control wiring including dimensioned connection locations.
5. Indicate finish and glazing details.
6. Include door hardware locations, mounting heights, and installation requirements.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installation firm.
- B. Field quality-control reports.
- C. Warranty: Sample of unexecuted manufacturer warranty.

1.7 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For exit lane breach control corridor, to include in maintenance manuals.

1.8 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer listed in this Section with minimum five years' experience in manufacture of similar products in successful use on similar projects and able to provide exit lane breach control corridor meeting specified requirements.
 1. Maintenance Proximity: Qualified personnel located not more than 2 hours normal travel time from Installer's place of business to Project site.
 2. Approval of Manufacturers and Comparable Products: Submit the following in accordance with project substitution requirements, within time allowed for substitution review:
 - a. Completed and signed Substitution Request form.
 - b. Product data, including certified independent data indicating compliance with requirements.
 - c. Samples of each finish component.
 - d. Sample submittal from similar project.
 - e. Project references: Minimum of five installations of similar equipment not less than two years old, with Owner contact information.
 - f. Sample warranty.
- B. Installer Qualifications: Experienced Installer approved by exit lane breach control corridor manufacturer for installation of exit lane breach control corridor required for this Project, who has completed installations similar in material, design, and extent to that indicated for this Project with a record of successful in-service performance.
- C. Glazing Fabricator Qualifications: Certified by primary glazing manufacturer.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Protect components according to manufacturer's written instructions. Prevent damage from condensation, temperature changes, direct exposure to sun, or other causes.

1.10 WARRANTY

- A. Manufacturer's Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of exit lane breach control corridor that demonstrate deterioration or faulty operation due to defects in materials or workmanship under normal use within warranty period specified.
 - 1. Warranty Period, Drive and Detection Components: 1 year from date of completion of installation, testing, commissioning and owner acceptance.
 - 2. Warranty Period, Fixed Structure: 5 years from date of completion of installation.
 - 3. Exit lane corridors shall not be used by passengers in normal functional use until the system is accepted in writing by the owner.
- B. The warranty shall execute a three tier approach to repairing downed units in the following manner:
 - 1. Tier 1 – The manufacturer shall train designated airport maintenance staff and provide a troubleshooting guide, to triage the down unit prior to contacting the manufacturer service support designee. The triage instructions shall attempt to resolve a high degree of potential issues causing down time by failure.
 - 2. Tier 2 – Should Tier 1 triage attempts deem unsuccessful, the manufacturer shall provide a phone support contact to provide additional triage instructions. Internet access to the controls shall be required with access allowed by the owner.
 - 3. Tier 3 – Should Tier 2 triage attempts deem unsuccessful, the manufacturer shall dispatch an qualified technician to the downed unit to arrive within 48 hours. Internet access to the controls shall be required with access allowed by the owner.
- C. Exit lane corridors shall not be placed in service for passengers use until the system has been accepted in writing, by the owner.
- D. Continuing Maintenance Service Agreement (CSMA): If called for in the Request for Proposal (RFP), the manufacture shall be prepared to provide an extended maintenance agreement proposal to Owner for maintenance of exit lane breach control corridor by qualified personnel of assembly Installer, beyond the warranty period. The extended agreement shall cover an additional three (3) year period without requiring evaluation of the units. Units older than four (4) years may be evaluated by the manufacturer prior to accepting an extended maintenance plan.
- E. Preventative Maintenance Inspections (PM):
 - 1. It is recommended each unit undergo a PM inspection six (6) months after commissioning, and one (1) time at the end of the warranty period. After the initial warranty period, it is recommend each unit undergo a PM inspection once per quarter.
 - a. The PM Inspection shall verify operation of exit lane breach control corridor, adjust, alignment, lubricate as required to bring assembly into

- manufacturer's recommended clearance tolerances and to provide smooth operation for operating and sensor components.
- b. Perform manufacturer's recommended tests to verify system is operating within published specifications.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Kaba Access & Data Systems Americas; Kaba Lane Model PIL-M02 or comparable approved product meeting all requirements.
1. Refer to Sections 01 2500 "Substitution Procedures" and 01 6000 "Product Requirements" for comparable product requirements.
- B. Source Limitations: Provide exit lane breach control corridors through one source from a single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Accessibility Standard: Comply with requirements of authorities having jurisdiction.
- B. Safety Glazing: Provide glass panels that comply with 16 CFR 1201, Category II requirements for safety glazing.

2.3 SYSTEM DESCRIPTION

- A. General: Provide manufacturer's standard exit lane breach control corridor. Where not otherwise indicated, provide manufacturer's products as indicated in published product literature and as required for complete exit lane breach control corridor.
- B. Exit Lane Breach Control Corridor: Floor-supported, self-supporting enclosure consisting of stainless steel framing and panels with glass infill panels, glazed doors, and hinged gates, forming a controlled-access secure path of travel configured to allow high-volume single-direction pedestrian movement, and to sense, deter, and provide local and remote notification for attempts to enter corridor from the restricted direction. The modular enclosure is equipped with a series of motion presence and video analytic sensors that detect unattended objects left within the corridor area. As pedestrians pass through the corridor, full-height and half-height double swing doors automatically open and close based upon selected operating mode. Combined, the physical barrier and sensor system provide secure detection, entry prevention, and separation of facility users from persons posing a risk to the public.
1. Aluminum-framed, stainless steel-clad structural components do not meet the requirements of this specification.
- C. System Configuration: As indicated on Drawings.

2.4 OPERATION MODE DESCRIPTIONS

- A. Free-Flow Mode: In the static position, two full-height door pairs and a half-height gate are closed and locked. As single or multiple users exiting the air side approach the unit, an activation sensor detects the users and opens airside set of doors. As

the users proceed through the exit lane and approach the landside set of doors, an activation sensor detects the users and opens the landside doors and half-height gate, thus allowing continuous exit flow.

- B. Interlock Mode: In the static position, the two full-height door pairs are closed and locked; the half-height gates remain in the open position. As the single or multiple user exits the airside approach the unit, an activation sensor detects the user and opens the airside doors to allow user or group of users to proceed to the landside doors which remain in the closed and locked position. Once an adequate count of users fill the corridor compartment, a voice announcement shall advise the users to stand clear of the airside doors as they begin to close. Once the airside set of doors are clear, closed, and locked, the landside set of doors and half-height gate open and allow users to exit.
- C. Maintenance Mode:
 - 1. Secure Side: Keyswitch on secure side activates maintenance mode. Secure side full height doors remain open, while second set of full height doors and half-height gates remain closed and locked. All security features are disabled.
 - 2. Non-Secure Side: Keyswitch on non-secure side activates maintenance mode. Non-secure side full height doors and half-height gates remain open, while airside set of full height doors remain closed and locked. All security features are disabled.
- D. Lock Down Mode: Activated at unit panel or remotely; locks all doors.
- E. Hold Open Mode: Activated locally or remotely; opens all doors.

2.5 COMPONENTS

- A. Wall and Glazing Framing: Stainless steel formed shapes, of width and thickness standard with manufacturer, with the following features:
 - 1. Concealed wire chase at top and bottom rails.
 - 2. Limiting plate directing wheeled traffic away from wall.
 - 3. Limiting bar protecting walls from door impact.
- B. Glass Wall Panels: Provide glass panels with safety glazing labeling.
 - 1. Laminated Glass: ASTM C 1172, consisting of two plies of fully tempered ultraclear low-iron float glass, ASTM C1048, Kind FT, Condition A, Type I, Quality-Q3, with 0.060 inch (1.5 mm) thick polyvinyl butyral interlayer.
 - a. Glass used on walls shall be 3/8 inch (10mm) overall thickness.
 - b. Glass used on full height swing doors shall be 1/4" (6mm) overall thickness.
 - c. Interlayer color shall be optional and specified by the architect.
 - 2. Source Limitations for Glass: All glass shall be provided with the system, supplied by the manufacturer.
- C. Ceiling Structure: Overhead soffits with sensor housings and perforated stainless steel plate covering.
- D. Floor Attachment: Rails supporting the wall panels shall be stainless steel. Stainless steel cladding is not acceptable. The floor anchoring system shall be provided by the manufacturer.

- E. Interlock Doors: Pair of full-height power-operated glass door panels, configured in one-way traffic pattern.
 - 1. Controls and sensors:
 - a. Microwave sensors open doors and gates; infrared sensors provide safety curtain when operating doors and gates.
 - b. Microwave sensors on non-protected side recognize attempted passage from non-protected to protected side.
 - c. Traffic lights indicate green for open/to proceed or red for closed.
 - 2. Power Door Operators:
 - a. Closing Speed: Less than 2.0 seconds.
- F. Automatic Gates: One or more pairs of power-operated fast-closing swinging gates formed of tubular stainless steel, configured in one-way traffic pattern, with a directional plaque mounted on a stainless steel pedestal. Opening and closing safety sensors are located on the non-secure side of interlock doors.
 - 1. Nonsecure Side Controlled Access: Owner supplied access control for unit service.
 - 2. Power Gate Operators:
 - a. Closing Speed: Less than 0.6 seconds.
- G. Door Operator Settings under Special Condition Failure:
 - 1. Component: Airside doors close and lock; landside doors and gates lock in open position.
 - 2. Power Outage: Airside doors close and lock; landside doors and gates remain unlocked.
 - 3. Emergency Evacuation:
 - a. Fail Safe: Airside doors, landside doors and gates shall be in an unlocked condition.
 - b. Fail Secure: Airside doors lock in a closed condition; landside doors and gates shall be in an unlocked condition to prevent any chance of entrapment.
- H. Safety Rails: Floor-mounted and framing-attached tubular stainless steel safety railings extending on both sides of interlock doors and gates.
- I. Interior Lighting: Manufacturer's standard sensor-coordinated low-energy fluorescent lighting fixtures as part of video analytics system.
- J. Power Requirements: 120VAC, 20A dedicated circuit.
- K. Refer to Division 26 electrical power section for online UPS and surge control serving this unit as recommended by system manufacturer.
- L. Thrown-in Object Detection: Sensor array configured to detect objects thrown into the exit lane corridor from the landside.
- M. Lighted Directional Signals: Progressive LED arrow signals directing pedestrian traffic (in lieu of pictographs).

2.6 SECURITY SYSTEM

- A. General: Provide manufacturer's standard inside corridor and exit side security packages providing presence detection, object detection, and reverse flow detection, with local and remote alarm and access control interface capabilities.
- B. Inside Corridor Security Package: Object detection camera system and floor-scanning laser providing presence and abandoned object detection. Multiple zone microwave motion sensors detect reverse motion within corridor, setting off pre-alarm followed by full alarm, released by user leaving the corridor on the secured side before reentering.
- C. Exit Side Security Package: Video analytics providing detection of reverse user flow, with audible pre-warning followed by full alarm and lockdown initiation. Half-height gates close immediately followed by the closing of full-height doors. System actively scans to identify if user turns and leaves corridor, allowing system to reset and reopen or to remain in full shutdown pending manual reset. Microwave motion detector with video analytics set off pre-alarm; second microwave sensor with video analytics set off full alarm which initiates closing of gates and doors.
- D. Control Interface: Panel with LED error code display, controls for switching functional modes, with input port and dry contacts for remote operation.
- E. Voice Annunciation System: Programmable voice module with 16MB storage capacity and loudspeaker, integrated into portal of interlock doors.

2.7 ACCESSORIES

- A. Hardware and Accessories, General: Manufacturer's standard operating hardware and accessories.
- B. Structural Anchors: For applications indicated to comply with certain design loads, use manufacturer-furnished fasteners, or provide fastener systems with working capacity greater than or equal to the design load.

2.8 FINISHES

- A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
- B. Powder-Coat Finish: Manufacturer's standard coating preparation and application meeting approved samples.
 - 1. Color: As selected by Architect from Manufacturer's full line.

2.9 FABRICATION

- A. Fabrication, General: Factory fabricate exit lane breach control corridor in accordance with approved shop drawings and published system descriptions.
- B. Glass Fabrication: Fabricate glazing panels in sizes, profiles, and configurations shown on Drawings.
 - 1. Provide holes and cutouts in glass to receive hardware, fittings, and accessories prior to tempering glass. Do not cut, drill, or make other alterations to glass after tempering.

2. Factory glaze components indicated as factory glazed on approved shop drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. The Owner shall evaluate and confirm the installation site conditions comply with the exit lane breach control corridor manufacturer's written requirements including tolerances, floor structure, lighting conditions, and concealed services, and are prepared for installation.
- B. The Owner shall verify that the supporting floor meets the following requirements:
 1. Overall Levelness: Within 1/4 inch (6 mm) of design elevation indicated on approved shop drawings.
 2. Sloped floors shall be flat within 1/4 inch (6 mm) of design elevation, with the slope equal to slope indicated on approved shop drawings.
 3. Installed finished floor material and color matches flooring approved in advance by manufacturer.
- C. The Owner shall validate electrical and communication system rough-ins for compliance with approved shop drawings.
- D. Proceed with installation once conditions affecting installation and performance meet the manufacturer's written requirements.

3.2 INSTALLATION

- A. General: Install exit lane breach control corridor according to manufacturer's written installation instructions and approved shop drawings. Install unit in presence of manufacturer-authorized service representative.
- B. Install exit lane breach control corridor after other finishing operations have been completed.
- C. Install panels, doors and frames, railings, accessories, and installation materials required to provide a complete exit lane breach control corridor. Secure exit lane breach control corridor to building structure using manufacturer's recommended fasteners suitable for application. Install exit lane breach control corridor level and plumb.
- D. Tolerances: Install exit lane breach control corridor in accordance with the manufacturer's written instructions.
- E. Building Services Provided By Owner:
 1. Sprinkler heads in accordance with drawings and requirements of authorities having jurisdiction and requirements of Division 21 sprinkler system sections.
 2. Electrical power service and data systems to the supplied exit lane corridor.

3.3 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Manufacturer-authorized service representative shall test and inspect components, assemblies, and equipment installations, including connections to building services and system software.
- B. Remove and replace components, assemblies, and equipment installations that do not pass inspections or where inspections indicate that units do not comply with specified requirements.

3.4 ADJUSTING

- A. Adjust operable components to produce smooth operation and uniform fit. Confirm that locks engage accurately and securely.
- B. Replace damaged components.
- C. Lubricate hardware and other moving parts.

3.5 CLEANING

- A. Clean components in accordance with manufacturer's written instructions. Do not use cleaning agents or methods not approved by glass manufacturer.
- B. Clean exposed metal surfaces to factory new appearance.
- C. Refer to Section 01 35 46 "Indoor Air Quality" and Section 01 74 23 "Final Cleaning" for additional requirements.

3.6 DEMONSTRATION AND TRAINING

- A. Manufacturer-authorized service representative shall provide startup services and train Owner's personnel to adjust, operate, and maintain exit lane breach control corridor.
- B. Refer to Section 01 79 00 "Demonstration and Training" for additional requirements.

END OF SECTION 11 14 53

SECTION 11 30 13 - RESIDENTIAL APPLIANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections (including all sustainability requirements), apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Refrigeration appliances.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include installation details, material descriptions, dimensions of individual components, and finishes for each appliance.
 - 2. Include rated capacities, operating characteristics, electrical characteristics, and furnished accessories.
- B. Product Schedule: For appliances.

1.4 INFORMATIONAL SUBMITTALS

- A. Sample Warranties: For manufacturers' special warranties.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For each residential appliance to include in operation and maintenance manuals.

1.6 WARRANTY

- A. Refrigerator/Freezer, Sealed System: Full warranty, including parts and labor, for on-site service on the product.
 - 1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Electrical Appliances: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 REFRIGERATOR/FREEZERS

- A. Refrigerator/Freezer Compact: One-door refrigerator with freezer compartment inside and complying with AHAM HRF-1.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Frigidaire; FFPE2411QB or comparable product by one of the following manufacturers meeting all requirements.
 - a. General Electric Company
 - b. LG Electronics
 - c. Sub-Zero Inc.
 - d. Whirlpool Corporation
2. Type: Freestanding.
3. Dimensions:
 - a. Width: 18-5/8 inches.
 - b. Depth: 17-3/4 inches.
 - c. Height: 24-7/8 inches.
4. Storage Capacity:
 - a. Refrigeration Compartment Volume: 2.4 cu. ft.
 - b. Freezer Volume: 0.14 cu. ft..
5. Front Panel(s): Manufacturer's standard.
6. Appliance Color/Finish: Stainless steel.

2.3 ICEMAKERS

A. Icemaker:

1. Basis-of-Design Product: Subject to compliance with requirements, provide Scotsman; Prodigy Undercounter Cuber with Storage or comparable product by one of the following manufacturers meeting all requirements.
 - a. General Electric Company
 - b. LG Electronics
 - c. Sub-Zero Inc.
 - d. Whirlpool Corporation
2. Type: Undercounter.
3. Dimensions:
 - a. Width: 26 inches.
 - b. Depth: 27-3/8 inches.
 - c. Height: 33 inches.
4. Front Panel: Manufacturer's standard.
 - a. Panel Color: Black.
5. Appliance Color/Finish: Stainless steel.

2.4 WATER COOLER

A. Point of use water cooler:

1. Basis-of-Design Product: Subject to compliance with requirements, provide Blueline; Global Water G3 or comparable product by one of the following manufacturers meeting all requirements.
 - a. OASIS

- b. Whirlpool Corporation
- 2. Type: Freestanding
- 3. Dimensions:
 - a. Width: 13 inches
 - b. Depth: 15 inches
 - c. Height: 42 inches
- 4. Filtration: 3-stage

2.5 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, power connections, and other conditions affecting installation and performance of residential appliances.
- B. Examine roughing-in for piping systems to verify actual locations of piping connections before appliance installation.
- C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install appliances according to manufacturer's written instructions.
- B. Freestanding Equipment: Place units in final locations after finishes have been completed in each area. Verify that clearances are adequate to properly operate equipment.

3.3 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
 - 1. Perform visual, mechanical, and electrical inspection and testing for each appliance according to manufacturers' written recommendations. Certify compliance with each manufacturer's appliance-performance parameters.
 - 2. Leak Test: After installation, test for leaks. Repair leaks and retest until no leaks exist.
 - 3. Operational Test: After installation, start units to confirm proper operation.

4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and components.
- B. An appliance will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

3.4 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain residential appliances.

END OF SECTION 11 30 13

SECTION 11 81 29 - HORIZONTAL FALL PROTECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections (including all sustainability requirements), apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Rooftop horizontal cable fall protection system.
- B. Related Sections
 - 1. Section 03 30 00 "Cast-In-Place Concrete"
 - 2. Section 05 12 00 "Structural Steel Framing"
 - 3. Section 05 21 00 "Steel Joist Framing"
 - 4. Section 05 31 00 "Steel Decking"
 - 5. Section 07 52 00 "SBS Modified Bituminous Membrane Roofing"
 - 6. Section 07 62 00 "Sheet Metal Flashing and Trim"
 - 7. Section 07 92 00 "Joint Sealants"

1.3 REFERENCES

- A. ANSI Z359.1 - Safety Requirements for Personal Fall Arrest Systems, Subsystems and Components
- B. ASTM A123 / A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- C. ASTM A747/A747M - Standard Specification for Steel Castings, Stainless, Precipitation Hardening.
- D. ASTM A36 - Standard Specification for Carbon Structural Steel.
- E. ASTM A500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
- F. AWS D1.1/D1.1M - Structural Welding Code - Steel.
- G. CSA Z259.16 - Design of Active Fall Protection Systems.
- H. OSHA 1926.502 - Fall Prevention Systems and Criteria and Practices.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.5 SUBMITTALS

- A. Product Data: Manufacturer's data and product information indicating the sizes, descriptions, capacities, test certifications, and other descriptive data showing in sufficient detail that the product complies with the contract requirements.
- B. Shop Drawings: For fabrication showing the complete fall protection system. Layout drawings of each system in relation to the supporting structure indicating the locations of properly labeled components.
- C. Installer's Certification: Furnish proof of installer's certification approval by manufacturer in the form of the installer's current certificate issued by the manufacture.
- D. Product Certificate: Containing the manufacturer's batch number on each individual component used in the systems.
- E. Qualifications Statement: For engineer performing delegated design.
- F. Systems Manual:
 - 1. Maintenance Procedures: Including parts list and maintenance requirements for all equipment.
 - 2. Operation Procedures: Indicating proper use of equipment for safe operation of the systems.
 - 3. Manufacturer's catalog data indicating the sizes, descriptions, capacities, test certifications, and other descriptive data showing sufficient detail that the product complies with the contract requirements.
- G. Record Documents: Include a copy of Record Drawings in the systems manual.
- H. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- I. Delegated-Design Submittal: For fall protection system, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Minimum 5-year experience manufacturing similar products.
- B. Installer Qualifications: Minimum 2-year experience installing similar products, authorized, trained, and certified by manufacturer.
- C. Engineer for Delegated Design: Licensed in the jurisdiction and with a minimum of two years engineering fall protection systems.
- D. Coordination: Coordinate the installation of horizontal fall protection system with structural supports and finish materials.
- E. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.

1. Finish areas designated by Architect.
2. Do not proceed with remaining work until workmanship is approved by Owner and Architect.
3. Remodel mock-up area as required to produce acceptable work.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in manufacturer's original unopened packaging. Store materials in original protective packaging. Prevent soiling, physical damage, or moisture.

1.8 PROJECT CONDITIONS

- A. Coordinate layout and installation of framing and reinforcements for fall protection system anchors.
 1. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

1.9 SEQUENCING

- A. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

1.10 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of horizontal fall protection system that fail in materials or workmanship within specified warranty period.
- B. Warranty Period: One year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 ROOFTOP HORIZONTAL CABLE FALL PROTECTION SYSTEM

- A. Provide rooftop horizontal cable fall protection system for rooftop maintenance including end anchors, intermediate cable supports, variable cable supports, traveler and corner cable supports as required.
 1. Maximum span of 39 feet (12 m) between anchors and provides continuous hands-free access for the user of the roof fall protection system.
 2. System shall not be used as a tieback anchor for facade maintenance.
- B. Basis of Design Manufacturers: Subject to compliance with requirements, provide Secured Global products or a comparable product by one of the following :
 1. Cable Safety – USA
 2. Hy-Safe Technology
 3. Latchways, Inc.
 4. Pro-Bel Group

5. XSPlatforms

C. Performance Requirements:

1. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Control".
2. Structural Performance: Fall protection systems shall withstand the effects of loads and stresses within limits and under conditions required by CSA Z259.16, ANSI A10.32, ANSI Z359.1, and OSHA 1926.502.
 - a. Allow for multiple users, based on required system calculations.
 - b. System designed for 2 simultaneous users maximum.
 - c. System capable of spanning 39 feet between intermediate supports.
 - d. Anchors shall be designed to accommodate forces as defined by OSHA requirements.

D. Materials:

1. Cable: 5/16" 316 Stainless Steel Rope.
2. Base plates, anchors, Eye and Pin, and all other components: 316 stainless steel.
3. Fasteners: Size as determined by design – 316 stainless steel.

E. Fabrication:

1. Fabricate anchoring devices as recommended by the manufacturer to provide adequate support for intended use. Shop fabricate required anchorage posts using structural steel with material test certificates for full material traceability.
2. Welding: AWS structural specification D1.1 by certified welders.
3. Fabricate joints in a manner to discourage water accumulation.
4. Swaging: Swage cable in-line with the anchor point.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of fall protection equipment.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Coordinate location of fall protection equipment indicated to be attached to structural substrate or surface of roofing system, and furnish anchoring devices with templates and diagrams.

3.3 INSTALLATION

- A. Install according to approved shop drawings and manufacturer's instructions. Coordinate with work of other trades.

- B. Install anchorage and fasteners in accordance with manufacturer's recommendations to obtain the allowable working loads published in the product literature and in accordance with this specification.
- C. Exposed work shall be true to line and level with accurate angles, surfaces and with straight square edges. Coordinate anchorage system with supporting structure.
- D. Do not load or stress system until materials and fasteners are properly installed and ready for service.

3.4 FIELD QUALITY CONTROL

- A. Provide manufacturer's certified installer to inspect installed fall protection system. Ensure that system components operate as specified.

3.5 ADJUSTING AND CLEANING

- A. Adjust fall protection components to function smoothly and safely.
- B. Clean components of any deleterious coatings or compounds. Remove loose materials, crating, and packing materials from site.

3.6 CLOSEOUT ACTIVITIES

- A. Demonstration: Demonstrate operation of system to Owner's personnel.
 - 1. Briefly describe function, operation, and maintenance of each component.
- B. Training: Train Owner's personnel on operation and maintenance of system.
 - 1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
 - 2. Provide minimum of two hours of training.
 - 3. Provide training at the lifeline installation site.
 - 4. Training to take place at the completion of the installation.

END OF SECTION 11 81 29

SECTION 122113 - HORIZONTAL LOUVER BLINDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Horizontal louver blinds with polymer slats.
- 2. Motorized operators.

B. Related Requirements:

- 1. Section 061053 "Miscellaneous Rough Carpentry" for wood blocking and grounds for mounting horizontal louver blinds and accessories.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For horizontal louver blinds, include fabrication and installation details.
- C. Samples: For each exposed product and for each color and texture specified, 12 inches long.
- D. Samples for Initial Selection: For each type and color of horizontal louver blind.
 - 1. Include Samples of accessories involving color selection.
- E. Samples for Verification: For each type and color of horizontal louver blind indicated.
 - 1. Slat: Not less than 12 inches long.
 - 2. Tapes: Full width, not less than 6 inches long.
 - 3. Horizontal Louver Blind: Full-size unit, not less than 16 inches wide by 24 inches long.
- F. Product Schedule: For horizontal louver blinds. Use same designations indicated on Drawings.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For horizontal louver blinds with polymer slats that have been tested for compliance with NFPA 701, for tests performed by manufacturer and witnessed by a qualified testing agency or a qualified testing agency.

- A. Maintenance Data: For horizontal louver blinds to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Horizontal Louver Blinds: Full-size units equal to 5 percent of quantity installed for each size, color, texture, pattern, and gloss indicated, but no fewer than two units.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver horizontal louver blinds in factory packages, marked with manufacturer, product name, and location of installation using same designations indicated on Drawings.

1.8 FIELD CONDITIONS

- A. Environmental Limitations: Do not install horizontal louver blinds until construction and wet-work and finish work in spaces, including painting, is complete and dry and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B. Field Measurements: Where horizontal louver blinds are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for operating hardware of operable glazed units through entire operating range. Notify Architect of installation conditions that vary from Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain horizontal louver blinds from single source from single manufacturer.

2.2 HORIZONTAL LOUVER BLINDS, POLYMER SLATS

- A. 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:
 - 1. CACO, Inc., Window Fashions.
 - 2. Hunter Douglas Contract.
 - 3. Levolor.
- B. Flame-Resistance Rating: Comply with NFPA 701; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

- C. Slats: Polymers that are lead free, UV stabilized, integrally colored, opaque, and will not crack or yellow; antistatic, dust-repellent treated.
1. Formulation: Permanently flexible, extruded PVC.
 2. Width: 1 inches.
 3. Thickness: 0.125 inch.
 4. Spacing: Manufacturer's standard.
 5. Profile: Manufacturer's standard.
 6. Features:
 - a. Lift-Cord Rout Holes: Minimum size required for lift cord and located near back (outside) edge of slat to maximize slat overlap and minimize light gaps between slats.
- D. Headrail: Formed steel or extruded aluminum; long edges returned or rolled. Headrail fully encloses operating mechanisms on three sides and ends.
1. Capacity: One blind(s) per headrail unless otherwise indicated.
 2. Manual Lift Mechanism:
 - a. Lift-Cord Lock: Variable; stops lift cord at user-selected position within full operating range.
 - b. Operator: Extension of lift cord(s) through lift-cord lock mechanism to form cord pull.
 3. Manual Tilt Mechanism: Enclosed worm-gear mechanism and linkage rod that adjusts ladders.
 - a. Tilt: Two-direction, positive stop or lockout limited at an angle of 60 degrees from horizontal[, **both directions**].
 - b. Operator: Corrosion-resistant steel rod.
 - c. Over-Rotation Protection: Manufacturer's detachable operator or slip clutch to prevent over rotation of gear.
 4. Manual Lift-Operator and Tilt-Operator Lengths: Full length of blind when blind is fully closed.
 5. Manual Lift-Operator and Tilt-Operator Locations: Right side of headrail unless otherwise indicated.
- E. Bottom Rail: Secures and protects ends of ladders and lift cords.
1. Type: Formed-steel or extruded-aluminum tube, with plastic or metal capped ends.
- F. Lift Cord: Manufacturer's standard braided cord.
- G. Ladders: Evenly spaced across headrail at spacing that prevents long-term slat sag.
1. Type: Braided cord.
- H. Mounting Brackets: With spacers and shims required for blind placement and alignment indicated.
1. Type: As indicated.
 2. Intermediate Support: Provide intermediate support brackets to produce support spacing recommended by blind manufacturer for weight and size of blind.
- I. Hold-Down Brackets and Hooks or Pins: Manufacturer's standard.

J. Colors, Textures, Patterns, and Gloss:

1. Slats: As selected by Architect from manufacturer's full range.
2. Components: Provide rails, cords, ladders, and materials exposed to view matching or coordinating with slat color unless otherwise indicated.

2.3 HORIZONTAL LOUVER BLIND FABRICATION

- A. Product Safety Standard: Fabricate horizontal louver blinds to comply with WCMA A 100.1 including requirements for corded, flexible, looped devices; lead content of components; and warning labels.
- B. Unit Sizes: Fabricate units in sizes to fill window and other openings as follows, measured at 74 deg F:
 1. Between (Inside) Jamb Installation: Width equal to jamb-to-jamb dimension of opening in which blind is installed less 1/4 inch per side or 1/2 inch total, plus or minus 1/8 inch. Length equal to head-to-sill dimension of opening in which blind is installed less 1/4 inch, plus or minus 1/8 inch.
- C. Concealed Components: Noncorrodible or corrosion-resistant-coated materials.
 1. Lift-and-Tilt Mechanisms: With permanently lubricated moving parts.
- D. Mounting and Intermediate Brackets: Designed for removal and reinstallation of blind without damaging blind and adjacent surfaces, for supporting blind components, and for bracket positions and blind placement indicated.
- E. Installation Fasteners: No fewer than two fasteners per bracket, fabricated from metal noncorrosive to brackets and adjoining construction; type designed for securing to supporting substrate; and supporting blinds and accessories under conditions of normal use.
- F. Color-Coated Finish:
 1. Metal: For components exposed to view, apply manufacturer's standard baked finish complying with manufacturer's written instructions for surface preparation including pretreatment, application, baking, and minimum dry film thickness.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install horizontal louver blinds level and plumb, aligned and centered on openings, and aligned with adjacent units according to manufacturer's written instructions.

SECTION 122113

1. Locate so exterior slat edges are not closer than 1 inch from interior faces of glass and not closer than 1/2 inch from interior faces of glazing frames through full operating ranges of blinds.
2. Install mounting and intermediate brackets to prevent deflection of headrails.
3. Install with clearances that prevent interference with adjacent blinds, adjacent construction, and operating hardware of glazed openings, other window treatments, and similar building components and furnishings.

3.3 ADJUSTING

- A. Adjust horizontal louver blinds to operate free of binding or malfunction through full operating ranges.

3.4 CLEANING AND PROTECTION

- A. Clean horizontal louver blind surfaces after installation according to manufacturer's written instructions.
- B. Provide final protection and maintain conditions in a manner acceptable to manufacturer and Installer that ensures that horizontal louver blinds are without damage or deterioration at time of Substantial Completion.
- C. Replace damaged horizontal louver blinds that cannot be repaired in a manner approved by Architect before time of Substantial Completion.

END OF SECTION 122113

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections (including all sustainability requirements), apply to this Section.

1.2 SUMMARY

- A. Section includes
 - 1. Electrically operated sunscreen roller shades.
 - 2. Automatic window shade control system, including the following:
 - a. Energy control unit which automatically adjusts window shades based on solar and weather conditions.
- B. Related Sections:
 - 1. Section 06 10 00 "Rough Carpentry" for coordination with blocking.
 - 2. Section 09 22 16 "Non-Structural Metal Framing" for installation of shade pockets, closures and related accessories
 - 3. Section 09 29 00 "Gypsum Wall Board" installation of shade pockets, closures and related accessories
 - 4. Section 09 51 13 "Acoustical Panel Ceilings" installation of shade pockets, closures and related accessories
 - 5. Division 26 - Electrical: Electric service for EDU's, and EDU controls, internal communication, low voltage wiring and data transfer, and connection to the Internet and required.
- C. System Description
 - 1. Automated Shade Control System: Provide control system to control sunscreen roller shades in multiple buildings with an automated, computer-server based, solar tracking control system.
 - a. Include automated solar shade system to control shades by tracking the sun and the position of and intensity of the solar rays.
 - b. Include system programming for solar data for every window from sunrise to sunset, each day of the year, providing data for establishing the appropriate shade position on the window with aligned intermediate stop positions.
 - c. System shall be ready to accept a module for predictive Shadow program to keep shades up when in shadow throughout the day / year.
 - d. System shall be ready to accept a reactive Brightness module for excessive glare due to sky-brightness.
 - e. System shall be ready to accept a predictive Reflection module for first reflections off natural landscapes such as a body of water and nearby fixed structures vertically or horizontally.
 - f. Including interface to provide capability of communication with the Building Management system (BMS) over RS 232 or BACNet over IP.

- g. Include master centralized override capability form server.
 - h. Include calendar event scheduling form server.
 - 2. The Limits of Work for the Roller Window Shade system is described generally as follows:
 - a. Airside:
 - 1) All shades and control circuits located within the limits of work boundary designated as Airside Terminal;
 - 2) The Automated Window Shade Control System components needed to operate both Airside and Landside Terminal Shades including interface of Automated Window Shade Control System with Landside Roller Window Shade system
 - 3) The integration of the two building systems
 - b. Landside:
 - 1) All shades and control circuits within the limits of work boundary designated as the Landside Terminal

1.3 SUBMITTALS

- A. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Styles, material descriptions, dimensions of individual components, profiles, features, finishes and operating instructions.
 - 3. Storage and handling requirements and recommendations.
 - 4. Mounting details and installation methods.
 - 5. Typical wiring diagrams including integration of EDU controllers with automatic window shade control system.
 - 6. Manufacturer's description of the science and logic employed for all automated systems.
 - 7. Manufacturer's description of the integration of the solar control system and the human factors required to assure thermal and visual comfort in the environment for the occupants, in conjunction with daylighting as an energy conserving subsystem.
 - 8. Provide specific shade locations and control zones conforming to requirements of Design Intent.
- B. Sustainable Design Documentation Submittals: Refer to section 01 81 13.14 "Sustainable Design Requirements – LEED V4 BD+C".
 - 1. Product Data: Documentation for Leadership Extraction Practices in the following:
 - a. Extended Producer Responsibility
 - b. Leadership Extraction Practices for Recycled Content
 - 2. Product Certificates: Provide the following:
 - a. Environmental Product Declarations (EPD's)
 - b. Corporate Sustainability Reporting (CSR's)
- C. Shop Drawings: Plans, elevations, sections, product details, installation details, operational clearances, power and control wiring diagrams, and relationship to adjacent work.

1. Prepare control, wiring diagrams based on, switching and operational requirements.
 2. Include one-line diagrams, wire counts, coverage patterns, and physical dimensions of each item.
- D. Window Treatment Schedule: For all roller shades. Use same room designations as indicated on the Drawings and include opening sizes and key to typical mounting details.
- E. Solar and Sky Monitoring Systems: Functionality of the solar monitoring and sky monitoring systems. Provide non-proprietary detailed description of the science and logic employed in the automated solar tracking control system and a schedule of the solar data provided.
- F. Verification Samples: For each finish product specified, one complete set of shade components, unassembled, demonstrating compliance with specified requirements. Shade cloth samples and aluminum finish sample as selected. Mark face of material to indicate interior faces.
- G. Maintenance Data: Methods for maintaining roller shades, precautions regarding cleaning materials and methods, instructions for operating hardware and controls.
- H. Warranty: Provide manufacturer's warranty documents as specified in this Section.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Obtain roller shades system through one source from a single manufacturer with a minimum of ten years' experience and minimum of five projects of similar scope and size in manufacturing products comparable to those specified in this section. This includes but is not limited to all required extrusions, accessories, controls and fabricated roller shades or else all stated and published warranties may be void.
- B. Installer Qualifications: Engage an installer, which shall assume responsibility for installation of all system components, with the following qualifications.
1. Installer for roller shade system shall be trained and certified by the manufacturer with a minimum of ten years' experience in installing products comparable to those specified in this section.
 2. Installer for automatic solar shade control system shall be a certified electrical engineer or controls specialist to set up the automated control system and coordinate with the commissioning agent, by others, to assure communication continuity and operational functionality between the central control system and the individual operating motors and groups of motors. Installer shall have a minimum of 5 years' experience in installing similar systems.
- C. Fire-Test-Response Characteristics: Passes NFPA 701-99 small and large-scale vertical burn. Materials tested shall be identical to products proposed for use.
- D. Electrical Components: NFPA Article 100 listed and labeled by either UL or ETL or other testing agency acceptable to authorities having jurisdiction, marked for intended

use, and tested as a system. Individual testing of components will not be acceptable in lieu of system testing. Where applicable, system components shall be FCC compliant.

- E. Internal communications: The back bone or Communication riser, Fiber optics or Copper and appropriate switches for communication at each floor or defined area shall be included as a turn-key installed solution . The designs of the riser and communication switches for the automatic solar tracking system are included under the work of this section.
- F. Internet Connection: An IP Interface shall be provided by the Automatic Solar Tracking systems subcontractor.
- G. Requirements for Controls, and Tracking system, switches:
 - 1. Electrical and electronic motor controls and accessories required for a complete Automated solar tracking motorized shade control system including a two-way appropriate interface to communicate with a standalone Automated Solar Tracking and sky modeling system; which in turn shall have two-way communication with the building BMS; and or Day Lighting, AV, systems.
 - 2. Automated solar tracking system shall maintain a historical data base for one complete year, plus 3 months for conversion or a total of 15 months of historical data on each full day's solar condition, from sunrise to sunset and shall log all shade moves i.e. Automatic; Manual Switch; Shadow Mode; Reflectance Mode.
 - 3. Local switches shall be wired back to and integrate with the Solar Tracking system. Shade movements by a local switch shall be recorded by the Solar Tracking system and integrated into the database.
 - 4. Automated solar tracking system shall provide standard reports on shade movement, solar condition at the time of each shade movement, and the control or switching system that moved the shades.
- H. Shadecloth Anti-Microbial Characteristics: 'No Growth' per ASTM G 21 results for fungi ATCC9642, ATCC 9644, and ATCC9645.
- I. PVC-Free Shadecloth: Comply with the following.
 - 1. Environmental Certification: Submit written certification from the manufacturer, including third party evaluation, recycling characteristics, and perpetual use certification as specified below. Initial submittals, which do not include the Environmental Certification, below will be rejected. Materials that are simply 'PVC free' without identifying their inputs shall not qualify as meeting the intent of this specification and shall be rejected.
 - 2. Third Party Evaluation: Provide documentation stating the shade cloth has undergone third party evaluation for all chemical inputs, down to a scale of 100 parts per million, that have been evaluated for human and environmental safety. Identify any and all inputs, which are known to be carcinogenic, mutagenic, teratogenic, reproductively toxic, or endocrine disrupting. Also identify items that are toxic to aquatic systems, contain heavy metals, or organohalogens. The material shall contain no inputs that are known problems to human or environmental health per the above major criteria, except for an input that is required to meet local fire codes.

3. Recycling Characteristics: Provide documentation that the shade cloth can, and is part of a closed loop of perpetual use and not be required to be down cycled, incinerated or otherwise thrown away. Scrap material can be sent back to the mill for reprocessing and recycling into the same quality yarn and woven into new material, without down cycling. Certify that this process is currently underway and will be utilized for this project.
- J. Perpetual Use Certification: Certify that at the end of the useful life of the shade cloth, that the material can be sent back to the manufacturer for recapture as part of a closed loop of perpetual use and that the material can and will be reconstituted into new yarn, for weaving into new shade cloth. Provide information on each shade band indicating that the shade band can be sent back to the manufacturer for this purpose.
- K. Requirements for Electronic Hardware, Controls, and Switches:
1. Roller shade hardware, shade fabric, EDU, and all related controls shall be furnished and installed as a complete two-way communicating system and assembly.
 2. Turn-key single-source responsibility for automated solar tracking control system (riser) to control the Motorized Interior Roller Shades. The design, engineering, and installation of the automated solar tracking shade control head end system and the riser and related controls for shade riser / backbone wiring specified in this section shall be by a single manufacturer and installer. Coordinate the following with work of related and adjacent trades.
 - a. Make connections to the floor controllers via a modular connection at each floor riser where floor controllers are located.
 - b. Coordinate and install Communication Gateways, and master override switches (if required within the same closet as the electrical IT riser).

1.5 SOLAR SHADING CONTROL INTENT

- A. Purpose: the intent of this paragraph is to provide program objectives for the solar shading system and guidelines for the following entities:
1. For Control Manufacturer and Installer: requirements for design, bidding, shop drawings and installation;
 2. For Commissioning Agent: requirements for final calibrations and fine tuning of the shading control system.
 3. For Owner and Maintenance Personnel: development of operations materials and maintenance instructions to include explanation of how the system is expected to operate and why.
- B. Refer to Section 01 81 13.14 Sustainable Design Requirements – LEED V4 BD+C for LEED objectives.
- C. The design of the shading control system for the project includes:
1. Automated operation of motorized shades
 2. Time switch operation of motorized shades.
 3. Manual override of automated motorized shades
 4. Programming
 5. Commissioning

D. Automated Shading

1. Programming shall be designed to achieve the following objectives:
 - a. Keep direct sun from hitting gate agents, podiums or information desks.
 - b. Control and eliminate direct sun penetration in Airside Concourses that might impact Hold Room locations.
 - c. Reduce sun penetration impacting media features in both Airside and Landside when passing through South and East clerestory windows adjacent to the Boulevard Ribbon skylight.

E. Zones

1. Each bay of windows or clerestory will be separately zoned for automated shading control.
2. The system programming shall have the capability to combine separate zones into grouped zones that act simultaneously together.

F. Future Expansion

1. Size shading system for 20% expansion, scalable for additional shades required in the future.
2. Provide conduit and j-boxes at specific shade pockets designated as future locations where shades are not initially installed but may be desirable in the future. Refer to drawings for locations.

G. Hours of Operation:

1. Normal hours of operation are between 5am and midnight daily. Other hours are considered "low activity" hours.
2. Shades intended to control direct sun penetration, solar glare, or sky glare should operate at all hours from sunrise to sunset.
3. All automated shades are expected to be fully retracted (in the full up position) from sunset until sunrise, or other hours as noted.

H. GENERAL NOTES ON SHADE CONTROL

1. Shade Control Zones
 - a. The areas of shading have been separated into zones to respond to orientation, potential for disability glare, task or function, thermal zone, and other considerations.
 - b. The shade control system is a stand-alone system
 - c. All shades indicated on the diagrams are to be motor-operated, and automatically controlled to close based on sun position and cloud cover.
2. Shade Positions
 - a. The shade controls must be capable of stopping the shades in various positions as indicated on the drawings or as follows:
 - 1) Full up
 - 2) Down to highest mullion
 - 3) Down to middle mullion
 - 4) Down to lower mullion
 - 5) Down to 6' AFF (Type B Holding rooms only)
 - 6) Down to 4' AFF (Type A Gate Agents only)
 - 7) Full down (Type C Clerestories only)
3. Daylight Responsive Controls

- a. In addition to orientation and function, shading controls shall be designed to automatically respond to three conditions: 1) time of day i.e., potential of sun in the sky to enter through glazed openings, 2) the extent of sun penetration allowed or desired in the space, and 3) the sky conditions i.e., sunny, hazy, partly cloudy or overcast. Control systems shall have equipment, sensors, time-switches and algorithms to provide this level of sophistication in managing the control of shading.
 - b. Controller shall be remotely programmable and easily programmed by the facilities manager if future changes are required.
 4. Open loop sensing:
 - a. Shades designed to control solar penetration shall be of the open loop variety responding to natural light alone. Shade control should not be linked to the dimming or modulation of electric lighting.
 5. Time delays
 - a. Shading controls shall respond within one (1) minute to direct sun penetration that meets the shade deployment criteria, and have a five (5) to thirty (30) minute time delay before retracting, to avoid "cycling" or unnecessary movement in response to intermittent cloud cover.
 - b. Slowly retract shades and maintain in the full up position until the next possible sun event for that façade, or until over-ride is manually triggered.
 6. Overrides
 - a. Shading controls shall have a means of override for authorized personnel including Gate Agents for conditions of reflected sunlight or sky glare.
 - b. Overrides are intended to increase the time shades are down, and may not be used to retract the shades prematurely.
 - c. Overrides may allow users to lower shades to any of the shade positions or be preset to allow only some limited position(s).
 - d. The override shall allow the shades to remain down for a set period not less than 30 minutes but not more than 90 minutes.
 - e. Locations for override keypads should be integrated into the Gate Agent podiums and Information Desks. Owner shall confirm locations during Submittal process.
 7. Time-switch control
 - a. The system shall include one astronomical time-switch, or multiple time-switches synchronized with each other.
- I. Shop Drawings:
 1. Certify that proposed system complies with every aspect of shading zoning, control and other requirements of the design intent narrative. Indicate in detail how proposed system differs from the documents and design intent narrative and how proposed system will achieve the goals of these specifications.
- J. Programming and Commissioning
 1. Provide initial programming and 'sequence of operation' spreadsheet to the design team and Owner for review based on the zoning and criteria herein. The manufacturer shall provide a designated factory trained representative for multiple visits as needed to verify the control system is fully operational and calibrated to initial settings.
 2. Modify settings as needed during the initial 3 months of operation.

3. In addition to above requirements provide up to two (2) additional on-site visits to fine-tune the shade controls and settings to meet Owner and/or design team requirements within the first 24 months of operation.

K. Specific Area Comments

1. Gate Agents / Podiums – Shades on East and North facades of North Concourse; and West and South facades of West Concourse.
 - a. Shades are required for Agent's performance of tasks. Provide completely automated shading control system for shades in vertical windows, with local overrides at Gate Agent podiums. Refer to drawings for shade zone and control locations.
 - b. Shades shall be down in the lowest position, to avoid both direct sun and reflected glare, but should be retracted in steps until all possibility of direct sun on Gate Agents or their work areas has past.

L. Hold Rooms – On West façade of North Concourse; and South façade of West Concourse.

1. Shades shall lower in steps to protect the occupants of passenger seating areas.
2. In areas without initial shades designated, provide conduit and junction boxes for potential future installation.

M. Boulevard Clerestories – Landside and Airside

1. Shades shall be programmed to automatically close one bay at a time to prevent direct sun penetration through the clerestory and interfering with
 - a. self-illuminated surfaces of the media features
 - b. Airside information desk
2. Retract shades once direct sun has past.
3. Provide separate algorithms for shades in Landside and Airside zones as needed to achieve shading objectives.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver components in factory-labeled packages, marked with manufacturer and product name, fire-test-response characteristics, and location of installation using same room designations indicated on Drawings and in the Window Treatment Schedule.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Install roller shades after finish work including painting is complete and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B. Power and control wiring shall be complete and certified fully operational with uninterrupted communication on the lines and minimal noise certified by commissioning agent.
 1. 485, ICON, Lonmark and Dry Contract Network: Noise on the line not to exceed shade manufacturer's limits.

1.8 WARRANTY

- A. Warranty: Provide manufacturer's standard warranties, including the following:
1. Roller Shade Hardware and Shadecloth: Manufacturer's standard non-depreciating twenty-five year limited warranty.
 - a. EcoVeil standard non-depreciating 10-year limited warranty.
 2. Electronic Roller Shade EDU's and EDU Control Systems: Manufacturer's standard non-depreciating five-year warranty.
 3. Roller Shade Installation: One year from date of Substantial Completion, including scaffolding, lifts or other means to access the work.
 4. Roller Shade Motor Control Systems: Manufacturer's standard non-depreciating five-year warranty.
 5. Automated Systems warranty: The PC controller, the operating system, and the solar tracking program and other components comprising the complete Automated System shall be warranted for one year, including a one-year automated systems service maintenance program fully monitored by the manufacturer / supplier of the system. The one year warranty covers the integrated environmental, functional and operational requirements as specified herein.
 6. Electronics warranty: including but not limited to total solar measuring sensors radiometers; IP interface connections and peripheral electronics to assure full operability and communication to the motor control network for one year.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. Basis-of-Design
1. Roller Window Shade: Subject to compliance with requirements, provide Roller Window Shade WT1 as indicated in Section 09 00 01 "Finish Key" or comparable approved product meeting all requirements including sustainability requirements.
 2. Window Shade Control System: Subject to compliance with requirements, provide MechoSystems Inc; SolarTrac™ or comparable product meeting all requirements.
 3. Refer to Sections 01 25 00 "Substitution Procedures" and 01 60 00 "Product Requirements" for comparable product requirements.

2.2 INTELLIGENT ENCODED ELECTRONIC DRIVE SYSTEM

- A. Electronic Drive Unit (EDU):
1. Intelligent Encoded EDU, and Control System: Tubular, asynchronous (non-synchronous) EDU's, with built-in reversible capacitor operating at 120VAC/60Hz, (230VAC/50Hz) single phase, temperature Class B, thermally protected, totally enclosed, maintenance free with line voltage power supply equipped with locking disconnect plug assembly furnished with each EDU.
 2. Quiet [42 – 46 db] (within 3 feet open air).
 3. Conceal EDU's inside shade roller tube.
 4. Maximum current draw for each shade EDU of 0.9Amps at 120VAC.
 5. Use EDU's rated at the same nominal speed for all shades in the same room.
 6. Use EDU's with minimum of 34RPM, that shall not vary due to load / lift capacity.

7. Total hanging weight of shade band shall not exceed 80 percent of the rated lifting capacity of the shade EDU and tube assembly.
- B. EDU System: (software, two-way communication): Basis of design: Intelligent EDU Control System, WhisperShade®IQ® System as manufactured by MechoSystems.
1. EDU shall support two methods of control.
 - a. Local Dry Contact Control Inputs:
 - 1) EDU shall be equipped with dry contact inputs to support moving the EDU/shade to the upper and lower limits.
 - 2) EDU shall be equipped with dry contact inputs to support moving the EDU/shade to local switch preset positions.
 - 3) Shall support configuring the EDU under protected sequences so that a typical user would not change the EDU's setup. At a minimum, the configuration should include setting limits, setting custom presets and configuring key modes of operation.
 - b. Network Control:
 - 1) EDU shall be equipped with a bi-directional network communication capability to support commanding the operation of large groups of shades over a common backbone. The network communication card shall be embedded into the tubular EDU assembly.
 2. Upper and lower stopping points (operating limits) of shade bands shall be programmed into EDU's using either a hand held removable program module / configurator or a local switch.
 3. Alignment Positions: Each EDU shall support a minimum of 133 repeatable and precisely aligned shade positions (including limits and presets).
 - a. All shades on the same switch circuit or with the same network group address with the same opening height shall align at each limit or preset (intermediate stopping position) when traveling from any position, up or down.
 - b. Shades of differing heights shall have capability for custom, aligned intermediate stop positions when traveling from any position, up or down.
 - c. Alignment of shades mechanically aligned on the same EDU shall not exceed +/- 0.125 inches (3.175mm) when commanded to the same alignment position.
 - d. Alignment of shades on adjacent EDU's shall not exceed +/- 0.25" inches (6.35mm) when commanded to the same alignment position.
 - e. Local Switch Presets: A minimum of 3 customizable preset positions shall be accessible over the local dry contact control inputs and over the network connection.
 - 1) Upon setting the limits for the shade EDU these preset positions shall automatically default to 25%, 50% and 57% of the shade travel.
 - 2) These positions shall be capable of being customized to any position between and including the upper and lower limits of the shade. A removable program module / configurator or local switch shall be capable of customizing the position of these presets.
 - f. Network Presets: A minimum of 29 customizable preset positions (including the 3 local switch presets) shall be accessible via network commands.

- 1) Upon setting the limits for the shade EDU these preset positions shall automatically default to the lower limit unless customized elsewhere.
 - 2) These positions shall be capable of being customized to any position between and including the upper and lower limits of the shade. A removable program module / configurator shall be capable of customizing the position of these presets.
4. Network Control:
 - a. The system shall have the capability of two-way digital communication with the EDU's over a common backbone.
 - b. Each EDU shall possess 8 addresses capable of being employed for various levels of group control. These addresses shall be configurable via a handheld configurator and/or a PC controller. A 9th unique address shall enable the EDU(s) to be independently controlled and configured over the network via a handheld configurator and/or a PC controller.
 - c. Low Voltage Communication Network Implementation.
 - 1) The low voltage network shall employ a bus topology with daisy chained network connections between nodes over a CAT5 cable (4 UTP) or over a 2 UTP cable employing at least 1 pair at 16 AWG for power and 1 pair at 22 AWG for data.
 - 2) The low voltage network (+/- 13VDC) shall be powered by the nodes attached to it. These nodes could be line voltage powered EDU's attached to 120 VAC or 230 VAC. Alternatively, low voltage nodes shall be powered typically by a centralized low voltage power supply. If a CAT5 network cable is employed and the node draws less than 1W then the node may be powered by DC power supplied by an associated line voltage EDU.
 - 3) Network Capacity: 4000 ft max, 250 nodes max
 - a) The number and size of a centralized DC supply shall vary depending upon the network requirements.
5. Operating Modes:
 - a. Uniform or Normal Modes of Operation:
 - 1) Uniform mode shall allow for shades to only move to defined intermediate stop positions to maintain maximum uniformity and organization.
 - 2) Normal Mode shall allow for shades to move to both intermediate stop positions, plus any position desired between the upper and lower limits as set by the installer.
6. Wall Switches:
 - a. Shades shall be operated by, 5, 7, or 10-button low voltage standard switches, or programmable intelligent switches [IS]. Standard switch shall be wired to a bus interface and the bus interface will be programmed to transmit an address for the local switch.
 - b. Intelligent switches may be installed anywhere on the bus line. Each IS shall be capable of storing one control level address to be broadcast along the bus line.
 - c. An address that is transmitted by either a switch or central controller shall be responded to by those EDU's with the same address in their control table.

- d. IS shall provide for interface with other low voltage input devices via a set of dry contact terminals located on the switch.
- e. Standard switch or IS may control an individual, sub-group or group of EDU's in accordance with the address in each EDU.

2.3 SHADE BANDS

- A. Shade Bands: Construction of shade band includes the fabric, the enclosed hem weight, shade roller tube, and the attachment of the shade band to the roller tube. Sewn hems and open hem pockets are not acceptable.
 - 1. Concealed Hembar: Shall be continuous extruded aluminum for entire width of shade band and with the following characteristics:
 - a. Hembar shall be heat sealed on all sides.
 - b. Open ends are not accepted.
 - 2. Shade Band and Shade Roller Attachment:
 - a. Use extruded aluminum shade roller tube of a diameter and wall thickness required to support shade fabric without excessive deflection.
 - b. Provide for positive mechanical attachment of shade band to roller tube; shade band shall be made removable / replaceable with a "snap-on" snap-off" spline mounting, without having to remove shade roller from shade brackets.
 - c. Mounting Spline shall not require use of adhesives, adhesive tapes, staples, and/or rivets.
 - d. Any method of attaching shade band to roller tube that requires the use of: adhesive, adhesive tapes, staples, and/or rivets, does not meet the performance requirements of this specification and shall not be accepted.

2.4 ROLLER SHADE FABRICATION

- A. Fabricate shade cloth to hang flat without buckling or distortion. Fabricate with heat-sealed trimmed edges to hang straight without curling or raveling. Fabricate unguided shadecloth to roll true and straight without shifting sideways more than 1/8 inch (3.18 mm) in either direction per 8 feet (2438 mm) of shade height due to warp distortion or weave design.
- B. Provide battens in standard shades as required to assure proper tracking and uniform rolling of the shade bands. Contractor shall be responsible for assuring the width-to-height (W:H) ratios shall not exceed manufacturer's standards or, in absence of such standards, shall be responsible for establishing appropriate standards to assure proper tracking and rolling of the shadecloth within specified standards. Battens shall be roll-formed stainless steel or tempered steel, as required.
- C. For railroaded shade bands, provide seams in railroaded multi-width shade bands as required to meet size requirements and in accordance with seam alignment as acceptable to Architect. Seams shall be properly located. Furnish battens in place of plain seams when the width, height, or weight of the shade exceeds manufacturer's standards. In absence of such standards, assure proper use of seams or battens as required to, and assure the proper tracking of the railroaded multi-width shade bands.

- D. Provide battens for railroaded shades when width-to-height (W:H) ratios meet or exceed manufacturer's standards. In absence of manufacturer's standards, be responsible for proper use and placement of battens to assure proper tracking and roll of shade bands.

2.5 ROLLER SHADE COMPONENTS

A. Access and Material Requirements:

1. Provide shade hardware allowing for the removal of shade roller tube from brackets without removing hardware from opening and without requiring end or center supports to be removed.
2. Provide shade hardware that allows for removal and re-mounting of the shade bands without having to remove the shade tube, drive or operating support brackets.
3. Use only Delran engineered plastics by DuPont for all plastic components of shade hardware. Styrene based plastics, and /or polyester, or reinforced polyester shall not be accepted.

B. Motorized Shade Hardware and Shade Brackets:

1. Provide shade hardware constructed of minimum 1/8-inch (3.18 mm) thick plated steel, or heavier, thicker, as required to support 150 percent of the full weight of each shade. Plastic components without use of steel angle construction do not meet the intent of this specification and shall not be accepted.
2. Provide shade hardware system that allows for field adjustment of EDU or replacement of any operable hardware component without requiring removal of brackets, regardless of mounting position (inside, or outside mount).
3. Provide shade hardware system that allows for operation of multiple shade bands offset by a maximum of 8-45 degrees from the EDU axis between shade bands (4-22.5 degrees) on each side of the radial line, by a single shade EDU (multi-banded shade, subject to manufacturer's design criteria).
4. All bands within a single EDU group shall be aligned within 1/4 inch (6 mm).

2.6 SHADECLOTH

A. Refer to Drawings for locations of each type of shadecloth.

B. Basis of Design Shade Cloth: MechoShade Systems, LLC.; ThermoVeil Basket Weave with 75 percent PVC / 25 percent polyester, basket weave, custom widths as required.

1. Type A:
 - a. Openness Factor (OF) = 3 percent open
 - b. Visible Light Transmission (Tv) = 0.05.
 - c. Solar Reflectance Rs: 0.04.
 - d. Solar Absorption As: 0.93.
 - e. Solar Transmittance Ts: 0.03.
2. Type B:
 - a. Openness Factor (OF) = 5 percent open
 - b. Visible Light Transmission (Tv): 0.07.
 - c. Solar Reflectance Rs: 0.04.

- d. Solar Absorption As: 0.90.
- e. Solar Transmittance Ts: 0.06.
- 3. Type C:
 - a. Openness Factor (OF) = 10 percent open
 - b. Visible Light Transmission (Tv) = 0.16.
 - c. Solar Reflectance Rs: 0.04.
 - d. Solar Absorption As: 0.83.
 - e. Solar Transmittance Ts: 0.13.
- C. Color: As selected by Architect from Manufacturer's full range.
- D. Microbial Resistance, ASTM E2180 and ASTM G21: Pass
- E. Warranty: 10-Year Interior.

2.7 ROLLER SHADE ACCESSORIES

- A. Shade Pocket: For recessed mounting in acoustical tile or drywall ceilings as indicated on the drawings.
 - 1. Either extruded aluminum and or formed steel shade pocket, sized to accommodate roller shades, with exposed extruded aluminum closure mount, tile support and removable closure panel to provide access to shades.
 - 2. Provide "Vented Pocket" such that there will be a minimum of four 1 inch diameter holes per foot allowing the solar gain to flow above the ceiling line.
- B. Fascia:
 - 1. Continuous removable extruded aluminum fascia that attaches to shade mounting brackets without the use of adhesives, magnetic strips, or exposed fasteners.
 - 2. Fascia shall be able to be installed across two or more shade bands in one piece.
 - 3. Fascia shall fully conceal brackets, shade roller and fabric on the tube.
 - 4. Provide bracket / fascia end caps where mounting conditions expose outside of roller shade brackets.
 - 5. Finish: to match Architect's sample.
- C. Cable Guides
 - 1. Manufacturer's standard cable guide system for roller shade 12 feet in height or greater.
 - a. Refer to drawings
 - b. Coordinate with adjacent trades.
- D. Catch pin brackets.

2.8 AUTOMATED DAYLIGHTING SOLAR TRACKING SHADE CONTROL SYSTEM

- A. Solar Tracking Control System: Automated Computer Shade Control System, SolarTrac™ as manufactured by MechoSystems Systems, Inc., Long Island City, NY.

B. Solar Evaluation and Sky Modeling System shall utilize approved scientific solar algorithms, which shall provide the following for every window under considerations in the building from sunrise to sunset, 365-1/4 days per year, as follows:

1. Solar heat gain in real time reported in BTU's / (W/M2) multiple times each minute 24/7.
2. Incident angle on every window.
3. Profile angle on every window.
4. Direct radiation on every window.
5. Diffuse radiation on every window.
6. Surface azimuth.
7. Solar surface azimuth.
8. Window geometry / profile.
9. Geometry of the solar ray and window geometry to determine solar penetration.
10. Adjustment by solar penetration.
11. Geometry of the solar ray, window geometry, and allowable solar penetration calculated to determine incremental shade position.
 - a. An algorithm integrated with the Solar Radiometers to provide in real time, a microclimatic sky condition for the project, 7/24/365, which shall be the basis of determining a clear, cloudy or overcast sky condition.
 - b. The system will then adjust the shades incrementally on the window to provide protection from direct solar radiation while maximizing view and daylighting for the project.
12. Adjustment by BTU / W-M 2 solar load on every window in the building 7/24/365.
13. Sky modeling and evaluation for clear, cloudy, bright, overcast sky condition – utilizing total solar measuring devices.
14. Sky modeling algorithms utilizing the instantaneous, real time total solar data to determine sky condition.
 - a. Control system shall adjust the shade position to maximize energy management, view and personal comfort based on micro-climactic conditions.
 - b. The goal is to maximize view without Thermal or Visual discomfort through:
 - 1) Thermal Comfort as assured by Solar Tracking
 - 2) Visual Comfort as assured by managing (on the window wall):
 - a) Brightness and glare
 - 3) Control Modules: Control system shall be capable of optimizing the position of the shades (incrementally), to continuously deploy the shades in response to changes in Proactive and Reactive requirements.
 - 4) Solar Tracking Module – Base Control System, Thermal Comfort:
 - a) Proactive Algorithms (Primary):
 - b) Sun angle
 - c) Solar intensity – total light spectrum
 - d) BTU load.
 - e) Reactive algorithms: real-time sky conditions via roof mounted radiometers.
 - c. Incremental positioning:
 - 1) Shades shall be capable of being aligned at up to 256 positions.

- 2) The control system shall be capable of staggering the operation of shade motors to assure balanced loading of the electrical system.
 - d. Continuous Operation:
 - 1) 24 hours per day, 7 days a week, 365 – ¼ days per year.
 - 2) Shade positioning resolution shall be calculated every 60 seconds.
- C. Graphic User Interface (GUI): Configure screen as follows:
 1. PC-GUI shall provide access to all adjustable parameters displaying current values including but not limited to:
 - a. Radiation.
 - b. Shade position.
 - c. User defined requirements.
 2. Displays Real-Time Microclimatic Sky Conditions.
 3. Key-Zone / Sensor Monitoring:
 - a. On main screen: able to display current operation of “Key-Zones” or “Sensors” anywhere in the building
 4. Alarms – On Main Screen: able to display overrides due to but not limited to:
 - a. Touch Screen.
 - b. Main- SolarTrac-PC| Control System.
 - c. Remote (3rd Party Interface (BMS, AV etc.)).
 5. Manual / Master Override:
 - a. Interactive Floor Plan: PC shall provide a map of each floor showing the shade motor groups, control zones and sensor locations with their real time position of each control zone.
 - b. Universal Command View: From the main screen the Universal Command View shall provide Whole Floor and Whole Building emergency control.
 6. Reports / Analysis:
 - a. Data Storage / Event Log: Continual record of each day’s activities including shade position and shade mode changes.
 - 1) Stored on a change of state basis.
 - 2) Archived based on user defined file size.
 - b. Sensor Data: Daily Record of sensor’s data stored into a history file on a 60 second basis, stored on a repetitive basis:
 - 1) Roof mounted radiometers.
 - 2) Interior / exterior photo sensors.
 - c. Control Zone Timeline Visual Record of Current Day’s Activity by Zone: Reporting by Zone of current day operation by intermediate stop locations.
 - d. Trending Reports:
 - 1) Daily Report: Sky, Sensors, Event Log, and Timeline.
 - 2) Shade Position Report: Percentage of time shade at each position.
 - 3) Override Report: Reason for override, percentage of day overridden up / down.
 - e. Interface with Other Report Writers:
 - 1) Event log and sensor data available in native MBD format.
 - 2) Available in SQL format.

- D. Override: Control Software shall incorporate an Override Event Scheduler such that the building Owner may customize position of shades by motor, group, zone or whole building for any event, night or weekend requirements
1. Manual Override:
 - a. Wall Switches.
 2. Master Override: SolarTrac-PC control system shall have capability of whole building control for master override by zone or by motor.
 3. Remote Off-Site-Monitoring:
 - a. IP Interface for monitoring, maintenance and software upgrades.
 - b. Provide Maintenance and Support as specified under Warranty.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 SINGLE-SOURCE RESPONSIBILITY

- A. Turn-Key Single-Source Responsibility for Interior Roller Shades and Automated Solar Tracking Control System: The design, engineering, and installation of electronic drive roller shade control system, shades, addressable controls, communication interfaces, and any required sensors, switches and low voltage control wiring specified in this Section shall be by a single manufacturer and installer.
- B. Coordination:
1. Confirm power panels and circuits indicated on electrical drawings are of sufficient size to accommodate roller shade power requirements.
 2. Coordinate requirements of this section with related and adjacent construction.
 - a. Ensure all components needed for completing the work of this section are installed prior to areas becoming inaccessible.
 3. Provide conduit with pull wire in all areas.
 4. Coordinate location(s) of duplex 120 VAC power receptacle in Electric closet or other designated location for floor/riser Communication Gateways.
 5. Verify that wiring conditions installed under other sections are acceptable for product installation in accordance with manufacturer's instructions.
 6. Comply with manufacturer's product data, including shop drawings, technical bulletins, product catalog installation instructions, and product carton instructions for installation.
 7. Protect installed product and finished surfaces from damage during all phases of installation including preparation, testing, and cleanup.

8. Coordinate required electrical work including but not limited to roof penetrations, conduits, fireproofing, etc.

C. Integration with Building Systems:

1. Coordinate the interface of the Roller Window Shades control system with programs and wiring of Building Systems provided under separate sections where integration is specified.
2. Integration of shade control network can be accomplished locally through dry contact closures, or RS-232.

D. Installation:

1. Furnish and install shade controllers, interfaces, splitters, coupler, sensors, switches, junction boxes, etc.
 - a. Mount concealed above ceiling in accessible locations or as indicated in drawings;
 - b. Locations of visible devices to be coordinated with Architect.
2. Inspect all material and components included under this section prior to installation. Manufacturer shall be notified of unacceptable material prior to installation.
3. Line Voltage Wiring:
 - a. Furnish and install power connection between Shade control system and EDU;
 - b. Be capable of providing single line voltage wire pull for each EDU.

E. Shade Power Wiring

1. Furnish and install line voltage cable from roller shade motor into line voltage side of control system.
2. Provide wire connection from power junction box to each motor on the shade network.
3. Furnish and install a disconnect plug at the end of the power wiring run to each EDU. The disconnect plug must mate with a matching disconnect plug on the motor cable. EDU cable disconnect plug must be prefabricated by the manufacturer to meet UL and ETL systems requirements.

3.4 INSTALLATION OF ROLLER SHADES

A. Provide an on-site Project Manager.

1. Attend all related jobsite scheduling meetings.
2. Supervise the roller shade installation and setting of intermediate stops of all shades to assure the alignment of the shade bands within a single EDU group, which shall not exceed +/- 0.125 inches (3.175mm), and to assure the alignment between EDU groups, which shall not exceed +/- 0.25 inches (6.35mm).
3. Provide field inspection on an area-by-area and floor-by-floor basis during construction to confirm proper mounting conditions per approved shop drawings.

B. Verification of Conditions:

1. Examine the areas to receive the work and the conditions under which the work would be performed and notify General Contractor and Owner of conditions detrimental to the proper and timely completion of the work.

2. Do not proceed until unsatisfactory conditions have been corrected. Commencement of installation shall constitute acceptance of environmental and substrate conditions by the installer.
- C. Provide accurate field measurements to 0.0625 inch (1.5875mm) for custom shade fabrication on the Roller Shades manufacturers input forms.
- D. Install roller shades level, plumb, square, and true according to manufacturer's written instructions, and as specified herein.
 1. Blocking for roller shades shall be installed plumb, level, and fitted to adjacent construction as required for installation or as indicated in the drawings.
 2. Adhere to industry standard tolerances.
 - a. The horizontal surface of the shade pocket shall not be out-of-level more than 0.625 inch (15.875mm) over 20 linear feet (6.096 meters)
- E. Shades shall be located so the shade band is not closer than 2 inches (50 mm) to the interior face of the glass. Allow proper clearances for window frames, support structure, and operation hardware.
- F. Adjust, align and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.
- G. Installer shall set Upper, Lower and up to 3 intermediate stop positions of all motorized shade bands, and assure alignment in accordance with the above requirements.
- H. Certify the operation of all motorized shades and turn over each floor for preliminary acceptance.
- I. Participate and cooperate with the Commissioning Agent and other trades as required to verify and certify the installation is in full conformance with the specifications and is fully operational. This work to occur during the commissioning stage and is in addition to preliminary acceptance required for each floor.
- J. Clean roller shade surfaces after installation, according to manufacturer's written instructions.

3.5 COMMISSIONING

- A. Automated SolarTrac System: Provide factory-certified field service engineer to ensure proper system installation and operation under following parameters.
 1. Minimum experience of 2 years training in the electrical/electronic field.
 2. Certified by the equipment manufacturer on the system installed
- B. The automated shade control system will be commissioned on a floor-by-floor basis and then finally as an entire system. Final commissioning shall be successfully completed prior to the first move-in date for client's occupants.
 1. Verify programming of user, defined attributes of system to owner.
 2. Final Acceptance shall be upon successful demonstration of all commissioning requirements described in section 3.3.C of these specifications.

- C. During Commissioning the following will be measured to determine system performance:
1. Response of system (demonstrated by deployment of shade) if average illumination of window wall at sensor exceeds 2,000 cd/m² or other value established by Owner.
 2. Sunlight penetration distance shall not exceed the Owner specified distance for each shade control zone.
 3. Response to variable external conditions including, but not limited to: partially sunny days; shading from other buildings in the neighboring urban landscape; and, reflections from other buildings in the neighboring urban landscape
 4. Proper consistent action of all shade groups on each façade for a 30 day period
 5. The shade log shall be plotted for each shade motor group for the 30-day period. The log shall be used to demonstrate to the Owner that the automated shade movement meets the specified criteria in these specifications.
 6. Return from manual override to automatic mode shall be demonstrated to be in accordance with these specifications using the log and also through direct observation under partly cloudy conditions.
 7. All aspects of rezoning, control monitoring, logging, fault diagnostics and reporting shall be demonstrated to the Owner.
- D. Final Acceptance shall be upon successful demonstration of all commissioning requirements described in these specifications.

3.6 DEMONSTRATION

- A. Train Owner's maintenance personnel to adjust, operate and maintain Roller Shade systems.
1. A minimum 20 hours of one-on-one training shall be provided to the System Operator.
 2. A separate 20 hours training shall be provided one-on-one to the System Administrator or other personnel designated by Owner.
- B. Provide an electronic-based educational guide in .pdf format to Building Occupants on the general workings of the shade control system and specific instruction on how to use the manual override feature(s).

3.7 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 12 24 13

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes stainless-steel countertops and sinks.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Sustainable Design Documentation Submittals: Refer to section 01 81 13.14 "Sustainable Design Requirements – LEED V4 BD+C".
 - 1. Product Data: Documentation for Low Emitting Materials
 - a. Low Emitting Materials for Adhesives and Sealants
- C. Shop Drawings: Include plans, sections, details, and attachments to other work. Detail fabrication and installation, including field joints.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver metal countertops only after casework has been completed in installation areas.
- B. Keep finished surfaces covered with polyethylene film or other protective covering during handling and installation.

1.5 FIELD CONDITIONS

- A. Field Measurements: Verify actual dimensions of construction to receive metal countertops by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304.
- B. Sealant for Countertops: Manufacturer's standard sealant of characteristics indicated below that complies with applicable requirements in Section 07 92 00 "Joint Sealants."
 - 1. Mildew-Resistant Joint Sealant: Mildew resistant, single component, nonsag, neutral curing, silicone.
 - 2. Joint Sealant: Latex.

3. Color: Clear.
4. Provide manufacture statements that confirm that the product used meets the California Department of Public Health (CDPH) Standard Method v1.1 2010 using the applicable exposure scenario.
 - a. Refer to Section 01 81 13.14 "Sustainable Design Requirements - LEED v4 BD+C" for additional requirements.

2.2 STAINLESS-STEEL COUNTERTOPS AND SINKS

- A. Countertops: Fabricate from 0.062-inch-thick, stainless-steel sheet. Provide smooth, clean exposed tops and edges in uniform plane, free of defects.
 1. Joints: Fabricate countertops without field-made joints.
 2. Weld shop-made joints.
 3. Form the backsplash coved to and integral with top surface, with a 1/2-inch-thick top edge and 1/2-inch return flange.
 4. Where stainless-steel sinks occur in stainless-steel tops, factory weld into one integral unit.
- B. Stainless-Steel Sinks: Fabricate from stainless-steel sheet, not less than 0.050-inch nominal thickness. Fabricate with corners rounded and coved to at least 5/8-inch radius. Slope the sink bottoms to outlet without channeling or grooving. Provide continuous butt-welded joints.
 1. Provide sizes indicated or manufacturer's closest standard size of equal or greater volume, as approved by Architect.
 2. Provide double-wall construction for sink partitions with top edge rounded to at least 1/2-inch diameter.
 3. Factory punch holes for fittings.
 4. Provide sinks with stainless-steel strainers and tailpieces.
 5. Apply 1/8-inch-thick coating of heat-resistant, sound-deadening mastic to undersink surfaces.
- C. Core Material: Marine grade plywood.
- D. Core Material at Sinks: MDF made with exterior glue.
- E. Core Thickness: 3/4 inch.
 1. Build up countertop thickness to 1-1/2 inches at front, back, and ends with additional layers of core material laminated to top.
- F. Backer Sheet: Provide plastic-laminate backer sheet, NEMA LD 3, Grade BKL, on underside of countertop substrate.

2.3 WALL-MOUNTED SHELVES

- A. Wall-Mounted Shelves: Fabricate from stainless-steel sheet, not less than 0.050-inch (1.27-mm) nominal thickness. Weld shop-made joints. Fold front edge down a minimum of 3/4 inch (19 mm); fold back edge up a minimum of 3 inches (75 mm). Provide integral stiffening brackets, formed by folding up ends a minimum of 3/4 inch (19 mm) and by welding to upturned edges.

- A. Grind and polish surfaces to produce uniform, directional satin finish matching No. 4 finish, with no evidence of welds and free of cross scratches. Run grain with long dimension of each piece. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces clean.

2.5 WOOD MATERIALS

- A. Manufacturers
 - 1. Boise Cascade Company
 - 2. Collins
 - 3. Timber Products Company
- B. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.
- C. Composite Wood: Provide composite wood products that meet the California Air Resources Board (CARB), Airborne Toxic Measure ATCM requirements for ultra-low emitting formaldehyde (ULEF) resins or no added formaldehyde resins.

2.6 FIRE-RETARDANT-TREATED MATERIALS

- A. Fire-Retardant-Treated Materials, General: Where fire-retardant-treated materials are indicated, use materials that are acceptable to authorities having jurisdiction and with fire-test-response characteristics specified as determined by testing identical products according to test method indicated by a qualified testing agency.
 - 1. Use treated materials that comply with requirements of referenced quality standard. Do not use materials that are warped, discolored, or otherwise defective.
 - 2. Use fire-retardant-treatment formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants to distinguish treated materials from untreated materials.
 - 3. Identify fire-retardant-treated materials with appropriate classification marking of qualified testing agency in the form of removable paper label or imprint on surfaces that will be concealed from view after installation.
- B. Fire-Retardant MDF: Medium-density fiberboard panels complying with ANSI A208.2, made from softwood fibers, synthetic resins, and fire-retardant chemicals mixed together at time of panel manufacture to achieve flame-spread index of 25 or less and smoke-developed index of 200 or less according to ASTM E 84.

2.7 MISCELLANEOUS MATERIALS

- A. Low Emitting Adhesives and Sealants
 - 1. Provide manufacture statements that confirm that the product used meets the California Department of Public Health (CDPH) Standard Method v1.1 2010 using the applicable exposure scenario.

2. Refer to Section 01 81 13.14 "Sustainable Design Requirements - LEED v4 BD+C" for additional requirements.
- B. Adhesive for Bonding Stainless Steel: As selected by fabricator to comply with requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of metal countertops.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install metal countertops level, plumb, and true; shim as required, using concealed shims.
- B. Field Jointing: Where possible, make field jointing in the same manner as shop jointing; use fasteners recommended by manufacturer. Prepare edges to be joined in shop so Project-site processing of top and edge surfaces is not required. Locate field joints where shown on Shop Drawings.
- C. Secure tops to cabinets with Z- or L-type fasteners or equivalent; use two or more fasteners at each front, end, and back.
- D. Abut top and edge surfaces in one true plane, with internal supports placed to prevent deflection.
- E. Seal junctures of tops, splashes, and walls with mildew-resistant silicone sealant or another permanently elastic sealing compound recommended by countertop material manufacturer.

3.3 CLEANING AND PROTECTION

- A. Repair or remove and replace defective work as directed on completion of installation.
- B. Clean finished surfaces, touch up as required, and remove or refinish damaged or soiled areas to match original factory finish, as approved by Architect.
 1. Refer to Section 01 35 46 "Indoor Air Quality Management" and Section 01 74 23 "Final Cleaning" for additional requirements.
- C. Protection: Provide 6-mil plastic or other suitable water-resistant covering over the countertop surfaces. Tape to underside of countertop at a minimum of 48 inches o.c. Remove protection at Substantial Completion.

END OF SECTION 12 36 16

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes plastic-laminate-clad countertops.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include data for fire-retardant treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.
- B. Sustainable Design Documentation Submittals: Refer to section 01 81 13.14 "Sustainable Design Requirements – LEED V4 BD+C".
 - 1. **Product Data:** For Leadership Extraction Practices in the following:
 - a. Leadership Extraction Practices for Recycled Content
 - 2. Documentation on Low Emitting Materials.
 - 3. **Product Certificates:** Provide the following:
 - a. Environmental Product Declarations (EPD's)
 - b. Corporate Sustainability Reporting (CSR's)
 - c. Health Product Declarations (HPD's)
- C. Shop Drawings: For plastic-laminate-clad countertops.
 - 1. Include plans, sections, details, and attachments to other work. Detail fabrication and installation, including field joints.
 - 2. Show locations and sizes of cutouts and holes for items installed in plastic-laminate-clad countertops.
 - 3. Apply AWI Quality Certification Program label to Shop Drawings.
- D. Samples: Plastic laminates in each type, color, pattern, and surface finish required in manufacturer's standard size.
- E. Samples for Initial Selection: For plastic laminates.
- F. Samples for Verification: As follows:
 - 1. Plastic Laminates: For each type, color, pattern, and surface finish required, 8 by 10 inches in size.
 - 2. Fabrication Sample: For each type and profile of countertop required, provide one sample applied to core material with specified edge material applied to one edge.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and fabricator.

- B. Product Certificates: For the following:
 - 1. Composite wood and agrifiber products.
 - 2. High-pressure decorative laminate.
 - 3. Adhesives.
- C. Quality Standard Compliance Certificates: AWI Quality Certification Program.
- D. Evaluation Reports: For fire-retardant-treated materials, from ICC-ES.

1.5 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.
 - 1. Shop Certification: AWI's Quality Certification Program accredited participant.
- B. Installer Qualifications: Fabricator of products.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver countertops only after casework and supports on which they will be installed have been completed in installation areas.
- B. Store countertops in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.
- C. Keep surfaces of countertops covered with protective covering during handling and installation.

1.7 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install countertops until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature and relative humidity at levels planned for building occupants during the remainder of the construction period.
- B. Field Measurements: Where countertops are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Established Dimensions: Where countertops are indicated to fit to other construction, establish dimensions for areas where countertops are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

PART 2 - PRODUCTS

2.1 PLASTIC-LAMINATE-CLAD COUNTERTOPS

- A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of plastic-laminate-clad countertops indicated for construction, finishes, installation, and other requirements.

1. Provide inspections of fabrication and installation together with labels and certificates from AWI certification program indicating that countertops comply with requirements of grades specified.
 2. The Contract Documents contain requirements that are more stringent than the referenced quality standard. Comply with requirements of Contract Documents in addition to those of the referenced quality standard.
- B. Grade: Custom.
- C. High-Pressure Decorative Laminate: NEMA LD 3, Grade HGS.
1. Basis-of-Design Product: Subject to compliance with requirements, provide Acoustical Panel Ceiling types as indicated in Section 09 00 01 "Finish Key" or comparable approved product meeting all requirements including sustainability requirements.
 - a. Refer to Sections 01 2500 "Substitution Procedures" and 01 6000 "Product Requirements" for comparable product requirements.
- D. Edge Treatment: Same as laminate cladding on horizontal surfaces.
- E. Core Material: MDF.
- F. Core Material at Sinks: MDF made with exterior glue.
- G. Core Thickness: 3/4 inch.
1. Build up countertop thickness to 1-1/2 inches at front, back, and ends with additional layers of core material laminated to top.
- H. Backer Sheet: Provide plastic-laminate backer sheet, NEMA LD 3, Grade BKL, on underside of countertop substrate.

2.2 WOOD MATERIALS

- A. Manufacturers
1. Boise Cascade Company
 2. Collins
 3. Timber Products Company
- B. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.
- C. Composite Wood: Provide composite wood products that meet the California Air Resources Board (CARB), Airborne Toxic Measure ATCM requirements for ultra-low emitting formaldehyde (ULEF) resins or no added formaldehyde resins.

2.3 FIRE-RETARDANT-TREATED MATERIALS

- A. Fire-Retardant-Treated Materials, General: Where fire-retardant-treated materials are indicated, use materials that are acceptable to authorities having jurisdiction and with fire-test-response characteristics specified as determined by testing identical products according to test method indicated by a qualified testing agency.

1. Use treated materials that comply with requirements of referenced quality standard. Do not use materials that are warped, discolored, or otherwise defective.
 2. Use fire-retardant-treatment formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants to distinguish treated materials from untreated materials.
 3. Identify fire-retardant-treated materials with appropriate classification marking of qualified testing agency in the form of removable paper label or imprint on surfaces that will be concealed from view after installation.
- B. Fire-Retardant MDF: Medium-density fiberboard panels complying with ANSI A208.2, made from softwood fibers, synthetic resins, and fire-retardant chemicals mixed together at time of panel manufacture to achieve flame-spread index of 25 or less and smoke-developed index of 200 or less according to ASTM E 84.

2.4 MISCELLANEOUS MATERIALS

- A. Low Emitting Adhesives and Sealants
1. Provide manufacture statements that confirm that the product used meets the California Department of Public Health (CDPH) Standard Method v1.1 2010 using the applicable exposure scenario.
 2. Refer to Section 01 81 13.14 "Sustainable Design Requirements - LEED v4 BD+C" for additional requirements.
- B. Adhesive for Bonding Plastic Laminate: As selected by fabricator to comply with requirements.
1. Adhesive for Bonding Edges: Hot-melt adhesive or adhesive specified above for faces.

2.5 FABRICATION

- A. Sand fire-retardant-treated wood lightly to remove raised grain on exposed surfaces before fabrication.
- B. Fabricate countertops to dimensions, profiles, and details indicated. Provide front and end overhang of 1 inch over base cabinets. Ease edges to radius indicated for the following:
1. Solid-Wood (Lumber) Members: 1/16 inch unless otherwise indicated.
- C. Complete fabrication, including assembly, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
1. Notify Architect seven days in advance of the dates and times countertop fabrication will be complete.
 2. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended, and check measurements of assemblies against field measurements before disassembling for shipment.

- D. Shop cut openings to maximum extent possible to receive appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately, and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.
 - 1. Seal edges of cutouts by saturating with varnish.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before installation, condition countertops to average prevailing humidity conditions in installation areas.
- B. Before installing countertops, examine shop-fabricated work for completion and complete work as required, including removal of packing.

3.2 INSTALLATION

- A. Grade: Install countertops to comply with same grade as item to be installed.
- B. Assemble countertops and complete fabrication at Project site to the extent that it was not completed in the shop.
 - 1. Provide cutouts for appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately, and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.
 - 2. Shop seal edges of cutouts by saturating with varnish.
- C. Field Jointing: Where possible, make in the same manner as shop jointing, using dowels, splines, adhesives, and fasteners recommended by manufacturer. Prepare edges to be joined in shop so Project-site processing of top and edge surfaces is not required. Locate field joints where shown on Shop Drawings.
 - 1. Secure field joints in countertops with concealed clamping devices located within 6 inches of front and back edges and at intervals not exceeding 24 inches. Tighten according to manufacturer's written instructions to exert a constant, heavy-clamping pressure at joints.
- D. Scribe and cut countertops to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- E. Fire-Retardant-Treated Wood: Handle, store, and install fire-retardant-treated wood to comply with chemical-treatment manufacturer's written instructions, including those for adhesives used to install woodwork.
- F. Countertop Installation: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.
 - 1. Install countertops level and true in line. Use concealed shims as required to maintain not more than a 1/8-inch-in-96-inches variation from a straight, level plane.
 - 2. Secure backsplashes to tops with concealed metal brackets at 16 inches o.c. and to walls with adhesive.

3. Seal joints between countertop and backsplash, if any, and joints where countertop and backsplash abut walls with mildew-resistant silicone sealant or another permanently elastic sealing compound recommended by countertop material manufacturer.

3.3 ADJUSTING AND CLEANING

- A. Repair damaged and defective countertops, where possible, to eliminate functional and visual defects. Where not possible to repair, replace countertops. Adjust joinery for uniform appearance.
- B. Clean countertops on exposed and semiexposed surfaces.
- C. Protection: Provide Kraft paper or other suitable covering over countertop surfaces, taped to underside of countertop at a minimum of 48 inches o.c. Remove protection at Substantial Completion.
- D. Refer to Section 01 74 23 "Final Cleaning" for additional cleaning requirements.

END OF SECTION 12 36 23.13

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Solid surface material countertops.
2. Solid surface material backsplashes.
3. Solid surface material end splashes.
4. Solid surface material apron fronts.
5. Solid surface material utility ledges.

B. Related Requirements:

1. Section 22 40 00 "Plumbing Fixtures" plumbing fittings.

1.2 ACTION SUBMITTALS

A. Product Data: For countertop materials.

B. Sustainable Design Submittals:

1. Product Data: Refer to section 01 81 13.14 "Sustainable Design Requirements – LEED V4 BD+C" for Leadership Extraction Practices for the following:
 - a. Extended Producer Responsibility
 - b. Recycled content
 - c. Regional material requirements
2. Product Certificates: Refer to section 01 81 13.14 "Sustainable Design Requirements – LEED V4 BD+C" for the following:
 - a. Environmental Product Declarations (EPD's)
 - b. Corporate Sustainability Reporting (CSR's)
 - c. Health Product Declarations (HPD's)
3. Adhesives and Sealants: Refer to section 01 81 13.14 "Sustainable Design Requirements – LEED V4 BD+C" subparagraph "Documentation on Low Emitting Materials" for Volatile Organic Chemical Emission requirements.

C. Shop Drawings: For countertops. Show materials, finishes, edge and backsplash profiles, methods of joining, and cutouts for plumbing fixtures.

1. Show locations and details of joints.
2. Show direction of directional pattern, if any.

D. Samples for Initial Selection: For each type of material exposed to view.

E. Samples for Verification: For the following products:

1. Countertop material, 6 inches square.
2. Wood trim, 8 inches long.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For fabricator.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For solid surface material countertops to include in maintenance manuals. Include Product Data for care products used or recommended by Installer and names, addresses, and telephone numbers of local sources for products.

1.5 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate countertops similar to that required for this Project, and whose products have a record of successful in-service performance.
- B. Installer Qualifications: Fabricator of countertops.
- C. Mockups: Build mockups as indicated in Section 01 43 39 "Visual Mock-up Requirements".
 - 1. Build mockup of typical countertop as shown on Drawings.
 - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 FIELD CONDITIONS

- A. Field Measurements: Verify dimensions of countertops by field measurements after base cabinets are installed but before countertop fabrication is complete.

1.7 COORDINATION

- A. Coordinate locations of utilities that will penetrate countertops or backsplashes.

PART 2 - PRODUCTS

2.1 SOLID SURFACE COUNTERTOP MATERIALS

- A. Solid Surface Material: Homogeneous-filled plastic resin complying with ICPA SS-1.
 - 1. Products: Provide products indicated in Section 09 00 01 "Finish Key".
 - 2. Type: Provide Standard type unless Special Purpose type is indicated.
 - 3. Colors and Patterns: As indicated by manufacturer's designations.
 - 4. Composite Wood Products: Provide manufacture statements that confirm that the product used meets the California Department of Public Health (CDPH) Standard Method v1.1 2010 using the applicable exposure scenario. Manufacturer claim of compliance must state the range of total VOCs after 14 days and measured as specified in the CDPH standard v1.1 2010

2.2 COUNTERTOP FABRICATION

- A. Fabricate countertops according to solid surface material manufacturer's written instructions and to the AWI/AWMAC/WI's "Architectural Woodwork Standards."
 - 1. Grade: Custom.
- B. Configuration:
 - 1. Front: Straight, slightly eased at top.
 - 2. Backsplash: Straight, slightly eased at corner.
 - 3. End Splash: Matching backsplash where indicated.

- C. Countertops: 1/2-inch-thick, solid surface material with front edge built up with same material.
- D. Backsplashes: 1/2-inch-thick, solid surface material where indicated.
- E. Fabricate tops with shop-applied edges and backsplashes unless otherwise indicated. Comply with solid surface material manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.
 - 1. Install integral sink bowls in countertops in the shop.
- F. Joints: Fabricate countertops without joints.
- G. Cutouts and Holes:
 - 1. Undercounter Plumbing Fixtures: Make cutouts for fixtures in shop using template or pattern furnished by fixture manufacturer. Form cutouts to smooth, even curves.
 - a. Provide vertical edges, slightly eased at juncture of cutout edges with top and bottom surfaces of countertop and projecting 3/16 inch into fixture opening.
 - 2. Counter-Mounted Plumbing Fixtures: Prepare countertops in shop for field cutting openings for counter-mounted fixtures. Mark tops for cutouts and drill holes at corners of cutout locations. Make corner holes of largest radius practical.
 - 3. Fittings: Drill or cut countertops in shop for plumbing fittings, undercounter soap dispensers, and similar items and items provided by others.

2.3 INSTALLATION MATERIALS

- A. Adhesive: Product recommended by solid surface material manufacturer.
 - 1. Provide products that do not contain excessive levels of VOC's in accordance with the California Air Resources Board (CARB) 2007, Suggested Control Measure (SCM) for Architectural Coatings or the South Coast Quality Management District(SCAQMD) Rule 1113 June 2011.
- B. Sealant for Countertops: Comply with applicable requirements in Section 07 92 00 "Joint Sealants."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates to receive solid surface material countertops and conditions under which countertops will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of countertops.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install countertops level to a tolerance of 1/8 inch in 8 feet, 1/4 inch maximum. Do not exceed 1/64-inch difference between planes of adjacent units.

- B. Fasten countertops by screwing through corner blocks of base units into underside of countertop. Predrill holes for screws as recommended by manufacturer. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
- C. Fasten subtops to cabinets by screwing through subtops into cornerblocks of base cabinets. Shim as needed to align subtops in a level plane.
- D. Secure countertops to subtops with adhesive according to solid surface material manufacturer's written instructions. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
- E. Bond joints with adhesive and draw tight as countertops are set. Mask areas of countertops adjacent to joints to prevent adhesive smears.
 - 1. Install metal splines in kerfs in countertop edges at joints. Fill kerfs with adhesive before inserting splines and remove excess immediately after adjoining units are drawn into position.
 - 2. Clamp units to temporary bracing, supports, or each other to ensure that countertops are properly aligned and joints are of specified width.
- F. Install backsplashes and end splashes by adhering to wall and countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears.
- G. Install aprons to backing and countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears. Fasten by screwing through backing. Predrill holes for screws as recommended by manufacturer.
- H. Complete cutouts not finished in shop. Mask areas of countertops adjacent to cutouts to prevent damage while cutting. Make cutouts to accurately fit items to be installed, and at right angles to finished surfaces unless beveling is required for clearance. Ease edges slightly to prevent snipping.
- I. Apply sealant to gaps at walls; comply with Section 07 92 00 "Joint Sealants."

END OF SECTION 12 36 61.16

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections (including all sustainability requirements), apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Quartz agglomerate countertops.
 - 2. Quartz agglomerate backsplashes.
 - 3. Quartz agglomerate end splashes.
 - 4. Quartz agglomerate apron fronts.
- B. Related Requirements:
 - 1. Section 22 40 00 "Plumbing Fixtures" for sinks and plumbing fittings.

1.3 ACTION SUBMITTALS

- A. Product Data: For countertop materials.
- B. Sustainable Design Documentation Submittals: Refer to section 01 81 13.14 "Sustainable Design Requirements – LEED V4 BD+C".
 - 1. Product Data: Documentation for Low Emitting Materials
 - a. Low Emitting Materials for Adhesives and Sealants
- C. Shop Drawings: For countertops. Show materials, finishes, edge and backsplash profiles, methods of joining, and cutouts for plumbing fixtures.
 - 1. Show locations and details of joints.
 - 2. Show direction of directional pattern, if any.
- D. Samples for Initial Selection: For each type of material exposed to view.
- E. Samples for Verification: For the following products:
 - 1. Countertop material, 6 inches square.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For fabricator.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For quartz agglomerate countertops to include in maintenance manuals. Include Product Data for care products used or recommended by Installer and names, addresses, and telephone numbers of local sources for products.

1.6 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate countertops similar to that required for this Project, and whose products have a record of successful in-service performance.
- B. Installer Qualifications: Fabricator of countertops.
- C. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for fabrication and execution.
 - 1. Build mockup of typical countertop as shown on Drawings.
 - 2. Refer to Section 01 43 39 "Visual Mock-up Requirements" for additional requirements.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 FIELD CONDITIONS

- A. Field Measurements: Verify dimensions of countertops by field measurements after base cabinets are installed but before countertop fabrication is complete.

1.8 COORDINATION

- A. Coordinate locations of utilities that will penetrate countertops or backsplashes.

PART 2 - PRODUCTS

2.1 QUARTZ AGGLOMERATE COUNTERTOP MATERIALS

- A. Quartz Agglomerate: Solid sheets consisting of quartz aggregates bound together with a matrix of filled plastic resin and complying with ICPA SS-1, except for composition.
 - 1. Products: Subject to compliance with requirements, provide the following:
 - a. Refer to Section 09 00 01 "Finish Key".
 - 2. Colors and Patterns: As indicated by manufacturer's designations.

2.2 COUNTERTOP FABRICATION

- A. Fabricate countertops according to quartz agglomerate manufacturer's written instructions and the AWI/AWMAC/WI's "Architectural Woodwork Standards."
 - 1. Grade: Custom.
- B. Configuration:
 - 1. Front: Straight, slightly eased at top.
 - 2. Backsplash: Straight, slightly eased at corner.
 - 3. End Splash: Matching backsplash.
- C. Countertops: Quartz agglomerate, thickness as indicated in Section 09 00 01 "Finish Key".
- D. Backsplashes: Match Countertop.

- E. Fabricate tops with shop-applied edges unless otherwise indicated. Comply with quartz agglomerate manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.
 - 1. Fabricate with loose backsplashes for field assembly.
- F. Joints: Fabricate countertops without joints to extent possible.
 - 1. Joint Locations: Not within 18 inches of a sink or cooktop and not where a countertop section less than 36 inches long would result, unless unavoidable.
 - 2. Joint Type: Bonded, 1/32 inch or less in width.
 - 3. Splined Joints: Accurately cut kerfs in edges at joints for insertion of metal splines to maintain alignment of surfaces at joints. Make width of cuts slightly more than thickness of splines to provide snug fit. Provide at least three splines in each joint.
- G. Cutouts and Holes:
 - 1. Undercounter Plumbing Fixtures: Make cutouts for fixtures in shop using template or pattern furnished by fixture manufacturer. Form cutouts to smooth, even curves.
 - a. Provide vertical edges, slightly eased at juncture of cutout edges with top and bottom surfaces of countertop and projecting 3/16 inch into fixture opening.
 - 2. Counter-Mounted Plumbing Fixtures: Prepare countertops in shop for field cutting openings for counter-mounted fixtures. Mark tops for cutouts and drill holes at corners of cutout locations. Make corner holes of largest radius practical.
 - 3. Fittings: Drill or cut countertops in shop for plumbing fittings, undercounter soap dispensers, and similar items and items provided by others.

2.3 INSTALLATION MATERIALS

- A. Adhesive: Product recommended by quartz agglomerate manufacturer.
 - 1. Provide manufacture statements that confirm that the product used meets the California Department of Public Health (CDPH) Standard Method v1.1 2010 using the applicable exposure scenario.
 - 2. Refer to Section 01 81 13.14 "Sustainable Design Requirements - LEED v4 BD+C" for additional requirements.
- B. Sealant for Countertops: Comply with applicable requirements in Section 07 92 00 "Joint Sealants."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates to receive quartz agglomerate countertops and conditions under which countertops will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of countertops.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

- A. Install countertops level to a tolerance of 1/8 inch in 8 feet, 1/4 inch maximum. Do not exceed 1/64-inch difference between planes of adjacent units.
- B. Fasten countertops by screwing through corner blocks of base units into underside of countertop. Predrill holes for screws as recommended by manufacturer. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with quartz agglomerate manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
- C. Fasten subtops to cabinets by screwing through subtops into cornerblocks of base cabinets. Shim as needed to align subtops in a level plane.
- D. Secure countertops to subtops with adhesive according to quartz agglomerate manufacturer's written instructions. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with quartz agglomerate manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
- E. Bond joints with adhesive and draw tight as countertops are set. Mask areas of countertops adjacent to joints to prevent adhesive smears.
 - 1. Install metal splines in kerfs in countertop edges at joints. Fill kerfs with adhesive before inserting splines and remove excess immediately after adjoining units are drawn into position.
 - 2. Clamp units to temporary bracing, supports, or each other to ensure that countertops are properly aligned and joints are of specified width.
- F. Install backsplashes and end splashes by adhering to wall and countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears.
- G. Install aprons to backing and countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears. Fasten by screwing through backing. Predrill holes for screws as recommended by manufacturer.
- H. Complete cutouts not finished in shop. Mask areas of countertops adjacent to cutouts to prevent damage while cutting. Make cutouts to accurately fit items to be installed, and at right angles to finished surfaces unless beveling is required for clearance. Ease edges slightly to prevent snipping.
 - 1. Seal edges of cutouts in particleboard subtops by saturating with varnish.
- I. Apply sealant to gaps at walls; comply with Section 07 92 00 "Joint Sealants."

END OF SECTION 12 36 61.19

SECTION 12 48 43.23 - ANTI-FATIGUE FLOOR MATS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections (including all sustainability requirements), apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Anti-fatigue floor mats.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Include layouts and edge ramps.
- C. Samples: Full-size units of anti-fatigue floor mat and edge ramp.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For anti-fatigue floor mats to include in maintenance manuals.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store anti-fatigue floor mats and accessories in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F. Store anti-fatigue floor mats on flat surfaces.

PART 2 - PRODUCTS

2.1 ANTI-FATIGUE FLOOR MATS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide SATECH, Inc., SmartCells or comparable approved product meeting all requirements including sustainability requirements.
 - 1. Refer to Sections 01 2500 "Substitution Procedures" and 01 6000 "Product Requirements" for comparable product requirements.
- B. Thickness: 1-inch
- C. Tile size: 36-inch by 36-inch
- D. Installation: Loose laid
- E. Provide electro-static-dissipative system where indicated.

2.2 ACCESSORIES

- A. Transitions: Manufacturer's standard 12-inch ramp
 - 1. Comply with Florida Building Code Fifth Edition (2014) – Accessibility
- B. Tile Connector: Manufacturer's standard connector.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates for compliance with requirements and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare substrates according to anti-fatigue floor mats manufacturer's written instructions.
- B. Immediately before installation, sweep and vacuum clean substrates to be covered by anti-fatigue floor mats.

3.3 ANTI-FATIGUE FLOOR MAT INSTALLATION

- A. Comply with manufacturer's written instructions for anti-fatigue floor mats.
- B. Scribe, cut, and fit anti-fatigue floor mats to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
- C. Extend anti-fatigue floor mats into toe spaces, door reveals, closets, and similar openings.

3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting anti-fatigue floor mats.
- B. Protect anti-fatigue floor mats from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- C. Cover anti-fatigue floor mats until Substantial Completion.
- D. Refer to Section 01 35 46 "Indoor Air Quality" and Section 01 74 23 "Final Cleaning" for additional requirements.

END OF SECTION 12 48 43.23

SECTION 12 93 00-SITE FURNISHINGS

PART 1 -GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:

- 1. Benches
- 2. Bicycle Racks.
- 3. Trash Receptacles.
- 4. Bollard.
- 5. Fence.

1.3 SUBMITTALS

- A. Product Data for each type of product indicated.
- B. Samples for Initial Selection for units with factory-applied color finishes.
- C. Samples for Verification for each type of exposed finish required, prepared on samples not less than 6-inch-long linear components and 4-inch-square sheet components.
- D. Product Schedule for site furnishings. Use same designations indicated on Drawings.
- E. Material Certificates for site furnishings, signed by manufacturers.
- F. Maintenance Data for site furnishings to include in maintenance manuals.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of site furnishing(s) through one source from a single manufacturer.

PART 2 -PRODUCTS

2.1 SITE FURNISHINGS

- A. Products: Products specified for this project are listed on the Site Furnishings Schedule within the construction drawings
- B. Product substitution will be considered only if the alternative product is considered equal or better

in terms of materials, sizes, dimensions, finishes, features, accessories, maintenance requirements and performance

2.2 MATERIALS

- A. Aluminum: Alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated; free of surface blemishes and complying with the following:

1. Rolled or Cold-Finished Bars, Rods, and Wire: ASTM B 211.
2. Extruded Bars, Rods, Wire, Profiles, and Tubes: ASTM B 221.
3. Structural Pipe and Tube: ASTM B 429.
4. Sheet and Plate: ASTM B 209.
5. Castings: ASTM B 26/B 26M.

- B. Steel and Iron: Free of surface blemishes and complying with the following:

1. Plates, Shapes, and Bars: ASTM A 36/A 36M.
2. Steel Pipe: Standard-weight steel pipe complying with ASTM A 53, or electric-resistance-welded pipe complying with ASTM A 135.
3. Tubing: Cold-formed steel tubing complying with ASTM A 500.
4. Mechanical Tubing: Cold-rolled, electric-resistance-welded carbon or alloy steel tubing complying with ASTM A 513, or steel tubing fabricated from steel complying with ASTM A 1011/A 1011M and complying with dimensional tolerances in ASTM A 500; zinc coated internally and externally.
5. Sheet: Commercial steel sheet complying with ASTM A 1011/A 1011M.
6. Perforated Metal: From steel sheet not less than 0.140 nominal thickness; manufacturer's standard perforation pattern.
7. Expanded Metal: Carbon-steel sheets, deburred after expansion, and complying with ASTM F 1267.
8. Malleable-Iron Castings: ASTM A 47/A 47M, grade as recommended by fabricator for type of use intended.
9. Gray-Iron Castings: ASTM A 48/A 48M, Class 200.

- C. Stainless Steel: Free of surface blemishes and complying with the following:

1. Sheet, Strip, Plate, and Flat Bars: ASTM A 666.
2. Pipe: Schedule 40 steel pipe complying with ASTM A 312/A 312M.
3. Tubing: ASTM A 554.

- D. Anchors, Fasteners, Fittings, and Hardware: Stainless steel, Galvanized steel, Zinc-plated steel, Manufacturer's standard, corrosion-resistant-coated or non-corrodible materials; commercial quality, tamperproof, vandal and theft resistant, concealed, recessed, and capped or plugged].

1. Angle Anchors: For inconspicuously bolting legs of site furnishings to or below-grade substrate; extent as indicated.
2. Antitheft Hold-Down Brackets: For securing site furnishings to substrate; extent as indicated on Drawings.

- E. No-shrink, Nonmetallic Grout: Premixed, factory-packaged, non-staining, noncorrosive, nongaseous grout complying with ASTM C 1107; recommended in writing by manufacturer, for exterior applications.
- F. Erosion-Resistant Anchoring Cement: Factory-packaged, non-shrink, non-staining, hydraulic-controlled expansion cement formulation for mixing with potable water at Project site to create pourable anchoring, patching, and grouting compound; resistant to erosion from water exposure without needing protection by a sealer or waterproof coating; recommended in writing by manufacturer, for exterior applications.
- G. Galvanizing: Where indicated for steel and iron components, provide the following protective zinc coating applied to components after fabrication:
 - 1. Zinc-Coated Tubing: External, zinc with organic overcoat, consisting of a minimum of 0.9 oz./sq. ft. of zinc after welding, a chromate conversion coating, and a clear, polymer film. Internal, same as external or consisting of 81 percent zinc pigmented coating, not less than 0.3 mil thick.
 - 2. Hot-Dip Galvanizing: According to ASTM A 123/A 123M, ASTM A 153/A 153M, or ASTM A 924/A 924M.

PART 3 -EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for correct and level finished grade, mounting surfaces, installation tolerances, and other conditions affecting performance.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Comply with manufacturer's written installation instructions unless more stringent requirements are indicated. Complete field assembly of site furnishings where required.
- B. Unless otherwise indicated, install site furnishings after landscaping and paving have been completed.
- C. Install site furnishings level, plumb, true, and securely anchored or positioned at locations indicated on Drawings.
- D. Post Setting: Set cast-in support posts in concrete footing with smooth top, shaped to shed water. Protect portion of posts above footing from concrete splatter. Verify that posts are set plumb or at correct angle and are aligned and at correct height and spacing. Hold posts in position during placement and finishing operations until concrete is sufficiently cured.
- E. Posts Set into Voids in Concrete: Form or core-drill holes for installing posts in concrete to depth recommended in writing by manufacturer of site furnishings and 3/4 inch larger than OD

of post. Clean holes of loose material, insert posts, and fill annular space between post and concrete with non-shrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions, with top smoothed and shaped to shed water.

- F. Pipe Sleeves: Use steel pipe sleeves preset and anchored into concrete for installing posts. After posts have been inserted into sleeves, fill annular space between post and sleeve with non-shrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions, with top smoothed and shaped to shed water.

3.3 CLEANING

- A. After completing site furnishing installation, inspect components. Remove spots, dirt, and debris. Repair damaged finishes to match original finish or replace component at Contractor's cost.
- B. Refer to Section 01 74 23 Final Cleaning for all final cleaning.

END OFSECTION

SECTION 13 46 00 - TRANSPARENT BULLET RESISTANT ASSEMBLIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections (including all sustainability requirements), apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Transparent Bullet Resistant System.

1.3 REFERENCE STANDARDS

- A. Underwriters Laboratories: UL 752 – Standard for Bullet Resisting Equipment.
- B. NIJ Standard 0108.01 – (National Institute of Justice) Standard for Ballistic Resistant Protective Materials.
- C. STM A 666 – Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel, Strip, Plate and Flat Bar.
- D. ASTM B 209/B 209M – Standard Specification for Aluminum and Aluminum Alloy Sheet and Plate.

1.4 SUBMITTALS

- A. Product Data: Submit Manufacturer's technical product data substantiating that products comply.
- B. Shop drawings: Submit for fabrication and installation of Barrier System. Include details, elevations and installation requirement of finish hardware and cleaning.
- C. Certification: Provide printed data in sufficient detail to indicate compliance with the contract documents.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain each component of the Bullet Resistant Assembly through one source from a single manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver Bullet Resistant Assembly crated to provide protection during transit and job storage.
- B. Inspect Bullet Resistant Assembly upon delivery for damage. Unless minor defects can be made to meet the Architect's specifications and satisfaction, damaged parts should be removed and replaced.

- C. Store Bullet Resistant Assembly at building site under cover in dry location.

1.7 PROJECT CONDITIONS

- A. Field measurements: Check opening by accurate field measurement before fabrication. Show recorded measurements on shop drawings. Coordinate fabrication schedule with construction progress to avoid delay of work.

1.8 WARRANTY

- A. All material and workmanship shall be warranted against defects for a period of one (1) year from the date of substantial completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design: Subject to compliance with requirements, provide products manufactured by C.R. Laurence Co., Inc. (CRL) or comparable approved product meeting all requirements including sustainability requirements.
1. Refer to Sections 01 2500 "Substitution Procedures" and 01 6000 "Product Requirements" for comparable product requirements.

2.2 MATERIALS

- A. Aluminum
1. All aluminum used to manufacture frames, channel, anchors, and accessories shall meet the following requirements:
 - a. Aluminum: ASTM B221, alloy 6105-T5 and 6063-T5 for extrusions.
 - b. All exposed aluminum shall have clean cut edges with no burrs, exposed corners shall be rounded and sanded.
 2. Finish: Clear Anodized
- B. Stainless Steel
1. All stainless steel used to manufacture deal trays, countertops, anchors, clamps and accessories shall meet the following requirement:
 - a. ASTM A 666 – Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel, Strip, Plate and Flat Bar.
- C. Bullet Resistant Glazing
1. UL Standard 752, Level 3 all glass unit consisting of multiple layers of glass and polyvinyl butyral (PVB).
 2. Transparent (One Way) Mirror Glass.
 3. Glazing shall have all edges sanded and polished to a clear finish.

2.3 GLAZING CHANNEL AND CLAMPS

- A. Glazing shall be secured partition walls with U-channel.
- B. All anchorage shall meet the Federal, State and Local ordinances and local codes.

PART 3 - EXECUTION

- A. Examine substrates to verify that locations to receive anchors have been clearly marked for Installer. Locate reinforcements and mark locations if not already done.

3.2 INSTALLATION, GENERAL

- A. System shall be installed plumb, level, rigid and in true alignment.
- B. Installation shall follow strictly in accordance with manufacturers recommendations and drawings. Any deviation may void warranties and product ratings. Repair damaged units as directed (if approved by the manufacturer and the architect) or replace with new units.
- C. System shall be installed and fastened to maintain alignment with frames to achieve maximum operational effectiveness and appearance. System shall be adjusted to maintain perimeter clearances as specified in drawings. Shimming shall be performed by the installer as needed to assure the proper clearances are achieved.

3.3 CLEANING

- A. Clean frame and glazing surfaces after installation, complying with requirements contained in the manufacturer's instructions. Remove excess glazing sealant compounds, dirt or other substances.

3.4 PROTECTION

- A. Institute protective measures required throughout the remainder of the construction period to ensure that the Transparent Bullet Resistant Barrier System does not incur any damage or deterioration at the time of acceptance.

END OF SECTION 13 46 00

SECTION 13 47 13 - CATHODIC PROTECTION SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section covers the requirements for designing, furnishing, installing, and testing a complete cathodic protection system for underground fuel system piping.
- B. It is the intent of these Technical Specifications that the Contractor engages the services of a Cathodic Protection Specialist to prepare the design and direct the installation of the cathodic protection system.

1.3 SCOPE

- A. The Contractor shall furnish all labor, equipment and materials to design and provide a sacrificial anode cathodic protection system to protect all underground fuel piping installed under this Contract from corrosion. This shall include, but not necessarily be limited to, furnishing and installing all anodes, anode test stations, reference electrodes, wire and incidental items, and performing check out testing and providing written reports. The Contractor shall submit signed and sealed engineering drawings and detailed engineering specifications for the proposed system prepared by a Florida PE.
- B. The Contractor shall engage the services of a corrosion specialist, certified by NACE International, subject to approval by the Owner's Authorized Representative, to supervise the installation and testing of the specified cathodic protection system in connection with the jet fuel piping system installed under this Contract and as specified and shown on the Plans.
- C. The Contractor shall be responsible for the design, installation, performance testing and certification of all the cathodic protection work performed under this Contract.
- D. Cathodic protection shall be provided by means of a sufficient number and size of connected sacrificial magnesium anodes to provide a not less than 30 year protection period before external corrosion may begin to occur.

1.4 APPLICABLE CODES AND STANDARDS

- A. The work shall be performed in accordance with the latest requirements of laws and codes governing this work, including but not limited to:
 - 1. National, State and Local Laws, Regulations and Codes.
 - 2. National Electrical Code (NEC).

3. U.S. Department of Transportation Regulations for the transportation of liquids by pipeline: Parts 180 and 195, Title 49 of the Code of Federal Regulations (DOT).
4. NACE International - NACE Standard RP0169-96, Recommended Practice - Control of External Corrosion on Underground or Submerged Metallic Piping Systems.
5. National Electric Safety Code.

1.5 CATHODIC PROTECTION SYSTEM SPECIALIST QUALIFICATIONS

- A. The Cathodic Protection System Specialist shall be a firm regularly involved in corrosion control work on aircraft fueling systems on a full-time basis for a period of at least five (5) years, and shall submit to the Owner's Authorized Representative, before commencement of the work, the names and addresses of at least ten (10) clients for whom he has satisfactorily performed cathodic protection services of a nature similar to the work proposed to be performed under this Contract.
- B. That portion of the work, which involves the installation of the cathodic protection system and the testing thereof, shall be performed under the direct supervision of the certified corrosion specialist.
- C. An approved Cathodic Protection Specialist for this project is: Craig Meier, Corrosion Control Incorporated, 494 Fairplay Street, Rutledge, Georgia 30663, Phone 706-557-9624.

1.6 ACTION SUBMITTALS

- A. Installer's Qualifications: Verification of the cathodic protection installer's work experience and certification of the corrosion specialist shall be submitted in writing to the Owner's Authorized Representative for approval prior to commencement of the work.
- B. The Contractor shall submit ten (10) copies each of shop drawings and catalog cuts covering the following material:
 1. Chemical composition of anodes and lead wire material,
 2. Anode weight and total weight of anode package including backfill material.
 3. Reference electrode and lead wire material.
 4. Welding, coating and priming materials.
 5. Test station, shunt size and lead wire material.
 6. Electrical Isolation materials.
- C. After the installation is completed, the cathodic protection system shall be inspected and tested by the certified corrosion specialist provided by and at the expense of the Contractor. Tests shall be performed by taking pipe-to-soil potentials and anode current outputs at representative locations. Any deficiencies in the performance of the system revealed by the testing shall be corrected and retested until the system is performing as required herein. At the

completion of the testing, the Contractor shall provide certification(s) issued by the corrosion specialist certifying that the system is capable of performing to the full extent meeting the requirements of these Specifications. The Contractor shall submit to the Owner's Authorized Representative six (6) certified copies of the final report, including all data and analysis provided by the corrosion specialist, and "As-built" drawings of the installation. Such submittal shall show the accurate location of each test station and anode, pipe-to-soil potentials and anode output currents.

PART 2 - PRODUCTS

2.1 GENERAL

- A. All materials shall be the latest design, in new condition and the first quality standard product of manufacturers regularly engaged in the production of such materials. All materials shall be compatible and, where possible, be the product of one manufacturer.

2.2 ANODES

- A. Anodes shall be prepackaged magnesium high current output type, Maxmag or approved equal, each containing 40 pounds of galvanic (sacrificial) anode and having the following chemical composition:

Aluminum	0.003% Maximum
Manganese	0.8% Maximum
Zinc	0.002% Maximum
Silicon	0.002% Maximum
Copper	0.001 Maximum
Nickel	0.001% Maximum
Iron	0.025% Maximum
Other Impurities	0.005% Maximum
Magnesium	Remainder

- B. All galvanic anodes shall measure 3" x 3" x 60" (nominal size) and shall be cast with a perforated galvanized steel core. The weight of the core shall not exceed 0.10 pound per foot. One end of the anode shall be recessed so that one end of the strap is accessible for lead wire connection.
- C. The anode lead wire shall be fifteen (15) feet minimum in length and shall be No. 10 AWG 19 strand copper wire with Type THWN insulation, red in color. The lead wire shall be connected to the core with silver solder. The connection shall be mechanically secured before soldering, and shall have at least one and one-half turns of wire at the connection. The entire connection shall be insulated to a 600 volt rating by filling the anode recess with an electrical sealing compound.

- D. The galvanic anodes shall be packaged in a permeable cloth bag 6 inches diameter by 64 inches long, with inert backfill material, containing not less than a 65-pound mixture of:

Ground Hydrated Gypsum	75%
Powdered Wyoming Bentonite	20%
Anhydrous Sodium Sulphate	5%

- E. Backfill shall have a grain size such that 100% is capable of passing through 20 mesh screen and 50% through a 100 mesh screen. The mixture shall be firmly packaged around the magnesium anode within the cloth bag by means of adequate vibration so that the magnesium anode is completely surrounded with a minimum $\frac{1}{2}$ inch of backfill material. The combined weight of the anode including backfill and sacrificial galvanic anode materials shall be not less than 105 pounds.

2.3 ANODE TEST STATIONS AND REFERENCE ELECTRODES

- A. Anode test stations shall have a cast iron head capable of withstanding a minimum average load of 250 P.S.I., 8 inches in diameter, stamped yellow with "CP-Test" with a 6 inch O.D. by 24 inches long, non-metallic conduit, Model 668 with locking lid, as manufactured by C.P. Test Services, Inc. or approved equal. All anode test stations shall provide 7 terminals with nickel-plated brass hardware.
- B. A shunting bar shall be furnished for each test station.
- C. Each anode test station shall be provided with a 1 inch wide by 2-inch long 316 stainless steel tag. This tag shall have the test station number and associated structure stamped into the metal. Attach tag to anode lead wire inside test station.
- D. Copper to copper sulfate reference electrodes shall be of the permanent type designed for a 30 year life and an accuracy of ± 5 MV, and shall be Model UL-CUG-SW as manufactured by Electrochemical Devices, Inc., or approved equal. It shall be packaged in a cloth bag containing special low resistivity backfill.
- E. The lead wire shall be 50 foot long; No. 14 AWG stranded copper wire with HMWPE (High Molecular Weight Polyethylene) insulation, black in color.
- F. All lead wire connections to the anode test station terminal block shall be made using appropriately sized, tinned solid copper, ring tongue, solder less crimp-type connectors, Burndy "HYLUG" type YAV, or approved equal.
- G. Lead wire connections from the anode test station terminal block to the pipelines shall be No. 10 AWG 19 strand copper wire with RHW-USE insulation, black in color.

2.4 MONOLITHIC ISOLATING JOINTS

- A. Monolithic isolating joints shall be used to electrically separate the existing piping system from the new double-walled piping installed under this project. The monolithic isolating joint shall be manufactured of API 5 L grade B or X grade steel to match the adjacent piping diameter and wall thickness. The monolithic joint shall consist of two pipe pups and a forged or pipe steel body that is assembled and welded under a compression load. Isolation shall be accomplished by means of two G-10 or G-11 rings. A double pressure-sealing system consisting of nitrile rubber or silicone rubber forming a positive pressure seal shall be incorporated within the body of the isolating joint. A dielectric filler material shall be used between the isolating rings and in the external gap between the body and pipe pup of the joint. All monolithic isolating joints shall be pressure tested to 150% of the operating pressure and dielectrically tested at the factory.

PART 3 - EXECUTION

3.1 ANODES

- A. Anodes shall be installed as and where shown on the Plans.
- B. The cathodic protection system shall be installed prior to placing any fuel through the pipeline and the protective coating shall be repaired prior to testing the pipe as specified in SECTION 33 52 46.
- C. The Contractor shall install the anodes in a vertical position as shown on the Plans. The anode shall, unless otherwise shown on the Plans, be located below the pipe at a distance between the top of the anode and the bottom of the pipe of not less than 3 feet.
- D. Excavate hole to minimum 2 inches larger than the packaged anode diameter, to the depth indicated.
- E. Anode lead wire shall be installed in a trench; the lead wire shall be installed at a depth of not less than 24 inches. The trench bottom shall be smooth. Excavation and backfilling shall be as specified elsewhere in the Technical Specifications.
- F. The Contractor shall not lift or support the anode by the lead wire. Exercise care to prevent damage to cloth bag or lead wire insulation.
- G. Center the packaged anode in the hole and backfill with clean native natural sand soil materials in layers not exceeding 6 inches deep. Carefully tamp each layer to properly compact the backfill. When the backfill is level with the top of the anode, pour not less than five (5) gallons of water into the hole. The backfill material shall be completely saturated. Add additional backfilling material as necessary to compensate for soil shrinkage.
- H. The Contractor shall connect the anode's lead wire to the pipe on the topside after the pipe has been cleaned to bare metal by scraping, filing or other approved means. Connection of lead wires to underground pipe shall be made using a thermite brazing method applied in strict accordance with the manufacturer's published instructions and recommended procedures, and as shown on the Plans. Thermite brazing shall be accomplished using Cadweld CA-15 cartridges, or approved equal. The connection area shall be primed with Royston No. 747 primer

and covered with a Royston "Handy Cap", installed in accordance with the manufacturer's written instructions, and as shown on the Plans. Any damaged pipe coating, including its outer wrapping, shall be repaired as specified in SECTION 33 52 46.

- I. Place a 3-inch layer of select bedding material around lead wire in the trench. This select bedding material shall be clean native natural sand soil material obtained from the trench excavation in the immediate area only and shall be 100% passing No. 16 ASTM sieve. Carefully center lead wire in trench. Backfill over the wire, using select backfill material, shall be placed in layers not exceeding six inches deep and each layer thoroughly compacted. Tree roots, wood scrap, organic matter and refuse shall not be allowed in the backfill. Exercise care to avoid damaging the lead wire or its connections.
- J. The anodes may only be installed horizontally if such installation is specifically shown on the Plans or directed by the Owner's Authorized Representative in writing.

3.2 ANODE TEST STATIONS AND REFERENCE ELECTRODES

- A. Anode test stations shall be installed as and where shown on the Plans, complete with prepackaged copper-to-copper sulfate permanent reference electrode and anode.
- B. All permanent reference electrodes shall be installed horizontally in native soil, 6 inches below the bottom of the pipe and a minimum of 20 feet to the closest anode. The reference electrodes shall be backfilled with clean native natural sand soil material in layers not exceeding 6 inches deep. Backfill material shall be obtained from the trench excavation in the immediate area only and shall be 100% passing No. 16 ASTM sieve. Carefully tamp each layer to properly compact the backfill. When the backfill is level with the top of the reference electrode, pour not less than five gallons of water into the hole. The backfill material shall be completely saturated. Add additional backfill material as necessary to compensate for soil shrinkage.
- C. The Contractor shall install anode test stations in pavement or in concrete pads, as shown on the Plans.
- D. Lead wire connections from the anode test station terminal block to the pipelines shall be as described under paragraph 3.1H above.
- E. Lead wire connections from the pipelines to the anode test station terminal block shall be shown on the Plans.
- F. Lead wire connectors as described under paragraph 2.3F above, shall be installed using the proper crimping tools and in strict accordance with the manufacturer's instructions.

3.3 ENERGIZING AND TESTING

- A. The Contractor shall notify the Owner's Authorized Representative at least one week in advance of the test to permit arrangements for the presence of the Owner's Authorized Representative and/or airline representatives to witness such tests.
- B. After installation of the cathodic protection system the entire system shall be tested by the corrosion specialist, in accordance with the recommended procedures of

NACE International, to assure its proper operation.

- C. Testing shall include a determination of proper operation of anodes at all test stations and adequacy of test stations and insulating joints. Testing shall also include measurement of galvanic anode current output, measurement of pipe-to-soil potential and all tests deemed necessary to verify proper operation of the cathodic protection system.
- D. Upon completion of the tests, the corrosion specialist shall submit six (6) copies of the detailed report to the Owner's Authorized Representative recording and describing test results and deficiencies detected. Any and all deficiencies shall be corrected by and at the expense of the Contractor and retested prior to final acceptance.
- E. When directed by the Owner's Authorized Representative, interference tests shall be conducted by the Contractor's corrosion specialist, on structures and utilities not connected to the cathodic protection system and located within 25 feet of the fuel piping system.

3.4 TESTING OF INSULATED FLANGES AND JOINTS

- A. Each insulating flange and joint assembly shall be tested with an approved ohmmeter.
- B. Ohmmeter used shall have at least 20 megohms, full-scale deflection when using the meter's highest direct current (DC) resistance multiplier setting.
- C. Ohmmeter tests shall be made when flange assembly is dry using the highest multiplier setting and shall indicate infinity measured between each stud and both flanges.
- D. Each insulating flange assembly shall be field tested after installation and shall be tested not higher than the manufacturer's recommended voltage.

3.5 ISOLATION OF CONDUITS AND OTHER POTENTIAL LOCATIONS FOR SHORTS

- A. Provide isolation of conduits and other metallic components to remove any possible path of shorting the cathodic protection system to ground.

END OF SECTION 13 47 13

SPECIFICATIONS (Continued)

**ATTACHMENT "C"
SPARE PARTS LISTS**

DESCRIPTION	PART NUMBER (Schindler O.E.M.)	MIN. QUANTITY REQUIRED
100VDC RELAY	700HC14Z14	15
110VDC RELAY	MY4Z1N	1
120 VAC RELAY	X45GS10H34	5
120VAC RELAY	KUP14A5120	5
2" RETURN HOSE HYDRO	6994C59G23	1
24VAC RELAY (ICECUBE 3PDT)	X45GS10H33	5
25 KW MG ARMATURE	2633C39G04	1
3" HALL LANTERN LENS	A-472A	20
330A DOOR DRIVE BELT	693B415H01	2
330A DOOR TIMING BELT	7268C09H06	1
330A DRIVE SHEAVE	693B44H01	1
330A HALL LANTERN LENS	7028C38H01	2
330A HALL PB	7028C46H01	2
330A HALL PB BACE	7028C47G01	2
330A LANDING SENSOR OPTICAL	1299D72G01	1
330A LH DOOR BLOCK ASSY	6997C32G02	2
330A SHEAVE SMALL	962087	1
38 MACHINE GASKET	144A524H01	1
38 MACHINE GASKET	215B690H01	1
38 MACHINE GASKET	7252C25H13	6
48VDC RELAY	25812D200	10
6B RELAY CONTACT FINGER	W216C1	10
6-B-CONTACTOR ARMITURE ASSY	M4523G01	8
9300 COMPLATE SWITCH LH	SMR405031	1
9300 COMPLATE SWITCH RH	SMR405032	1
9300 DUAL DRIVE VFD	SPECIAL	1
9300 OILER ASSY	SMS312445	1
AC MOTOR 10HP 230/460	5191D54H01	1
AC UNIT (ELEVATOR-LIFTAIRE)	6531B692	1
ACCESS KEY SWITCH 501CH	8544C29H09	1
ACCESS PLATE UP/DOWN	693B348H02	1
ACUMNA 2.Q PCB ASSY	225038	1
ACUMNA BRD 3.Q	225402	1
ADAMS 2POS SWITCH 1NO 1NC #2	AS468S2	1
ADAMS ALARM BELL 6" 6VDC	A915A1	1
ADAMS EMERGENCY LIGHT KIT	A911	1
ADAMS FIRE SERV RECALL SWITCH 2PULL	AS469K14	1
ADAMS PB ASSY BLANK	ASA452CLBL	1
ADAMS SERV DPDT SWITCH 2PULL	AS468J23	1
ADAMS SERV FLOOR DISC AE102 KEY	AS469K17	1
ADAPTER	7285C81H07	2
AIRPORT TERMINAL	SPECIAL	1
ALARM BELL 6" WHEELLOCK 115 VAC	P10352 2801	1
ALARM BELL PUSH BUTTON	SPECIAL	1
ALARM PUSH BUTTON	AS480W#	1
ANTISTATIC BRUSHES	SMH318221	10
ANTRIEBSWELLE B (M/W BULLGEAR)	SCK388232E	1
ASIBNA 1.QC PCB ASSY	222536	2

SPECIFICATIONS (Continued)

DESCRIPTION	PART NUMBER (Schindler/O.E.M.)	MIN. QUANTITY REQUIRED
ASIBNA 2.QA PCB ASSY	224317	2
ASIBNA 3.Q PC BRD	225435	1
ASILOG 3.Q PC BRD	590867	2
ASILOG 3.Q PC BRD	591610	1
ASTERICAL	618A595H01	1
ASTERICAL	682A101H46	1
ASTRICAL	682A101H01	5
ASTRICAL	A853A	5
ASTRICAL #122	A853T2	5
ASTRICAL 9' LENGTH	681A595H01	1
ASTRICAL ADAMS #112	A853M	1
ASTRICAL, ADAMS #121	A853T1	5
AUX CONTACT	A101H46	2
AUX CONTACT	DIL04	1
AUX CONTACT (WARD/LENARD) LINE STA	5672	2
AUX CONTACT CA5-13M	51511373	2
AUX CONTACTOR	DILA-XH122	1
AUX CONTACTOR	DILR31	2
AUX CONTACTOR BLOCK NC	345425	2
AUX CONTACTOR BLOCK NO	345426	2
AUX CONTACTOR CUTLER HAMMER	C320KGT10	1
AUX CONTACTOR K1-07D31 9300	NEA462657	2
AUX CONTACTOR K2-07D40	345453	2
AUX. CONTACTS SIEMENS	3RH19212FJ22	2
AUX. CONTACTS TOP MOUNT CUTLER-HAMMER	C320KGT3	1
AUXCONTACTOR DILER 40G 24V	345457	2
AUXFHNA 2.Q	225004	1
AXLE	SWS241273	5
AXLE (SERVICE)	STS437472	5
AXLE BUSHING	691B783H01	50
AXLE CLAMP	SMS244109	1
AXLE ROLLER	WE974W2	25
AXLE STEP MOD 250 2/BEARING	5191D44H04	20
B1 STEP COMPLETE (REFURBISHED)	1727C53G02	5
BANNER LANDING SYSTEM RK5	223357	2
BANNER MINI BEAM 25964	692B409H01	5
BATTERY 12 V3AH	PM1230	10
BATTERY 6V	BB6200	1
BATTERY 6V POWER SONIC	PS-670-F1	5
BATTERY 7.2V 300mAh	RP700110	1
BATTERY ADAMS 6V NP10-6 RECHARGABLE	A911X3	1
BATTERY CHARGER	222560	1
BATTERY CHARGER NYLUBE	NYLUBE	2
BATTERY HOLD DOWN BRKT	A91114	5
BATTERY PACK ALKALINE	100178	5
BDC 1.Q PCB ASSY	224379	2
BEARIBG	6314 2RS JEM	2
BEARING	6313	2
BEARING	751195	1
BEARING	210PP	2
BEARING	62032-RS JEM	60
BEARING	62042-RS JEM	55

SPECIFICATIONS (Continued)

DESCRIPTION	PART NUMBER (Schindler / O.E.M.)	MIN. QUANTITY REQUIRED
BEARING	6306 2Z RC3	2
BEARING	6310 2RS JEM	1
BEARING	7313 BEGB4	10
BEARING	60032RSJEM	1
BEARING	6203ZC3	1
BEARING	6954C42H22	1
BEARING	6309 2RS JEM	1
BEARING	C213	1
BEARING TXR5 -A4	6311-2RS/P63	2
BEARING (M/W HR DRIVE SHAFT)	750820	2
BEARING 38 MACHINE SLEEVE BEARING	626D318H02	1
BEARING 6205	X18BS3H62	1
BEARING 6206-RS	X18BS3H67	2
BEARING 6212-2RS	X18BS2H32	1
BEARING 6213-2Z	X18BS1H18	1
BEARING 6215-RS	X18BS3H68	2
BEARING 6312-2Z	X18BS3H56	2
BEARING ASSY	SMH898844	30
BEARING KIT OGURA BRAKE	RP08002 H24	5
BEARING NTN	6209ZZC3/EM	3
BEARING SELF ALIGN 22215C-E	X18ES1H15	2
BEARING SELF ALIGN 22215-W33-SS	X18RS1H01	4
BEARING SKF	7409BCBM	2
BEARING TIMKEN ROLLER LM11949	X18DS2H37	2
BELT 3VX530	GRAINGER	2
BELT 3VX710	GRAINGER	10
BELT 3VX500	9412-0500	10
BELT 4L-4402440	GRAINGER	4
BELT 4L-450	GRAINGER	4
BELT GAL 15YO5 (058K)	GRAINGER	1
BELT 7"8 1/4" GV W/3/8" STUD EACH END	144A600H32	1
BELT 9350	144A416H03	1
BELT G FLAT WESTING.HOUSE	144A17 02	1
BELT G FLAT WESTING.HOUSE	144A600H-13	1
BELT G FLAT WESTING.HOUSE	144A600H-15	1
BELT GROVED V 3UX600	2L392G	4
BELT GROVED V 3VX560	2L391G	4
BELT HY-T-WEDGE 3V670EVN	5.27832E + 11	5
BOARD	A46221	1
BOARD	P24170	1
BOARD	P24172	1
BOARD BOX MARKED S-21	PCB-062-C	1
BOARD BOX MARKED S-21	PCB-067-A	1
BOARD CHIME BOARD	ACH024	3
BOARD CHIME BOARD (WESTINGHOUSE)	998C150H11	3
BOARD AGBT W/GA	222519	3
BOARD BRD	998C275H11	4
BOARD BRD	998C274H11	1
BOARD CEDES	102756	1
BOARD DCM	7285C21G01	2
BOARD DPB	998C164H13	1
BOARD DPB	998C164H12	1

SPECIFICATIONS (Continued)

DESCRIPTION	PART NUMBER (Schindler/O.E.M.)	MIN. QUANTITY REQUIRED
BOARD LWC	998C219H22	1
BOARD MCE (FOR S-16)	MOTION CONTROL	1
BOARD MCI-F	SY387600R	2
BOARD MIO	998C246H12	1
BOARD PEM	SY590810	2
BOARD PIB	998C245H12R	3
BOARD PIOIGHC	220475	1
BOARD RTM	7286C37G01	1
BOARD SETSDL	225881	2
BOARD STDC	7252C08G01	1
BOARD CIO	998C247H14	1
BOARD HPBHNA	222837	5
BOARD Y-DELTA	478C315G01	2
BOTTOM L/H TURNAROUND	5191D51G06	2
BOTTOM R/H TURNAROUND	5191D51G05	2
BRACKET STEADY BRACKET MOD 250	CUSTON MADE	2
BRAILLE 1 1/2X3/4 DOOR CLOSE W/STUD	C075150S9	1
BRAILLE 1 1/2X3/4 DOOR OPEN W/STUD	C075150R	1
BRAILLE 1 1/2X3/4 W/STUD #3R	C075150S9	1
BRAILLE 1 1/2X3/4 W/STUD #4	C075150S9	1
BRAILLE 1 1/2X3/4 W/STUD #5	C075150S9	1
BRAILLE 1 1/2X3/4 W/STUD #7	C075150S9	1
BRAILLE 2 1/2X3 1/2 W/ADHEASIVE 2	HP2	1
BRAILLE 2 1/2X3 1/2 W/ADHEASIVE 3	HP2	1
BRAILLE 2 1/2X3 1/2 W/ADHEASIVE *1	HP2	1
BRAILLE 2 1/2X3 1/2 W/ADHEASIVE & PINS 1	HP2	1
BRAILLE 2 1/2X3 1/2 W/ADHEASIVE & PINS G	HP2	1
BRAILLE 2 1/4X 2 1/4 BRONZ EM PHONE	Signs & Simb.	1
BRAILLE 2 1/4X 2 1/4 SS EM. PHONE	J238238	1
BRAILLE 2 3/4X 2 3/4 W/ADHEASIVE 5	J275-275	1
BRAILLE 2 3/4X 2 3/4 W/ADHEASIVE 6	J275-275	1
BRAILLE 2 3/4X 2 3/4 W/ADHEASIVE 9	J275-275	1
BRAILLE 2 3/4X2 3/4 SS EM PHONE	J275-275	1
BRAILLE 3/4X1 1/2 BELL W/STUD	C075150S9	1
BRAILLE 3/4X1 1/4 DOOR CLOSE	C075113R	1
BRAILLE 4"X3" SS W/ADHESIVE * 1	J400400#	1
BRAILLE 4"X3" SS W/ADHESIVE 10	J400400#	1
BRAILLE 4"X3" SS W/ADHESIVE 11	J400400#	1
BRAILLE 4"X3" SS W/ADHESIVE 2R	J400400#	1
BRAILLE 4"X3" SS W/ADHESIVE P1	J400400#	1
BRAILLE 4"X3" SS W/ADHESIVE P2	J400400#	1
BRAILLE 4"X3" SS W/ADHESIVE P3	J400400#	1
BRAILLE 4"X3" SS W/ADHESIVE P4	J400400#	1
BRAILLE 4"X3" SS W/ADHESIVE T	J400400#	1
BRAILLE 4"X4" SS W/ADHESIVE 10	J400400#	1
BRAILLE 4"X4" SS W/ADHESIVE 11	J400400#	1
BRAILLE 4"X4" SS W/ADHESIVE 2	J400400#	1
BRAILLE 4"X4" SS W/ADHESIVE 3	J400400#	1
BRAILLE 4"X4" SS W/ADHESIVE 4	J400400#	1
BRAILLE 4"X4" SS W/ADHESIVE 5	J400400#	1
BRAILLE 4"X4" SS W/ADHESIVE 6	J400400#	1
BRAILLE 4"X4" SS W/ADHESIVE 7	J400400#	1

SPECIFICATIONS (Continued)

DESCRIPTION	PART NUMBER (Schindler/O.E.M.)	MIN. QUANTITY REQUIRED
BRAILLE 4"X4" SS W/ADHESIVE 8	J400400#	1
BRAILLE 4"X4" SS W/ADHESIVE 9	J400400#	1
BRAILLE 4"X4" SS W/ADHESIVE R2	J400400#	1
BRAILLE 4"X4" SS W/ADHESIVE T	J400400#	1
BRAILLE 4"X4" SS W/ADHESIVE *1	J400400#	1
BRAILLE 4"X5" SS W/ADHESIVE *R1	J500400#	1
BRAILLE 5 1/4X9 3/4 IN C/Fire Elev. O.O.S w/stud	ACV0075	1
BRAILLE 5 1/4X9 3/4 IN C/Fire Elev. O.O.S wo/stud	ACV0075	1
BRAILLE CAP PB ROUND 2	65X21P99 - 2-	1
BRAILLE CAP PB ROUND 3	65X21P99 -- 3	1
BRAILLE CAP PB ROUND 4	65X21P99 -- 4	1
BRAILLE CAP PB ROUND P1	65X21P99 -- P1	1
BRAILLE CAP PB ROUND P2	65X21P99 -- P2	1
BRAILLE CAP PB ROUND P3	65X21P99 - P3-	1
BRAILLE CAP PB ROUND P4	65X21P99 -- P4	1
BRAILLE CAP PB ROUND R1	65X21P99 -- R1	1
BRAILLE CAP PB ROUND R2	65X21P99 -- R2	1
BRAILLE CAP PB ROUND DC	65X21P99 -- DC	1
BRAILLE CAP PB ROUND D0	65X21P99 -- D0	1
BRAILLE CAP PB ROUND STAR	65X21P99 -- STAR	1
BRAILLE CAP PB ROUND STAR 1	65X21P99 -- STAR 1	1
BRAILLE CAP PB ROUND T	65X21P99 -- T	1
BRAILLE CAP PB ROUND ALARM BELL	65X21P99 -- ALARM	1
BRAKE (CONTROLLED STOP) WARNER	2898C83G03	2
BRAKE BAND ASSM.	SCT392556	1
BRAKE BAND CPL	SHT241010	3
BRAKE LIFTING SOLENOID	NAA298465	2
BRAKE MOD 250 AL-10-40	EDAL-6K	2
BRAKE MOTOR	RU73886	1
BRAKE MOTOR LKS	SDT437144	2
BRAKE MOTOR PINION ASSM	SWT242009	3
BRAKE PLUNGER	144A523G01	7
BRAKE PLUNGER LEATHER/FELT	X6LS1H19	10
BRAKE SW AASSY 38 MACHINE	WMP18	1
BRAKE SWITCH BRACKET(PROX)GRD	7254C56H04	30
BRAKE SWITCH CABLE	WKB3T-0.5/S105	2
BRAKE SWITCH EPIC GT/LESS	7265C13G01	1
BRAKE SWITCH(PROX SWITCH N/O) GRD MACH	7254C56G02	10
BRAKE WARNER CONDUIT BOX W/HARDWARE	52000101010	1
BREATHER	692B273H01	2
BRUSH (1/6 HP MG DOOR MOTOR)	7431C95H18	10
BRUSH 8" SCRUB 3U781/ 44416H	3U781	2
BRUSH CAP FOR BALDOR TACH	X38ES6H77	4
BRUSH TRICO 2"	2637C34H14	10
BULB	X46EAS1H03	5
BUMPER	X11HS1H01	5
BUMPER (GAL)	G30B1	5
BUSHING	866A291H01	1
BUSHING	X11KS1H02	1
BUSHING	X11KS1H05	1
BUSHING	X11KS1H07	1
BUSHING	X11KS1H11	1

SPECIFICATIONS (Continued)

DESCRIPTION	PART NUMBER (Schindler/O.E.M.)	MIN. QUANTITY REQUIRED
BUSHING BRAKE PLUNGER 38E MACH	R8757H01	1
BUSHING PLASTIC NYLINER 3/8" ID	7284CIH30	1
BUSHING STEP (SLOTTED)	SDS315221	1
BUSHING(ez operator) 20272	5207D42H21	1
BUSINESS PLAN	SPECIAL	1
BUTT HALO	AS480-BL	1
BUZZER 120 VAC	196C493H04	1
BUZZER 24 VAC	5065A10H01	1
BUZZER 24 VDC	865A445H01	1
BUZZER 24 VDC	CS21261	2
CAB FAN (NYLUBE)	A725	1
CAM WESTINGHOUSE	216B311G05	4
CAPACITOR FAN TXR5	431027	2
CAR GUIDE ASSY FOR BUSHING	K1763G04	5
CAR GUIDE ROLLER 3 3/8"	EC18405	2
CAR GUIDE ROLLER 3"	W409S	2
CAR GUIDE ROLLER ASSY 3"	7876209289	8
CAR GUIDE ROLLER 4 1/2" W/HOUSE	W4115	4
CAR GUIDE ROLLER 6" RUBBER	323C160G01	4
CAR GUIDE ROLLER ASSY 6"	627D989G01	2
CAR GUIDE RUBBER BUSHING	144A237H02	2
CAR GUIDE RUBBER BUSHING	K5212H05	1
CAR SLIDE GUIDE ASSY	766OC58H03	4
CAR SLIDE GUIDE SCREWS	X5551H12	10
CAR SLIDE GUIDE SHOE	766OC58H02	4
CARBON BRUSH	IMP-46	12
CARBON BRUSH	IMP-59	8
CARBON BRUSH	IMP-34	12
CARBON BRUSH	LRS-2	25
CARBON BRUSH	LRS-44	25
CARBON BRUSH	LRS-9	10
CARBON BRUSH	LRS-90	25
CARBON BRUSH	OE191	25
CARBON BRUSH	LRS-21/121	5
CARBON BRUSH	EG332	5
CARBON BRUSH	LRS20	5
CARBON BRUSH	LRS-85	5
CARBON BRUSH	X38R73B	5
CARBON CONTACT	W50C	25
CARBON SPRING BRUSH HOLDER	460	5
CARBON SPRING BRUSH HOLDER	RE53.08	5
CARBON SPRING BRUSH HOLDER	WE11A	5
CENTER COMBFINGER SECTION	626D315H19	50
CERTIFICATE FRAME 6"X9"	CFS6090	1
CHAIN 9300 CONNECTOR LINK	SMS405123	4
CHAIN 9300 STEP CHAIN (1-3)	PO# 22043	1
CHAIN DOOR OPERATOR	GL915H1	1
CHAIN DOOR OPERATOR U-BOLT	GL915W	5
CHAIN LINK	741492	4
CHAIN LINK H/R DRIVE	741490	4
CHIME BOARD	692B927H01	2
CHIME BOARD	CETG024BF1	1

SPECIFICATIONS (Continued)

DESCRIPTION	PART NUMBER (Schindler/O.E.M.)	MIN. QUANTITY REQUIRED
CHIME BOARD	A925R	1
CHIME BOARD EPCO 125AC/DC	SA130-VZXX	1
CIO PC BOARD	998C247H12	1
CIOACD 330A 2Q PCB ASSY	225825	2
CIOHNA 2.Q PC BRD	224476	1
CIRCUIT BREAKER 240V ABB	212323	1
CIRCUIT BREAKER FAZG4-CAN	328550	2
CLASSIC DOOR CLOSE FRONT	AS480W#	1
CLASSIC DOOR OPEN FRONT	AS480W#	1
CLASSIC DOOR OPEN REAR	AS480W#	1
CLEAR PB CAP	AS480WBL	15
COIL	X19BBS1G16	3
COIL ECCO VALVE	196C148H14	5
COIL ECCO VALVE 110VDC	196H148H02	2
COIL ES RELAY	X19BGS1G21	5
COIL MAXTON VALVE 115 VDC	5063A40H01	5
COMBFINGER END FILLER (R)(YELLOW)	SMR898743	5
COMBFINGER END FIL LER (L)(YELLOW)	SMR898744	8
COMBFINGER SIDE	626D315H19	25
COMBFINGER SWE / 9300 (Yellow)	SMR313283	50
COMBTEETH (CONTINUOUS)	SFR390543Y	25
COMBTEETH (END)	SFR390542Y	25
COMPACT PALLET 1000MM	SFS390221	25
CONNECTING PIPE	SUS496193	5
CONNECTOR 10 PIN FEMALE	X48ADS5H30	20
CONNECTOR 10 PIN MALE	X48ACS7H56	20
CONNECTOR 12 PIN MALE	X48ADS5H35	5
CONNECTOR 16 PIN	X48ACS4H18	5
CONNECTOR 20 PIN FEMALE	X48ACS7H57	1
CONNECTOR 20 PIN FEMALE	X48ADS5H34	5
CONNECTOR 24 PIN	X48ACS1H06	5
CONNECTOR 4 PIN MALE	X48ADS5H26	5
CONTACT / STARTER	S626B187G13	2
CONTACT / STARTER KO46	S626B187G17	1
CONTACT / STARTER S & S	22.105.212-03	1
CONTACT / STARTER SIZE 2 1/2	3151	1
CONTACT ASSY MAIN S1ZE 2 JOSLYN CLARK	95M573	1
CONTACT ASSY THREAD	W221	1
CONTACT ASSY ANGLE	W226A	6
CONTACT ASSY LINE STARTER SIZE 2	5406C86H38	1
CONTACT ASSY TXR5 (CA5-22E-AU)	222987	4
CONTACT BLOCK	US46B	10
CONTACT BLOCK (LA1KN22)	220760	1
CONTACT BRIDGE (6B CONTACTOR)	K4277G01	10
CONTACT KIT BH579N301	HA-100-A9	1
CONTACT KIT K751	CH6-43-2	1
CONTACT KIT K757	CH6-65-17	4
CONTACT MOVABLE FOR POWER DOOR OP	W848	2
CONTACTOR	DILA-40	2
CONTACTOR	DILR40	2
CONTACTOR 3P K2-23A10	345450	2
CONTACTOR 3P K2-45A10	345452	2

SPECIFICATIONS (Continued)

DESCRIPTION	PART NUMBER (Schindler/O.E.M.)	MIN. QUANTITY REQUIRED
CONTACTOR 3P K2-60A00 110	345470	2
CONTACTOR 6B3	465D066G09	1
CONTACTOR A22-A199	345451	2
CONTACTOR ABB	A-26-30-01	2
CONTACTOR RESISITOR	419000	2
CONTACTOR S&S	CA77200	1
CONTACTOR S&S 110V50/120V60	CA74300	1
CONTACTOR SEIMENS 3RT-1026-3AK60	CLQ9810	2
CONTACTOR SIEMANS	3RT10463A	1
CPB AUX	223200	1
CRIPHNA 330A 5.0A W/O AC RELAY	225725	2
CRIPHNA 5.0	225733	1
CUTTIN RING 0 4MM	854047	25
CUTTIN RING 0 6MM	854048	25
DECKING TRIM 5"	SVC319892	2
DECKING TRIM 8"	SVC319891	2
DECKING TRIM LH 12"	SMV312736	2
DECKING TRIM RH 12"	SMV312737	2
DECODER	BCE24	1
DIDODE	X45ADS2H08	4
DIGITAL DISPLAY	RZART	1
DIRECTION ARROWS RAISED	1718C85G01	1
DIRECTIONAL ARROW	1103066	1
DIRECTORY DISPLAY LED RED	10L26P05	1
DIRECTORY DISPLAY LED RED	A9331900003	1
DIRECTORY DISPLAY LED WHITE	10L26P01	1
DIRECTORY DISPLAY LED WHITE	A9331250000	1
DIVERTER CHAIN 12 ROLLER	SEH498347	10
DIVERTER CHAIN 15 ROLLER	SCH409585	10
DOOR KEY GAL	G840	1
DOOR KEY GAL	G841	1
DOOR KEY OTIS 2 SECTION DOOR KEY	O825A	1
DOOR MOTOR 1/3HP 180V 1725RPM	7283C05H02	1
DOOR MOTOR 1/6 hp 180VDC, 1150 RPM	692B863G01	1
DOOR MOTOR 1/6 hp 24vdc	5208D74H88	1
DOOR MOTOR HG&MG 1/4HP 230VDC	7431C95H13	1
DOOR MOTOR PHC 1/6HP 125VDC E4 OPER	681A554H01	1
DOOR OPEN	SPECIAL	5
DOOR OPERATOR CHAIN SPROCKET	5203D66H14	1
DOOR ROLLER	W417M	5
DOOR ROLLER W/SHAFT 3 1/4	MX410	10
DOOR/SS GUIDE FOR ASTRICAL	SPECIAL	10
DOOR/SS SIGHT GUARD	SPECIAL	1
DPI PC BOARD	998C198H12	1
DRIP PAN CONNECTORS	SPECIAL	50
DRIVE BLOCK ASSY W/HOUSE	628D408G01	2
DRIVE CHAIN 2 PR ORDER (POLY CHAIN)	2648C02G01	2
DRIVE MOD 250	7196D16G08	1
DRIVE MOTOR 7.5HP	2630C55H01	1
DRIVE SHAFT M/W	SCH437468	2
DS CONTACTOR	DIL OAM	2
EBCM PC BOARD	998C210H24	2

SPECIFICATIONS (Continued)

DESCRIPTION	PART NUMBER (Schindler/O.E.M.)	MIN. QUANTITY REQUIRED
EBCOM68 ASSY	222923	1
EBLON2 ASSY	222970	2
ECCENTRIC ROLLER ASY	7263C05H01	35
ECI BEARING	1000-2003	10
ECI PICKUP ROLLER	5226D09H18	10
ECI RELEASE ROLLER ASSY	5226D09H20	5
EDGE CABLE	434829	1
EM LIGHT 10 5/8"X 4 5/8"Elev Prod Co	1001-43-00	1
EM LIGHT 4 1/4 X 2 1/8 LENS	SPECIAL	1
EM LIGHT LED ILLUMINATOR 24 VAC 6W	SME438517	3
EMER STOP COVER	7431C23H01	1
EMER STOP SW ASSY	6947C64G01	2
EMER STOP SW ASSY	6947C64H02	1
EMER STOP BLOCK ASSY	692B013G01	2
EMER STOP BLOCK LH	692B013H06	2
EMER STOP BLOCK RH	692B013G02	2
EMER STOP DOOR SPRING	692B013H04	1
EMER STOP STEEL PIN	865A206H08	2
EMER STOP TUBING	865A206H09	4
EMERGENCY BATTERY KIT (NYLUBE)	EL-22502-KMW	2
EMERGENCY LIGHT POWER SUPPLY	A911A	1
EMERGENCY POWER PACK 6VDC 1A W/BELL	10M44G02	1
ENCODER	6997C39H01	2
ENCODER COUPLER	866A511H02	1
ENCODER OPTICAL HW-206 GOVERNOR	692B997H05	2
ENCODER OPTICAL HW-209 GOVERNOR	692B997H06	2
ENCODER SHEVE LARGE 330-A	962718	1
EPOCH II FIBER ASSY	7431C10G01	1
ERB PC BOARD	998C110H12	2
ERL REGULATOR ASSY	1718C08G01	1
ES RELAY	W250S5	4
ES RELAY CONTACT	W250S3B	4
ES RELAY CONTACT BLOCK	T9560	4
ES RELAY SPACER	W250L2	28
ESC TOOL	TD325G01	1
ESC. ROLLER	SDS242073	4
ESCALATOR ANTI SLIDE GUARD 1 15/16"	SPECIAL	2
ESCALATOR ANTI SLIDE GUARD 2 7/16"	SPECIAL	2
ESCALATOR BUSHING	691B783H01	50
ESCALATOR CEILING DEFLECTOR	SCV315283	2
ESCALATOR CHAIN OILER ASSY	7263C73G01	4
ESCALATOR H/R ENRTY BOOT	SCV468251	5
ESCALATOR PINCH GUARD	SCV315282	4
ESCALATOR S/BRUSH END CAP SET	RO27B0T003P	15
ESCUTCHEON	WDO-57A	20
ESCUTCHEON SS & TAPE 4 1/2"	SPECIAL	2
ESP 902 SERIAL SERVER	SPECIAL	4
ESS RELAY ASSY	320C942G04	2
ETSDL PC BOARD	998C206H12	2
EXTENSION CABLE 3M 330 HYDRO EDGE	104195	2
EYE BOLT HW 90-8	7252C37H03	2
E-Z OPERATOR BELT 4L550 (QKS 14,15)	5207D42H46	2

SPECIFICATIONS (Continued)

DESCRIPTION	PART NUMBER (Schindler/O.E.M.)	MIN. QUANTITY REQUIRED
E-Z OPERATOR BELTS 4L680 SET	5207D42H47	10
EZ-OPERATOR HANGER ROLLER	694B995H01	10
FAN	223666	1
FAN (TWO SPEED)	X12F9 (1500)	1
FAN RK5	223680	2
FAN RK5	418789	1
FCB PC BOARD	225094	8
FER SIGN CAR W/HOLD #4SS	74660C49H01	2
FERRUEL W/SPEED NUT	W459F	10
FINGER BOARD (WESTINGHOUSE)	W228	8
FIRE SERVICE SWITCH	AS468K13	8
FIRE SWITCH, ADAMS	AS468K09	5
FIXING SPRING FOR H/R PAD	SDH392124	25
FIXING WASHER	1000-2032	5
FLANGE BEARING	5207D42H58	2
FLEX COUPLING	866A626H01	3
FLOOR CONTOL BOARD MTG BKT	SPECIAL	2
FREEWHEEL (BRAKE MOTOR CLUTCH)	739403	1
FREIGHT (PEELE) DOOR CHAINS	SPECIAL	2
FREIGHT DOOR ACESS KEY BOX	AUE5	1
FREIGHT DOOR RODS 42"	SPECIAL	2
FREIGHT SIGNS (FREIGHT ONLY)	A556	1
FREIGHT STEEL GATE GUIDE W/PLASTIC INSERT	O258	4
FREIGHT STEEL GATE GUIDE WO/PLASTIC INSERT	O239	5
FRICTION WHEEL	SCH310676	2
FRICTION WHEEL HUB (DRIVE DISK)	SCH394074	10
FUSE 125 A-125 V	X52BAS1HO5	5
FUSE PICO 3A	X52BAS1HO1	5
FUSE , BUSS FUSE	NON 10 250 VAC	5
FUSE BUSS FUSE HOLDER	BM6031SQ	5
FUSE BUSS FUSE HOLDER	BM6032SQ	2
FUSE BUSS FUSE HOLDER	BM6033SQ	5
FUSE FUSETRON RK5	FRS- R-30 600 VAC	1
FUSE FUSETRON 20A 250V	FRNR20	2
FUSE GOULD-TRI-ONIC RK5	TRS 1 8/10R 600 VAC	1
FUSE GOULD-TRI-ONIC RK5	TRS 20R 600VAC	1
FUSE GOULD-TRI-ONIC RK5	TRS 60R 600VAC	1
FUSE GOULD-TRI-ONK RK5	TRS45R 600 VAC	1
FUSE LITTLE FUSE RK5	FISR-30 600 VAC	1
FUSE LITTLE FUSE RK5	FISR 150AQ 600V	1
FUSE LITTLE FUSE TIME/DELAY	110 A RK5 FUSE	1
FUSE MICRO	X52AS1HO4	1
FUSE SOCKET 58390	2174C33H05	1
FUSE, BULLET RK5	ECNR 40 250 VAC	1
FUSE, BULLET RK5	ECSSR 25 600 VAC	1
FUSE, BUSS FUSE	NES 10A 600V	1
FUSE, BUSS FUSE	NON 12 250 VAC	1
FUSE, ECO FUSE	ESO 100 600 VAC	1
FUSE, LITTLE FUSE	FLRS 100 600 VAC	1
FUSE, LITTLE FUSE	L255-1-A-250 VAC	1
FUSE, LITTLE FUSE RK5	FIRS 60A 600 VAC	1
FUSE, LITTLE FUSE (INCIDATOR) RK5	FLRS 100 600 VAC	1

SPECIFICATIONS (Continued)

DESCRIPTION	PART NUMBER (Schindler/O.E.M.)	MIN. QUANTITY REQUIRED
FUSE, LITTLE FUSE (INCIDATOR) RK5	FLRS 70 600 VAC	1
FUSE, LITTLE FUSE (INCIDATOR) RK5	FLRS 90 600 VAC	1
FUSE, LITTLE FUSE NLS15 600V 15A	681A556H16	1
FUSE, SHAWMAL K5	OTS 100 600 VAC	1
GAL FLAT WASHER	5203D67H29	25
GAL BEARING	5203D67H28	50
GAL BEARING	5203D66H28	5
GAL CAM ASSY	693B501G01	4
GAL CLUTCH SHORT STOP BAR	7284C21H31	2
GAL DOOR LOCK AND PICK UP ASSY	GL902M2	1
GAL HANGER SHEVE ASSY L/H	7263C05H24	2
GAL HANGER SHEVE ASSY R/H	7263C05H25	2
GAL INTERLOCK ASSY LH	G810A2	1
GAL KEEPER ASSY	G812A2	2
GAL KEEPER BRIDGE BLOCK	G812C1	25
GAL MO INTERLOCK L/H	LH6951C64H20	2
GAL MO INTERLOCK R/H	RH6951C64H19	2
GAL MOVING CONTACT	G830C2	8
GAL RELEASE ASSY RH	5226D09G01	4
GAL RETRACTING VAIN	GL916A3	4
GAL UPTHURST ROLLER	GL928K	2
GAL WIPER ASSY	G401W	50
GAL-G CONTACT KIT	G810C2	4
GAL-G CONTACT KIT	G810C1	5
GAL-G CONTACT KIT BASE W/ BRIDGE BLOCK	G810K2	10
GASKET CORK 4.50WX7.00X125T	R5027H03	4
GATE ROLLER WESTINGHOUSE	GL-945-R	5
GATE SWITCH CONTACT HY/HC	SH 81A2	3
GATE SWITCH HOUSING	GL-945-H	2
GATEKEEPER	A850EZ159	1
GATEKEEPER	A850G7	1
GATEWAY2 PCB FOR TXR5	222925	2
GAUGE	865A066H01	2
GCIO 360 PCB	590862	2
GEAR 15T	SPECIAL	2
GEAR 24T	SPECIAL	1
GEAR BOX MOVING WALK MODEL 160	SMT244938	1
GEAR BOX OUTPUT GEAR (17T)	SPECIAL	1
GEAR BOX OUTPUT GEAR (23T)	SPECIAL	1
GEAR HAND RAIL DRIVE (32T)	SMK405151	1
GEAR SPLIT (30T)	SR360805	1
GEAR/ BULL GEAR (36T)	STK437464	1
GIB ASSY / BLUE	A908B	20
GIB ASSY / GREEN	A908G	10
GIB ASSY / WHITE	A908W	4
GIB LINER NYLON	146A636H01	10
GIBB BRACKET	146R745H10	10
GIBB BRACKET	693B336G02	20
GIBB SHIM (5 HOLE)	5061A10H01	25
GOV PIN FLYWT PIVOT B5 GOV	694B956H01	2
GOV PIN (FLYWT LINK PIVOT B5 GOV	145A587H01	2
GOV PIN TRIP LEVER PIN B5 GOV	694B955H01	2

SPECIFICATIONS (Continued)

DESCRIPTION	PART NUMBER (Schindler / O.E.M.)	MIN. QUANTITY REQUIRED
GOV PINS	695B044H02	2
GOV PINS	2301CS190	2
GOV PINS (FLYWT)	145A514H01	2
GOV ROD 2 PC 150" (12' 6")	SPECIAL	1
GOV SHAFT	SPECIAL	1
GOV TAIL SHEVE B-5	5203D27G02	1
GOV. B-5 ASSY	2644C57H01	1
GUIDE CURVE	SFR319852	2
GUIDE PIECE	SDH315301	5
H R ENTRY BOOT 9300	SMV405890	1
H R ENTRY COVER	SCV891132	4
H R ENTRY COVER	SCV891133	2
H.R. GUIDE (NEWL END)	SCH409585	4
H.R. GUIDE ROLLER	SMH405045	2
H.R.ENTRY INNER COVER LH	SMV405797	5
H.R.ENTRY INNER COVER LH W/HOLE	SMV405797E	4
H.R.ENTRY INNER COVER RH	SMV405796	4
H.R.ENTRY INNER COVER RH W/HOLE	SMV405796E	4
H.R.ENTRY OUTER COVER LH	SMV405795	4
H.R.ENTRY OUTER COVER RH	SMV405794	4
H/R D/CHAIN ADJ ASSY MOD 250	5199D53G01	2
H/R Diverter Chain M/WALK & SWU	SEH498347	0
H/R DRIVE SHAFT W/SPROCKET	SMH405621	2
H/R LATERAL GUIDE PAD	SDH393696	25
H/R SPEED MONITOR	340345	4
HALF RING LOCK	X6ZS56H82	100
HALO BLACK	AS450H06	10
HALO FIRE SERVICES PH 1	A449R181	5
HALO FIRE SERVICES PH 2	A449R186	5
HAND RAIL DRIVE CHAIN 157.5"	2898C84H14	2
HAND RAIL ROLLER GUIDE	SCH409612	20
HANDRAIL DRIVE ROLLER	152B238G02	6
HANDRAIL DRIVE SPROCKET MOD 250	1724C18G01	4
HANDRAIL SPROCKET IDLER ASSY	2898C70G02	4
HANDRAIL TIMING BELT	691B789H05	2
HANGER ROLLER (WESTINGHOUSE) 2-3/4"	W408W1	20
HAZET CONE	854001	25
HOLD HR SIGN	2838C22H01	10
HOLD HR SIGN STAND OFF	681A593H01	10
HOLD HR SIGN STAND OFF	CLQ2112	10
HOLD HR SIGN STAND OFF 9 3/4"PLATE	CLQ2116	1
HOLD HR SIGN STAND OFF H/R STAND OFF BRKT	681A95AH01	10
HOLD HR SIGN STAND OFF SCREW COVER	CLQ2020	10
HOOK ASSY	2890C06H03	1
HOOK KEEPER	2890C06H04	1
HOOK KEEPER	7284C2H36	1
HR GUIDE VINYL(BROWN TRACK)	864A976H01	1
HR ROLLER GUIDE	SUH495238	20
HVM	998C214H12	1
IDLER SPROCKET ASSY	2898C62H01	2
IGBT	20250210	1
IGBT	20227869	1

SPECIFICATIONS (Continued)

DESCRIPTION	PART NUMBER (Schindler/O.E.M.)	MIN. QUANTITY REQUIRED
IGBT (BAD)	20227869	1
INITATOR RPM MONITOR 24VDC	337311CL3R	1
INITIATOR RPM MONITOR	340310	2
INTERLOCK BR2 LEAF CONTACT	2638C81H14	4
INTERLOCK MGT BLOCK	865A247H01	4
INTERLOCK BEAK (ECI)	5226D09H11	1
INTERLOCK BEAK (GAL)	SPECIAL	1
INTERLOCK CONTACT (ECI)	5226D09H14	4
INTERLOCK CONTACT SEPERATOR	W85B2	3
INTERLOCK HATCH	TYPE S3	1
IOX PC BOARD	998C188H11R	2
JACK PACKING 4.5 SEAL KIT	7264C45G04	4
JACK PACKING 5.5	7264C45G06	1
JACK PACKING 5.5	7264C45G06A	1
JACK PACKING 5.5	GP5500	1
JACK PACKING 6.0 KIT	7264C45G07A	1
JACK PACKING 6.5	6E231SF	1
JACK PACKING 6.5 KIT	6EA02507	1
JACK PACKING 3 7/8" OTIS PACK KIT	6EA114-05	1
JACK PACKING 4.5	196C145H05	2
JACK PACKING 5.0	7264C45H05	2
JACK PACKING 5.5	7264C45H06	2
JACK PACKING 6.0	7264C45H07	2
JACK PACKING 6.5	7264C45H08	1
JACK PACKING 8.562	FO 8.562E	2
JACK PACKING GEMINI	73346	2
JACK SUB SEAL KIT	KIT 075	1
JACK SUB SEAL KIT	KIT 090	1
JACK SUB SEAL KIT	KIT 105	1
JACKPACKING 4.0 TEACONE PACK KIT	9EA113-03	1
K- EDGE RISER LH YELLOW	SCS319903	20
K- EDGE RISER RH YELLOW	SCS319905	20
K- EDGE TOP CENTER YELLOW	SCS319900	20
K- EDGE TOP LH YELLOW	SCS319901	20
K- EDGE TOP RH YELLOW	SCS319902	20
KELLUM GRIP .750"-.990"	SPECIAL	1
KELLUM GRIP 1.25"-1.49"	SPECIAL	1
KELLUM GRIP 1.50"-1.74"	SPECIAL	1
KELLUM GRIP 1.75"-1.99"	SPECIAL	1
KELLUM GRIP LOCKING PIN	SPECIAL	1
KEY PLATE S/R	8537C94H09	8
KEY SW CL2332 CHICAGO	1320B11G01	1
KEY SW H2268 CHICAGO	SPECIAL	1
KEY SW KARA 202 LOCK CYL (DIMPLE KEY)	198C418G13	1
KEY SW MFD CHICAGO	SPECIAL	1
KEY SW ADAMS F/S OFF/ON/HOLD	AS468K01	5
KEY SW CONTACT BLOCK	X50KS1H02	1
KEY SW EPCO 1	EPCO	1
KEY SW ILLINOIS -F315	SPECIAL	1
KEY SW NORTHEAST H-301(KEYS)	5061A41H02	1
KEY SWITCH	AS468K04	1
KEY SWITCH 3POS 514	SPECIAL	1

SPECIFICATIONS (Continued)

DESCRIPTION	PART NUMBER (Schindler/O.E.M.)	MIN. QUANTITY REQUIRED
KEY SWITCH 514	22119	1
KEY SWITCH 514	23119	1
KEY SWITCH ACCES 514	12004	1
KEY SWITCH LABEL RUN UP/DOWN	SPECIAL	1
KEY SWITCH OCOT	5061A46H01	1
KEY SWITCH PLATE HOLD/ON/OFF	SPECIAL	1
KEY SWITCH PLATE ON/OFF/BYPASS	SPECIAL	1
KEY SWITCH PLATE ON/OFF/RESET	SPECIAL	1
KEY SWITCH T112	X50KS1H01	1
KEY SWITCH WDO1 HOLD/ON/OFF	7275C52H11	1
KEY SWITCH WDO1 ON/OFF/BYPASS	7275C52H12	1
KEY SWITCH WDO1 ON/OFF/RESET	SPECIAL	1
KIT (MOD 250)	5225D42G02	2
KSE - RS	418-482	5
LAMP HOLDER	196C149H04	50
LANDING SWITCH	324C969G02(W880K4)	3
LANDING TAPE GUIDES	145A110H01	25
LANTHNA PC BRD	222821	3
LATCH NOSING E5B	682A244H01	10
LFTDP150 PCB ASSY QB	222533	3
LFTSDPI 8.N	222541	1
LIFT NET POWER SUPPLY LINK	AD1250BB3	5
LIFTING SOLENOID	SSA897200	1
Lift-Net Dual Port Serial Sever	LNK2	1
Lift-Net Power Supply	PS	1
Lift-Net Processor Board (LNP)	LNP	1
Lift-Net Single Port Serial Server	LNK1	1
LIMIT SWITCH	W8881	3
LIMIT SWITCH	KIPS4H13	1
LIMIT SWITCH AUTO RESET	337206	1
LIMIT SWITCH LH AUTO RESET	337205	3
LIMIT SWITCH LH MANUAL RESET	337204	3
LIMIT SWITCH LS-1B (ELEV CONTROLS)	SPECIAL	1
LIMIT SWITCH MANUAL RESET	337219	1
LIMIT SWITCH RH AUTO RESET	337202	5
LIMIT SWITCH RH MANUAL RESET	337203	5
LINE STARTER COIL 208/220vac sz 3-4	505C633G02	3
LINE STARTER CONTACTS	22801.20.01	4
LNPO403	SPECIAL	1
LNPO403 AUX	SPECIAL	1
LOCK NUT	N13	2
LOCK PLATE	630B938H19	2
LOCK WASHER	W13	2
LOCKING BAR	OP-3028	3
LOCKING BAR	GL-902-Y1	6
LOCKING CAM	OP-3029	2
LONDAG 1.Q PCB	590873	2
LONIOH 16 ASSY	222920	5
LONLMSU 1.Q PCB ASSY	590874	1
MAN-D-TEC CAB LIGHT FIXTURE ASSY	HDL6	1
MFR PC BOARD	998C030H27R	2
MGC PC BOARD	998C255H14	2

SPECIFICATIONS (Continued)

DESCRIPTION	PART NUMBER (Schindler/O.E.M.)	MIN. QUANTITY REQUIRED
MGS PC BOARD	998C254H12	2
MHC PC BOARD	998C187H25	1
MHC PC BOARD	998C187H26	1
MIC F PC BOARD	SY387600	1
MICRO SWITCH	144A026H03	15
MICRO SWITCH	X50AS3H06	2
MICRO SWITCH	864A941H01	5
MICRO SWITCH (MANUAL RESET)	866A541H01	5
MICRO SWITCH BZE6-RN18X1 (wisker sw)	1724C36G01	2
MICRO SWITCH LONG	866A541H02	1
MICRO SWITCH OMRON	337231	5
MICRO SWITCH SELF RESET	BZE62RN51	10
MINIATURE RELAY	344530	5
MODULE IGBT	224446	2
MOELLER SWITCH NZMB2-30A-NA	113514	1
MOTOR 11KW 480VAC 3/PH 60/HZ	SSB897347	1
MOTOR 20 hp SUB. MAGNETEK	7428C86H04	1
MOTOR 38 MACHINE ARMATURE	2899C38G01	1
MOTOR 8KW 480VAC	CT319824	1
MOTOR CONTROL PROTECTION	PKZMO-063	1
MOTOR J BOX	SPECIAL	1
MOTOR J BOX (6"X7"X10")	SPECIAL	1
MOTOR J BOX (7"X9"X3 1/2")	SPECIAL	1
MOTOR MOD 250 / 5 hp	2630C55H03	1
MOTOR PROTECT SWITCH MS220	346901	2
MOTOR TO GEAR BOX COUPLING	NMA298871	2
MOTOR TO GEAR BOX COUPLING	NAA298872	2
MOTOR TXR5	7031C02G01	1
MOTOR, 7.5 KW, 480V, 9300 SERIES	SSB897346	1
MOUNT PLATE BT2	7431C24H02	1
MOUNT TRACK (RELAY) 5 1/2"	223349	5
MOVING CONTACT BRAKE SWITCH	R7533G04	10
MOVING WALK AUTO LUB ASSY	SCS241787	3
MOVING WALK AUTO LUB MOTOR	700010480	2
MOVING WALK SLIDE GUIDE	SDH315301	50
MOVING WALK slide guide track 39 7/16" metal	SPECIAL	2
MPH PC BOARD	998C145H24	2
MPH2 POWER SUPPLY 24V 4.5A	89Z282	2
MPT PC BOARD	998C153H15R	4
MUFFIN FAN MU2B1	28027	2
MUFFLER 2 1/2"	7260C63H01	1
MUFFLER 2"	7260C63H02	1
MVR PC BOARD	998C026H26R	2
NYLON ROLLER	GDO 45A	6
NYLON WASHER	X6BHS1H11	20
NYLON WASHER	X6BHS1H12	5
O RING	X30DS3H65	25
OIL WIPE OFF BRUSH	SUS499197	10
OILER SPREAD BRUSH	853420	10
OILER SPREAD BRUSH MALE THREAD	CLQ3706	5
O-RING	865A066H02	1
O-RING	X30DS1H10	1

SPECIFICATIONS (Continued)

DESCRIPTION	PART NUMBER (Schindler/O.E.M.)	MIN. QUANTITY REQUIRED
O-RING	X30DS1H18	1
O-RING	X30DS1H22	1
O-RING	X30DS2H28	1
O-RING	X30DS2H29	1
O-RING	X30DS2H30	1
O-RING 0.237IDX0.103W	X30DS3H58	1
OST FIBER TO UTP CONVERTER	4300-1	10
OVER LOAD 3 PH	PKZM	1
OVERSPEED DETECTOR	2174C33H02	4
PALATE HOLDER	SF5468881	25
PALLET CHAIN LINKS	SFS394176	4
PALLET SET SCREW	NAA299197	25
PALLET SUPPORT	SFS468462	25
PANA 40 PLUS 3D	HA917T10	1
PEM 1.Q PC BOARD	590810	1
PES PC BOARD	590811	4
PHASE MONITOR	98A00445-03	1
PHASE MONITOR	1320B08H02	1
PHASE MONITOR	8544C48H01	1
PHASE MONITOR	98A00445-02	1
PHASE MONITOR TIME MARK	C263	1
PHASE MONITOR 3P 200-600V 9300	NEA462544	1
PHONE SMART PHONE MOD 2100-946BL	2100-946BL	1
PHONE TALK A PHONE	ETP-100EB	2
PHOTO ELECTRIC SWITCH	E58CBL18TM5L	1
PHOTO EYE FOR FREIFHT CAR SOURCE	468509	2
PHOTO EYE FOR FREIGHT CAR DETECTOR	468505	1
PHOTO SENSOR	5061A04H02	1
PHOTO SENSOR SKAN-A-MATIC	692B658G01	1
PHOTO SWITCH REFLEX PHOTO HD	2898C99H02	2
PHOTO SWITCH RELAY	2898C99H01	2
PHOTO SWITCH RELAY	2898C99H03	2
PHOTO SWITCH RELAY	2898C99H04	2
PHOTOSWITCH	5061A04H01	10
PI BOARD	222533	2
PIHNA PC BRD	222824	2
PILLOW BLOCK	5207D42H67	2
PIN	692BG21G01	1
PIOVECL 3.Q PCB ASSY	590880	2
PIT SW	SPECIAL	2
PLANK SWITCH	T9165G05	2
POLLY TUBE 4MM SCREW	854041	10
POLLY TUBE 4MM	853253	25FT
POLLY TUBE 6MM	853254	10FT
POLY V BELT 1841L12	SMH2737916	4
POLY V PULLY W/BOLT	SCH394014	4
POLY V PULLY W/OUT BOLT	SCH394007	4
POTENTIOMETER	X28JS5H33	1
POTENTIOMETER	X28JS5H38	1
POWER SUPPLY	SLS-12-01 7T	2
POWER SUPPLY SC4	19436	2
POWER SUPPLY 100-240VAC 15VDC	RS-25-15	2

SPECIFICATIONS (Continued)

DESCRIPTION	PART NUMBER (Schindler/O.E.M.)	MIN. QUANTITY REQUIRED
POWER SUPPLY 100-240VAC 24VDC	RS-25-24	2
POWER SUPPLY 10V	RP700144	2
POWER SUPPLY 115VAC 90VDC@1.25AMP	865A116H01	2
POWER SUPPLY 24V 2.5A	6EP13321SH42	2
POWER SUPPLY 330	6997C36H01	2
POWER SUPPLY 5V 3A	R15A5	2
POWER SUPPLY E183223 (Z WORLD)	D60A	2
POWER SUPPLY MPH2	7264C46H01	2
POWER SUPPLY PS4 5VDC-2AMP	5061A17H01	2
PRESSURE ADJUSTER	424844	1
PRESSURE ROLLER KIT MOD250	5199D27G01	5
PRESSURE SWITCH 220VAC	315160	2
PROT SW	346243	1
PROX SW (INIT RPM MONITOR)	7285C81H06	5
PROXIMITY SENSOR 20-250VAC	8538C91H03	5
PROXIMITY SW HAND RAIL SPEED MOT.	SMP5500MG5M	2
PROXIMITY SWITCH 10-55VDC	299929	5
PS1 POWER SUPPLY	7431C26H01	1
PS3 POWER SUPPLY 24VDC 33.5AMP	7431C26H03	1
PSPS 415.Q PCB	590881	1
PTC PC BOARD	998C257H11	3
PTS PC BOARD	998C256H12	3
PULLEY	691B6962H01	1
PULLY STAND	692B868H02	4
PULLY STAND WID	6954C44H01	1
PUMP MOTOR 60HP	693B250H022	1
PUMP MOTOR 75HP	693B250H23	1
PUMP REPAIR KIT	195C937H57	2
PUMP REPAIR KIT IMO 350	195C937H58	1
PVEC 165.N B PCB ASSY	431078	1
Q BOARD	2984C59G01	1
Q BOARD	2984C59G07	1
Q-STRIP CAB MOD	222560	1
RECEPTACLE SW	866A567H01	2
RECTIFIER FOR ERL BN & HEAT SINK	GE24A80V60GS	2
RECTIFIER SILICONE 0316 INDIA 2N692	X45BS2H16	2
RECTIFIER SILICONE 600V 12A	X45ADS5H26	2
RECYCLE TIMER	7266C56G03	1
REDUCER	1525C87G01	1
REDUCER 48"	7196D16G08	1
REDUCTION SHAFT EZ OPERATOR	5207D42H54	1
REFLECTOR 1 1/8"	5061A47H01	5
REFLECTOR H/R STOPPED SW 5/8"	2898C99H05	5
REL CABLE KIT	5063A83G01	4
REL CABLE STUD EZ OPERATOR	2643C95H30	5
RELAY	T362CCCC248V	2
RELAY 24VDC E.R. RELAY MOD 250	692B916H01	1
RELAY LY2 24 VAC CUBE	54045927	2
RELAY 250 VAC	AP324906M01	25
RELAY 48V DC 903401	R10-E1-Z4-V2.5K	2
RELAY 5 PIN 30VDC	38595	1
RELAY ABB TXR-5	A26-30-01-84	1

SPECIFICATIONS (Continued)

DESCRIPTION	PART NUMBER (Schindler/O.E.M.)	MIN. QUANTITY REQUIRED
RELAY BASE	344538	2
RELAY CONTROL RELAY BF 221	765A857G08	1
RELAY CUBE LY2 110 VAC	54045935	2
RELAY EC	324C981G44	2
RELAY GT5Y-4SN- 24 VAC	78Y32	2
RELAY GT5Y-4SN- 24 VDC	77530	2
RELAY GT5Y-4SN-120VAC	X45GS12H46	1
RELAY P 7 B 24 VDC	KHAU17012B24HK	2
RELAY POTER / BROMFIELD 120 VAC	KUP11D15-48	2
RELAY PRINT PSR 4.Q	NEA897203	1
RELAY SOCKET	54405-5	2
RELAY SOCKET	27E121	1
RELAY SOCKET /W/CLIP	X48DBS2H04	2
RELAY SOCKET / TRACK MOUNT	540416164	2
RELAY TESTER	TD299G01	1
RELAY TESTER	TD299G02	1
RELAY/ RY4S-UL-48VDC (US ELEVATOR)	R4S-U148VDC	2
RELAY-DIODE PCB	5061A22G03	2
RELEASE CABLE ASSY	7284C21H41	2
RELEASE CABLE ASSY	7284C21H41	2
RELEASE CABLE ASSY	ET--8--A	2
RELEASE ROLLER ASSY L/H MG/GAL	7263C05H04	2
RESISTOR 200 OHM	VK200WA	2
RESISTOR 825.2 (ADJ)	X28AS1H17	1
RESISTOR 100 OHM (N/ADJ)	ASBAS1H11	2
RESISTOR 126 OHM (ADJ)	X28AS1H12	2
RESISTOR 168 OHM (ADJ)	X28AS1H13	2
RESISTOR 48 ohm	X28AS1H09	2
RESISTOR TUBE 64.2 OHMS	X28AS1H10	2
RESISTOR TUBE 84 OHM	X28AS1H11	2
RESTRICTOR ROD	101204	2
RETAINER ASSY	2898C54G02	1
RETAINING RING	X6BCS1H01	5
RETAINING RING	X6ZS7H42	5
REVERSING CHAIN END (SDS & 9300)	SCH409214	4
REVERSING CHAIN SDS / 9300	SCH896208	4
RIBBON CABLE	2893C73G03	1
RIBBON CABLE	692B929G01	1
RIBBON CABLE	7431C92G01	1
RIM TACH WHEEL 3.835D	694B981G01	2
RINGFEDER	NKA424851	1
RMH PC BOARD	998C216H28	2
RMH PC BOARD	998C216H27	1
ROCKER SWITCH IND/ HE SERVICE	7257C63H06	2
ROCKER SWITCH (HAND / AUTO)	7429C48H06	2
ROCKER SWITCH FAN 3POS LOW,OFF,HIGH	7257C63H11	2
ROCKER SWITCH ON/OFF	7257C63H05	2
ROCKER SWITCH RENDANT STATION UP/DOWN	7257C63H14	1
ROLLER OPERATOR CHAIN	1000-2027	3
ROLLER & SHAFT (GAL)	G825A	20
ROLLER (BLUE) 9300	SmS405029	20
ROLLER 2 3/4" WESTINGHOUSE	576B535G04	35

SPECIFICATIONS (Continued)

DESCRIPTION	PART NUMBER (Schindler/O.E.M.)	MIN. QUANTITY REQUIRED
ROLLER ASS (FLAT ROLLER)	SLH243447	25
ROLLER ASSM. TAPPED	SMH405291	2
ROLLER ASSM. TAPPED (NEWL)	SCH241518	2
ROLLER CHAIN 16B-2X103	741330	2
ROLLER CHAIN 16B-2X110	741320A	2
ROLLER CHAIN 20B-2X89 LINKS	741335	2
ROLLER CHAIN 87 LINK	741334	2
ROLLER HOLDER L/H	SDH891920	5
ROLLER HOLDER R/H	SDH891919	2
ROLLER KIT (GAL)	7263C05H03	2
ROLLER KIT (GAL)3-1/4 DIA	G401	15
ROLLER OPERATOR STOP (YELLOW)	5203D03N17	1
ROLLER PICK UP CAR GATE	6952C34H01	4
ROTARY SWITCH B STRY MAINT	692B226H02	2
RPM MONITOR (proximity switch)	NEA462570	44
RT3 A-24V DC SPECTER & SCHUSTER	JVB1328H02	1
RUBBER BOOT	4T266A	1
RUBBER BUSHING FOR ROLLER GUIDE.	691B964H01	2
RUBBER PAD (6 PER SET)	NAA298587	4
RUBBER PAD (6 PER SET)	NAA298588	4
SCREW	144A542H03	10
SEAL	25005-6356	2
SEAL	6381-1	2
SEAL	13588	2
SEAL	17750	2
SEAL	19229	2
SEAL	22823	2
SEAL	23429	2
SEAL	29525	2
SEAL	297402	2
SEAL	RPO8001H01	2
SEAL	RPO8001H02	2
SEAL	W872E20	2
SEAL SPLIT SEAL KLOZURE	25004-5025	2
SEAL 38 MACHINE	620318G01	2
SEAL 38 MACHINE	W872E18	2
SEAL 38 MACHINE DRIVE SHEAVE	695B197H01	10
SEAL JM CLIPPER	R-0218-06532	2
SEAL KIT 6.50 (F JACK)	7264C45G08	2
SEAL MOD 250	X30AS3H54	1
SEAL MOD250	X30AS2H47	1
SEES SS HD DOOR GIBB GREEN	SPECIAL	10
SELF CLINCHING NUTS(10 PER PACK)	X4WS1H03	10
SEMIKRON VF GROUP	642GB120-20	1
SEMIKRON VF GROUP	642GB120-208CTV	1
SHAFT STUB	7428C71H01	1
SHAFT STUB ADJUSTABLE INDEX PLATE	7428C72G01	1
SHAFT, WID DRIVE PULLEY	6954C48H01	1
SHEAVE 2 GROOVE	5207D42H50	2
SHEAVE REL CABLE NYLON	151B465G02	4
SHIM-KEEPER ASSY	7433C93H04	15
SHUNTS	W217S2	4

SPECIFICATIONS (Continued)

DESCRIPTION	PART NUMBER (Schindler / O.E.M.)	MIN. QUANTITY REQUIRED
SHUNTS	X22BGS1G02	4
SHUNTS	X22GCS1G01	4
SHVM 1.Q PC BOARD	224213	2
SIGHT COVER 38 MACHINE	SPECIAL	10
SIGN CAB F/S	2638C87H09	2
SIGN CAB F/S 4 9/16" X 6 7/16'	7660C49H03	2
SIGN CAB F/S 6 3/4" X 3 1/8'	7660C49H11	2
SIGN HALL F/S 3 1/4" X 5"	7660C49H10	2
SIGN HALL F/S 3 1/4" X 7 3/8"	7660C49H08	2
SIGN INCASE OF FIRE	A559SC20	2
SILENCER RING	1000-2025	2
SKIRT SWITCH BUTTON	694B930H01	4
SKIRT SWITCH PLUNGER ASSY	1727C81G02	4
SKIRT SWITCH SPRING	X9BS3H59	4
SL/DR/LINK BRKT	2179C38H75	4
SMHC PC BOARD	225515	1
SOCKET (8 PIN ROUND)	51X00120-01	1
SPB PC BOARD	998C149H12	2
SPEAKER	7255C73H01	2
SPEAKER 2"	7029C44	2
SPEED MONITOR PKZM	340346	2
SPEED SENSOR	1722C01H01	2
SPIRATOR SMALL AC HANGERS	215B951H01	10
SPIRATOR WITH BRACKET (330A)	1206198	3
SPLIT SEAL ASSY FOR REDUCER KIT	2175C78G01	4
SPLIT SEAL FOR #38 WORM	X30ES1H20	1
SPLIT SEAL W/BEARING KIT	2630C99G01	1
SPRING	X9AS1H03	2
SPRING	X9ES2H54	2
SPRING	X9HS2H48	2
SPRING 6 B CONTACTOR	X9JS1H17	2
SPRING (JAWS B-5 GOV)	X9ES3H62	2
SPRING CLIP	SMS244108	2
SPRING CLOSER	7263C05H55	2
SPRING CLOSER "L" BRACKET	6951C41H03	2
SPRING CLOSER GUIDE ROD	6951C45G01	2
SPRING CLOSER SPRING	6951C47H01	2
SPRING tensioner (drive)	X9FS1H01	2
SPRING WASHER	X6DS1H11	2
SPROCKET (17 TOOTH MOD 250 H/R DRIVE)	2898C70G01	1
SPROCKET DOUBLE	1724C24G01	1
SPROCKET MOD 250 45T R/H	2898C89G01	1
SPROCKET(15 TOOTH FOR #60 CHAIN)	866A703G01	1
STAINLESS DECKING CAP	SPECIAL	2
STARTER CONTACTOR FURNAS	42HF35A	1
STARTER FURNAS SERIES C	72ND35AFA	1
STARTER S&S CA1-40-N	5406C181H17	1
STARTER WESTINGHOUSE SIZE 4	6716C97G01	1
STARTER S&S 2CA3-PH10-WH2-120	7263C12H02	4
STARTER WARD LEONARD SIZE 2	6718C97G01	1
STATION KEEPER	7263C05H53	2
STATIONARY CONTACT ASSY (GAL)	G830C1	5

SPECIFICATIONS (Continued)

DESCRIPTION	PART NUMBER (Schindler/O.E.M.)	MIN. QUANTITY REQUIRED
STDC PC BOARD	223825	2
STEP 9300 SNAP-IN YELLOW DEMAR (E24, 25, 28,	50626486	10
STEP 9300 YELLOW DEMARK PAINT/SCREW (E-79)	SMS405148	10
STEP ASSM. 1000MM (9300)	SMS405145	25
STEP ASSM. 1000MM SWE BLACK	SCS807618	25
STEP AXLE 1000MM	STS437475	2
STEP AXLE COLLER (B STWY)	866A348H01	5
STEP GUIDE	SCS409172	25
STEP LATCH MOD 250 LH	1727C70G03	1
STEP LATCH MOD 250 RH	1727C70G04	2
STEP LEVEL / BROKEN STEP DEVICE	Z575434	2
STEP MOD 32" BLACK	1727C53G01	5
STEP MOD 48" BLACK	1727C53G02	25
STEP MOD UNISTEP	7206D04G01	5
STEP ROLLER	691B785G07	50
STEP ROLLERS RED	SCS241534	40
STEP SCREW SS	864A925H02	50
STEP UPTHURST	SCS409794	10
STEP UPTHURST KIT RH	SCS409795	10
STOP / RESET ASSY	2642C20G01	1
STOP SW ASSY	W471A1	1
STUB SHAFT (HOLLOW)	1724C07H01	1
SURGE SUPPRESSOR	220733	2
SWITCH RUN / STOP	W4701A	1
SWITCH ROCKER	7257C63H05	1
SWITCH ROCKER	7257C63H13	1
SWITCH ROCKER DN	7257C63H15	1
SWITCH ROCKER LIGHT	7257C63H01	1
SWITCH ROCKER S/W ON/OFF	7257C63H24	1
SWITCH ROCKER S/W STOP/RUN	7257C63H10	1
SWITCH ROCKER UP	7257C63H14	1
TAC	40283F	2
TANGIAL GUIDE LEFT (NYLON)	SML244158	4
TANGIAL GUIDE RIGHT (METAL)	3CL392608	4
TANGIAL GUIDE RIGHT (NYLON)	SML244157	4
TCP PC BOARD	998C276H22	2
TCP PC BOARD	998C276H12	1
TERMINAL STRIP	K5530H02	2
TERMINAL STRIP 10 PIN	135686	2
TERMINAL STRIP 10 PIN	140666	2
TERMINAL STRIP WAGO 5 PIN	7310605	2
THERMOSTAT MPH2	865A278H01	2
THRUST WASHER	5207D42H12	2
TIMER MALLORY TYPE FD	466D034G02	1
TIMER SS 1--100 SEC (SSAC)	693B101H01	20
TIMER (S-16) D/O3178 PRD 11 AYO-240V	A103B4	3
TIMER (AUTO OILER)	700002	1
TIMER 120 VAC 1.5-30S	7267C14H02	1
TIMER AGASTA .5--5SEC	X45GS5H15	1
TIMER H 3 DP-C	344330	4
TIMER SOLID STATE 120VAC 1A 0.2-10SEC	8538C91H01	1
TIMER SPECTER & SCHUSTER	693B101H02	1

SPECIFICATIONS (Continued)

DESCRIPTION	PART NUMBER (Schindler O.E.M.)	MIN QUANTITY REQUIRED
TIMER SWS	X45GS18H59	1
TIMKEN BEARING SET	JM718149/JM718110	2
TOOTH SEGMENT	SR360835	5
TOP L/H TURNAROUND	5191D51G03	1
TOP R/H TURNAROUND	5191D51G04	1
TRANSFORMAR 450VA P=230-480 S=230 1PH	418794	1
TRANSFORMER 24V CAPICTOR & TRANS,	200B24H	1
TRANSFORMER 318VA P=208-600 S=120 1PH	343541	1
TRANSFORMER 450VA	7265C84H01	1
TRANSFORMER 450VA P=230/60 S=115/160	6925C91H01	1
TRANSFORMER 500VA	PT500MQMJ	1
TRANSFORMER 500VA P=208-600 S=24V 1PH	343542	1
TRANSFORMER 550VA	320C940H02	1
TRANSFORMER 600VA	692B253H01	1
TRANSFORMER HANNA 100 VA	PT100MOMJ	1
TRANSFORMER PS P=115 S=5.2@0.5A DC	2175C96H03	1
TRANSFORMER US TR9 3000VA	TI-3000-009	1
TRANSFORMER WESTINGHOUSE 750 VA	465D025-01	1
TRANSFORMER120--24V TYPE EO2	83711	1
TRANSFORMER120--24V TYPE K100	06941	1
TRI TRONIC REC CABLE	7269C63H12	2
TRI TRONIC CIR INTERF	19753	3
TRI TRONIC EMIT CABLE	7269C63H13	1
TRI TRONIC MAGIC EDGE LA CABLE	18262	4
TRI TRONIC MAGIC EDGE RA CABLE	18263	4
TRI TRONIC MAGIC EDGE SET	EDGE-6/EC-1	2
TRI TRONIC MAJIC EDGE CABLE EXT. 25'	19528	2
TRI TRONIC MAJIC EDGE CABLE LA2	19464	4
TRI TRONIC MAJIC EDGE CABLE RA2	19465	4
TRI TRONICS POWER SUPPLY BOARD ONLY	600-1372	2
TRI TRONICS POWER SUPPLY WITH BOX	600-1372	2
TRM PC BOARD	998C168H24	2
TRUARC RING	X6Z118	25
TRUARC RING	X6ZS5H93	25
TRUARC RING	X6ZS7H40	25
TRUARC RING	Z6ZAS1H09	25
TXR5 BRAKE CHOPPER	120 BR	1
TXR5 DRIVE	SPECIAL	1
TXR5 BATTERY CHARGER	5062A48G01	2
TXR5 DRIVE (CONTROLLER MOTOR)	GETTYSBURG	1
TXR5 MOTOR ENCODER (G0522582)	7250C61H22	2
TXR5 RESISTOR BANK	223657	1
U-BOLT EZ-OPERATOR	5207D42H44	4
UC MAXTON VALVE REPAIR KIT	MAXDPA	1
UC3 & 4 MAXTON VALVE REPAIR KIT	291540	1
UC4 VALVE (MAXTON)	UC4	1
UP GRADE KIT 9300	CLQ8006	11
UP GRADE KIT 9300 CUST RESET	CLQ3603	2
UV5A VALVE EECO	UC5A 1"	1
UV5A VALVE (3/4" EECO	UC5A 3/4"	3
V LINX POWER SUPPLY	ESR901	2
VALVE UC1A	UC1A	1

SPECIFICATIONS (Continued)

DESCRIPTION	PART NUMBER (Schindler O.E.M.)	MIN. QUANTITY REQUIRED
VANE ASSY	7284C21H17	2
VICTAULIC 2" GASKET	STYLE -75-77-78	5
VICTAULIC 3" GASKET	STYLE -75-77-78	5
VICTAULIC 4" GASKET	STYLE -75-77-78	5
VICTAULIC 2 1/2" GASKET W/CLAMP	STYLE -75-77-78	5
VICTAULIC COUPLING 2 1/2 "	X49AS1H15	5
VICTAULIC COUPLING 2"	X49AS1H14	1
VICTAULIC COUPLING 4"	X49AS1H17	2
WASHER BRZ	x6fs1h11	100
WESTINGHOUSE PROX SENSOR	2633C76H01	4
WHEEL &REFL ASSY H/R STOPPED SWITCH	7428C92H31	6
Z WORLD BOARD COMPLETE	SPECIAL	1
Z WORLD BOARD ONLY	SPECIAL	1
Z WORLD RABIT	SPECIAL	1
Z-World Escalator PCB (Kit H)	51510312	1
Z-World Kit PCB (Kit F)	51510087	1
Z-World PCB (Kit E)	51510086	1

**SPECIFICATION FOR
ELEVATOR, ESCALATOR MAINTENANCE AND REPAIR**

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SPECIFICATION

PART 1 - GENERAL

1.1. SCOPE OF WORK:

- 1.1.1. The Contractor shall provide all labor, supervision, materials, repair parts, supplies, tools, diagnostic equipment, manuals/schematics and any and all other items and services necessary or proper for, or incidental to, performing twenty-four (24) hours per day, seven (7) days per week, on-site maintenance and repair for elevators and escalators located at the Orlando International Airport South Terminal C, Phase 1 (STC-P1) including Parking Garage C-Phase 2, Ground Transportation Facility, Airside Concourse and Landside Terminal, (Reference Construction Documents for those Projects) and other South Airport Complex units as may be amended from time to time. The Contractor shall provide and maintain an on-site inventory of spare parts (Attachment C, to be approved by the Authority as a condition of Substantial Completion of the initial construction subcontract before the Effective Date of this Contract), and as necessary complete the testing/witnessing in accordance with the testing schedule (Attachment D, to be approved by the Authority as a condition of Substantial Completion of the initial construction subcontract, before the Effective Date of this Contract) and shall maintain the elevator/escalator monitoring system (LiftNet) at the Orlando International Airport ("OIA") STC-P1 in accordance with the Specification.
- 1.1.2. The Contractor's work obligations ("Work") with respect to the equipment identified herein, and all replacements and additions thereto (the "Equipment"), shall include at no additional cost to the Authority (except when such repair or parts replacement is required due to Vandalism or Third-Party **damage**), the following items and services:
 - 1.1.2.1. Scheduled and preventative maintenance, including inspecting, testing, adjusting, lubricating, repairing, cleaning, cosmetic touch-up, and the replacement of expendable/consumable parts in accordance with the schedule for this Work,
 - 1.1.2.2. Unscheduled repairs and/or parts replacement as required to identify and remedy failures/malfunctions,
 - 1.1.2.3. Scheduled overhaul/refurbishment of equipment and components,
 - 1.1.2.4. Safety and code compliance testing, including repairs and adjustments necessary for code compliance as identified by the Authority's elevator safety code inspection service/contractor, including providing all necessary test equipment (i.e. test weights, pressure gauges, skirt indexing tools, ladders, etc.) as necessary to complete the testing/witnessing, in accordance with the testing schedule (Attachment D) (),
 - 1.1.2.5. Replenishing/maintaining of spare parts, materials, and supply inventories,

- 1.1.2.6. Providing and updating maintenance reports, daily logs, status reports, and safety/code testing schedules including state re-inspection reports,
- 1.1.2.7. Updating and maintaining Equipment Operating and Maintenance (O&M) manuals,
- 1.1.2.8. Tracking of manufacturer software/control/logic updates, and installing those software or controls/logic updates when recommended or required by the equipment manufacturer to increase or improve safety or to remedy problems/bugs.
- 1.1.2.9. Repairing and replacing parts resulting from vandalism or Third-party damage, (for additional compensation when approved by the AAR) in accordance with the Additional Work provisions described in sub-part 3.5,
- 1.1.2.10. Housekeeping in Work and Storage areas to include but not limited to cleaning of machine rooms, pit areas, drip pans, hoist ways and car tops.
- 1.1.2.11. Machine room, elevator/escalator pit, and elevator cab, light bulb replacement,
- 1.1.2.12. Maintenance, repair and replacement of sump pumps wherever located (excluding plumbing and electrical outside of the pit),
- 1.1.2.13. Maintenance and repair of the LIFTNET monitoring system and those related control components directly connected from the monitored unit to the applicable LIFTNET controller interface device and computer server.
- 1.1.2.14. The repair and replacement of all elevator emergency communication devices (i.e. Talk-A-Phone).
- 1.1.2.15. Assisting/escorting the Elevator Safety Inspector/Contractor as necessary to perform the A17 safety inspections of the equipment per the schedule shown in Attachment to be developed,
- 1.1.2.16. Maintenance and repair of all elevator cab air conditioning units,
- 1.1.2.17. Any and all other repairs and maintenance, except as described in Section 1.1.3 below, necessary to keep equipment in good operating condition.
- 1.1.3. Exclusions - The Authority will not hold the Contractor responsible for the maintenance or repair of the following items:
 - 1.1.3.1. Electrical wiring feeders, switches and fuses or breakers to the equipment controller(s),
 - 1.1.3.2. The buried portion of hydraulic cylinders, casing, piping, and conduit,
 - 1.1.3.3. Machine room and elevator/escalator pit lighting fixtures or ballast,
 - 1.1.3.4. Smoke detectors and heat sensors,
 - 1.1.3.5. Cleaning of the elevator car interior and exposed sills,
 - 1.1.3.6. Cleaning of escalator balustrades, decking, steps, or handrails,
 - 1.1.3.7. Emergency power plant and associated switchgear,

- 1.1.3.8. Elevator Pit sump pumps and related plumbing and wiring (except those sump pumps installed in tunnel level escalator and moving walk pits).
- 1.1.3.9. The Authority's network portion of the LIFTNET monitoring system located between the airport's server communication rooms and the applicable network interface device in the machine room, escalator, or moving walk pit. Contractor is responsible for the cabling, connections, and LiftNet-to-Equipment interface cards located in the machine rooms and/or equipment controller cabinets.
- 1.1.4. The obligations of the Contractor to perform the Work are absolute and shall not be limited by a lack of knowledge on the part of the Contractor or the Authority that work is needed with respect to any equipment.

1.2. DEFINITIONS AND REFERENCED DOCUMENTS

Definitions:

- 1.2.1. Entrapment: a reported stoppage of an elevator, due to malfunction of the elevator equipment, while a passenger(s) is on-board. The malfunction is also considered an Entrapment even if a passenger(s) is not present when the elevator technician arrives, provided that an entrapment (i.e. elevator phone) is reported and the elevator is found to be malfunctioning.
- 1.2.2. Equipment or Unit: may be used interchangeably and refers to the Elevators, Escalators, and/or the Wheelchair Lift covered under by this Contract.
- 1.2.3. Maintenance: The normal "scheduled" preventative action taken to ensure the continuous, trouble-free, efficient, and safe operation of the Equipment. This includes inspection, testing, lubrication, and cleaning, adjusting, and the periodic replacement of parts as recommended by the original Equipment manufacturer.
- 1.2.4. Repair: The corrective action taken, through the replacement of parts and/or components, for the purpose of restoring, or reestablishing the level of safety, operation, design, and/or performance characteristics, as determined by the original Equipment manufacturer, applicable code requirement, or the Authority.
- 1.2.5. ROA: reported entrapments where the unit is running when the mechanic arrives and there is no indication that an entrapment has occurred and no apparent Equipment malfunction (i.e. false alarm).
- 1.2.6. Third-Party damage: Damage caused by severe weather (**e.g.** lightning, flooding, hurricanes), electrical feed malfunctions or interruptions, communication interruptions, damages caused by other contractors (i.e. construction projects, custodial, etc.) and/or other system/building failures that directly or indirectly effect the operation of the Equipment, and which are beyond the control of the Elevator Contractor. Electrical malfunctions (surges, spikes, etc.) will not be considered Third Party damage if there are no visible indications or residual markings (i.e. burn marks) on the damaged component or other independent means to verify that the cause of the damage was electrical. The AAR shall make

the determination if a cause is not readily apparent.

- 1.2.7. Vandalism: The intentional or willful destruction or damage of property or Equipment. This shall be evident by the parties' inspection and/or reasonable conclusion. This term also includes misuse and abuse which is described as the damage due to the unintentional misapplication, or improper use of Equipment as determined by the original Equipment manufacturer's design and application intent, and which is not caused by the Contractor's acts or omissions. The AAR shall make the determination if a cause is not readily apparent.
- 1.2.8. LIFTNET: A non-proprietary interactive monitoring system developed by Integrated Display Systems (IDS) to monitor and manage the airport's elevators, escalators and moving walkway equipment.
- 1.2.9. Elevator Mechanic or Elevator Constructor Mechanic ("Mechanic"): also known as a Certified Elevator Technician, is a natural person registered with and authorized by the Florida Department of Professional Regulation, under the license category "Elevator Safety" to construct, install, maintain, or repair any vertical conveyance, after having been issued an elevator certificate of competency by the division. Each certified elevator technician must annually register with the division and be covered by general liability insurance coverage in the minimum amounts set by the division.
- 1.2.10. Elevator Helper or Elevator Constructor Helper ("Helper"): A natural person performing work under the direct supervision of an elevator certificate of competency holder to construct, install, maintain, or repair any vertical conveyance.
- 1.2.11. Elevator Constructor Apprentice: A natural person performing work under the direct supervision of an elevator certificate of competency holder to construct, install, maintain, or repair any vertical conveyance. An Elevator Apprentice may be designated/classified as an Apprentice First-Year, Second-Year, Third-Year or Fourth-Year Apprentice but under no circumstances will be a Probationary Apprentice be considered an Elevator Apprentice to be compliant with the terms of this contract.
- 1.2.12. Foreman, Supervisor, Mechanic-In-Charge: these terms are used interchangeably to refer to the senior Elevator Mechanic who is responsible for coordinating the work efforts of the Elevator Mechanics and Helpers. This person assigns work schedules/tasks, ensures the parts inventory is maintained, provides quality control/oversight of completed work, and provides technical assistance to the Elevator Mechanics and Helpers.
- 1.2.13. Prorata: Prorata amount is when a new elevator, escalator, or moving walk is installed in the middle of the month. The Authority will pay Contractor $\frac{1}{2}$ of the maintenance amount for that type of equipment as described on the Bid Form. Additional language in the Specification Section 2.3.2 states if existing equipment is removed from service at Authority's discretion (i.e. construction in area prevents escalator use) the maintenance of the unit will continue to be paid if the total time the equipment is out of service is less than 30 days.

1.2.14. References

- American Standard Safety Code for Elevators and Escalators
- Americans with Disabilities Act (ADA)
- ASME A17.1, A17.2, A17.5 Safety Code for Elevators and Escalators
- ASME Standards and Inspector's Manual
- Florida Elevator Code: (Chapter 61C-5)
- Florida Statutes (Section 212.08 – Sales Tax)
- Greater Orlando Aviation Authority Comprehensive Security Plan
- Greater Orlando Aviation Authority Emergency Procedures
- National Elevator Industry Field Employees' Safety Handbook
- Southern Building Code, Section 506
- State of Florida, Department of Insurance, Division of State Fire Marshal, Chapter 4A47 Uniform Fire Safety Standards for Elevators

1.3. REGULATIONS:

- 1.3.1. The Contractor shall comply with all applicable Federal, State and local laws, ordinances, rules and regulations pertaining to the performance of the work specified herein.
- 1.3.2. The Contractor shall obtain all permits, licenses and certificates, or any such approvals of plans or specifications as may be required by Federal, State and local laws, ordinances, rules and regulations, for the proper execution of the work specified herein.
- 1.3.3. Contractor shall comply with Federal and State right-to-know laws if hazardous materials are used. The MSDS (Materials and Safety Data Sheets) shall be made available to all workers and Authority's representatives. Contractor shall report immediately to the AAR any spillage or dumping of hazardous materials on Authority property. The Contractor shall also be responsible for the cleanup and any costs incurred for all such incidents.
- 1.3.4. During the performance of this Contract, Contractor shall keep current and, if requested by the Authority, provide copies of any and all licenses, registrations or permits required by applicable governing agencies. Contractor shall keep a copy of any and all licenses, registrations and permits on the job site while performing the Contract work.

1.4. WORK HOURS:

- 1.4.1. On all passenger elevators and escalators, preventative maintenance and repairs are to be performed during the second or third shifts (1500 -2330 or 2300 – 0700 hours respectively) so as not to interfere with, or delay the operations of the Authority or tenants. Attachment "A" to be developed by the AAR and Contractor will list the specific units and the work shifts for the preventative maintenance and repairs. The AAR may approve or require when repairs are to be conducted.

1.5. CONTRACTOR'S PERSONNEL:

- 1.5.1. Contractor will abide by all State and Federal regulations on wages and hours of an employee dealing with the employment relationship between Contractor and its subsidiaries or related parties and its employees, including but not limited to the Florida Human Relations Act, the Federal National Labor Relations Act, the Federal Fair Labor Standards Act, the Federal Civil Rights Act of 1964, as amended, and the Americans with Disabilities Act.
- 1.5.2. Contractor shall require all prospective employees to show proof of citizenship, or proof from the United States Immigration and Naturalization Service of valid entry permits and/or work permits, and that they are legal aliens eligible to be employed in the United States.
- 1.5.3. Should the Contractor engage employees who are illiterate in English, it will be the Contractor's responsibility and obligation to train such employees to be able to identify and understand all signs and notices in and/or around the areas that relate to them or the services being performed by them pursuant to this Contract. In addition, the Contractor will have someone in attendance at all times who can communicate instructions to said employee.
- 1.5.4. Contractor shall maintain a drug-free workplace within the meaning of the Florida Drug-free Workplace Act. No employee shall be hired by a Contractor for work on Authority's premises prior to such employee having tested negative for drugs. In addition, existing employees of the Contractor must be subject to drug testing by the Contractor upon reasonable suspicion of drug use. Results of all such drug tests are to be retained by the Contractor. Copies shall be provided to the Authority, if requested.
- 1.5.5. Contractor shall transfer promptly from the airport any employee or employees that the Authority advises are not satisfactory, and replace such personnel with employees satisfactory to the Authority; but in no event shall Authority be responsible for monitoring or assessing the suitability of any employee or agent of Contractor.
- 1.5.6. The Contractor's employees shall be instructed that no gratuities shall be solicited or accepted for any reason whatsoever from the tenants, customers or other persons at Orlando International Airport. The Contractor shall be responsible for ensuring that all articles found by its employees on Authority's premises are turned over to the Authority, or the Authority's designated agent in charge of such articles.
- 1.5.7. A valid Florida driver license (Commercial Driver License, if applicable) will be required of all personnel operating motor vehicles or motorized equipment on roadways in or around Orlando International Airport. Each of the Contractor's motor vehicles brought onto the Authority's premises shall have the Contractor's business name and/or logo prominently displayed on both front doors of such vehicle.
- 1.5.8. While working on airport property all Contractor's employees shall wear neat-appearing uniforms with the company name and/or logo and footwear of a style

that complies with all legal and safety requirements, including and without limitation, the requirements of OSHA.

- 1.5.9. A Mechanic shall be present on each shift.
- 1.5.10. The Foreman/Supervisor/Mechanic-In-Charge, and all Mechanics identified on the Contractor's Staffing Plan shall possess a current Certification of Competency (CC card) for elevator constructors issued by the State of Florida.
- 1.5.11. Staffing Levels
 - 1.5.11.1. Minimum staffing levels: The Contractor shall continuously provide at least one (1) Mechanic or Helper for every twenty (20) units maintained by the Contractor. Units removed from service (i.e. unavailable for public use due to construction or removed at the discretion of the Authority) for more than 90 days shall not be counted as being maintained by the contractor for the purpose of calculating staffing requirements.
 - 1.5.11.2. The Contract Manager and Foreman/Supervisor or Mechanic-in-Charge shall not be counted as a mechanic or helper for compliance with this requirement.
 - 1.5.11.3. In the event that the total number of **Mechanics and Helpers** required, as determined by dividing the total number of units maintained by twenty (20), contains a fractional component, then the total staffing number required shall be rounded up to the next whole number.
 - 1.5.11.4. For example: if the total number of units maintained is 204, then the required number of mechanic/helpers would be 11; i.e. $204/20 = 10.2$, rounded up to eleven.
- 1.5.12. Contractor shall submit a proposed Staffing Plan with its sealed bid and obtain written approval of the final Staffing Plan by the AAR before the Effective Date of this Contract. The plan may be updated as necessary for employee and/or rotational changes. The proposed Staffing Plan must include job titles and work shifts (i.e., Mechanic 1, Mechanic 2, etc). The final Staffing Plan must indicate all employees' names, assigned work shifts, and job classifications and include resumes of all staff. At a minimum, Contractor shall divide the mechanics and helpers into three shifts and provide sufficient staffing on each shift to ensure the work can be accomplished on the third shift.. The Owner may cancel the award if no agreement is reached on the Staffing Plan.
- 1.5.13. Personnel Qualifications: The following personnel are considered key and critical to the maintenance and repair of the Equipment covered by this contract.
 - 1.5.13.1. Contractor shall employ at the Airport site at least one (1) employee on staff with a minimum of five (5) years' experience maintaining, diagnosing, and repairing the elevator controller that is included in the construction bid.
 - 1.5.13.2. Contractor shall employ at the Airport site at least one (1) employee with a minimum of five (5) years' experience maintaining, diagnosing, and repairing the escalator model that is included in the construction bid.
 - 1.5.13.3. Contractor shall employ at the Airport site at least one (1) employee with a

minimum of two (2) years' experience maintaining, diagnosing, and repairing the LiftNet elevator/escalator monitoring system.

1.5.13.4. The Contractor shall employ at the Airport site an experienced Operation and Maintenance (O&M) Manager (with at least 5-years' experience managing an elevator maintenance and repair contract) , be LEED certified and be authorized to represent and act for the Contractor in matters pertaining to its operations and activities at the Airport. Contractor shall keep the Authority informed in writing of the identity of such Manager. The O&M Manager shall be in charge of and have overall responsibility for the work to be performed by the Contractor under the Contract. Such Manager shall devote his time exclusively to those responsibilities related directly to the contract and any related construction activities at the Airport. Contractors' O&M Manager shall not be involved with any projects/work (construction related or other maintenance contracts) not related to the Airport unless such activity is approved by the Authority in writing in advance. The Authority shall have the right, in its sole discretion, to approve or reject any Manager selected by the Contractor, and the Authority's written approval shall be required prior to involvement of any Manager in the work provided by this Contract. The Contractor's Manager shall make himself available to the AAR for purposes including weekly or semimonthly meetings, and periodic tours and/or inspections of the premises.

1.5.13.5. In the event a Contractor's key personnel position becomes vacant, Contractor has 30 days to fill the position. The Authority has the right to review the qualifications of, and reject, any replacement key personnel. In the event Contractor does not fill vacant positions with approved personnel in 30 days, the Authority shall deduct at the hourly rate specified in the bid form for Additional Work, for each vacant position, 8-hours per day until the position is filled.

1.5.14. Exclusive Service

1.5.14.1. All Supervisors, Mechanics, and Helpers identified on the Staffing Plan shall provide exclusive service to the South Airport Facilities that are within the scope of this Contract for maintenance and repair duties as described in the Contract Documents. NONE OF THE INDIVIDUALS STAFFED FOR THIS CONTRACT ARE PERMITTED TO PERFORM OTHER WORK ON AUTHORITY PROPERTY, unless under extraordinary circumstances when written authorization of the Authority's Chief Operating Officer is obtained (such as an emergency). **The staffing plan for this Contract must be exclusive to this Contract, for 24 hours a day, seven days a week (typically 21 shifts), even if the Contractor disagrees with the need to fully staff the scope of this work.**

1.6. IDENTIFICATION AND ACCESS REQUIREMENT:

1.6.1. Contractor is required to conduct an employee background check, or require its subcontractors to perform an employee background check, in accordance with the requirements herein on each person proposed for employment at the Orlando International Airport in connection with this Contract, if such person is

an employee of Contractor or an employee of a subcontractor for whom Contractor is required under Section 1.6.5 below to sign the Authority's badge application ("Contractor Responsible Employees"). Such background check must be successfully completed prior to such person applying for an access control identification badge with the Authority. Each background check shall be performed to the following minimum requirements:

- 1.6.1.1. Each employee must provide a ten (10) year work history.
- 1.6.1.2. Contractor must confirm the last five (5) years of each employee's work history. Any gaps in employment of thirty (30) days or more during such five year period must be explained in writing by the employee and must be confirmed by Contractor through W-2s, student transcripts, medical records, or written references of stay-at-home situations from credible local persons such as pastors or priests (which reference must indicate personal knowledge of employee's general work history during the gap period).
- 1.6.1.3. Contractor must check each employee's criminal history for the immediately preceding five years, with such check to be conducted in each county where the employee has lived or worked in such five year period.
- 1.6.2. Contractor shall not present any Contractor Responsible Employee to the Authority's Access Control Office for badging if such person has any unexplained gaps in their work history, has a criminal record that would disqualify them from receiving an access control badge or has an unacceptable termination record.
- 1.6.3. The Authority will issue, for a fee, as stated below in paragraphs 1.6.3.1 below and 1.6.3.2 below, to all Contractor Responsible Employees an identification badge that will display their picture, name, and other applicable information; and any key(s) required in the performance of the Contract, provided that such person meets the minimum criteria established to receive a badge. At all times while on airport property, the Contractor Responsible Employees are required to display such badges prominently on their uniforms in accordance with Authority's guidelines. Every new employee requiring unescorted access to a secure area of the airport must be electronically processed by the Authority's Access Control Office for a Criminal History Records Check and Security Threat Assessment before an identification badge is issued. In addition to this records check, the employee will be required to attend security training class (approximately 1 hour), and in the case of operating a vehicle on the Airport Operating Area (AOA) the employee will also be required to attend a driving safety class (approximately 1 hour); both training classes are provided by the Authority. The Contractor shall maintain, and shall require its subcontractors to maintain, a permanent record in its files of the background information, including drug screening tests, on all current and former employees who are utilized in the performance of this Contract and, when requested, shall provide such information to Authority, TSA, or such other entity as deemed appropriate by the Authority. The Contractor further agrees to perform, or require its subcontractors to perform, such additional employee background checks, fingerprinting, or other identification measures as may be required by any future

security rules or applicable federal regulations.

1.6.3.1. Fees Associated with Identification Badges:

Security Background Check	\$11.00
New Issue	\$25.00
Renewal/Defaced	\$25.00
Name Change	\$25.00 (paid at time of issuance)
Addition	\$25.00 (i.e. adding company name, driver, etc.)
Deletion	\$25.00
Lost	\$50.00
Stolen	No Charge with proper documentation
Fingerprinting	\$27.00 (every two years)
AOA Vehicle Decal	\$25.00 per vehicle

1.6.3.2. Fees Associated with Keys:

New Hard Key	\$10.00
Lost Hard Key	\$50.00

Note: No personal checks or credit card payments are accepted. Companies will be assessed a \$100.00 fee for each non-returned identification badge and key.

1.6.4. Contractor must maintain all information described above for a period of four (4) years following expiration of this Contract. Such information is subject to audit by the Authority and must be sufficient in scope and detail to permit verification of compliance by Authority audit. Actual damages to the Authority resulting from a breach by Contractor of its obligations hereunder will be difficult or impossible to determine. As a result, Authority shall be entitled to recover liquidated damages of Two Hundred-Fifty Dollars (\$250.00) for every Contractor Responsible Employee presented to the Authority for access control badging (a) for whom the above background check has not been completely and accurately performed, or (b) who should not have been presented per the above guidelines. The Contractor remains responsible for any/all regulator deductions associated with the Contractor's failure to properly conduct/complete the required background check. The amount payable hereunder by Contractor is not a deduction, is in addition to any access control badging application fee paid by the employee and is payable whether or not such employee is issued an access control badge by the Authority.

1.6.5. Contractor must co-sign with the subcontractor all badge applications for any employee of a temporary employment agency engaged as a subcontractor to provide personnel to Contractor on this Contract. All employees provided by temporary employment agencies for this Contract shall be Contractor

Responsible Employees. Before submitting a badge application for an employee provided on this Contract by a temporary employment agency, Contractor or the temporary employment agency must submit to the Authority's AAR for prior approval of such employee, a contract between the temporary employment agency and such employee reflecting an intended assignment of such employee to the Contract for the remaining duration of the Contract or the duration of the Contractor's need for such position.

1.7. U.S. CUSTOMS AND BORDER PROTECTION ACCESS REQUIREMENTS

1.7.1. The U.S. Customs and Border Protection (CBP) required badge for the purposes of performing duties under the Contract is a hologram badge. The Contractor shall comply with all CBP requirements in order to obtain and maintain a hologram to be affixed on the Authority badge. Currently a bond must be posted with CBP before any holograms are issued. Contractor should verify bond cost with U.S. Customs and Border Protection. The bond amount could change if the Contractor commits CBP violations or if the CBP changes its rules or procedures.

1.7.2. Contractor shall post a continuous CF 301 Bond (Type 1 or 2) or an Airport Security Bond. The bond is obtained from an authorized surety company as referenced in 19CFR113.37. The face value of the bond depends upon how many employees will require access to the Customs security areas.

Less than 15 \$ 25,000.00

Between 15 and 25 \$ 50,000.00

More than 25 \$100,000.00

1.7.3. The CF 301 Bond can be designated as an import/broker bond, warehouse bond, international carrier bond, or a non-specific Airport Security Bond.

1.7.4. The Contractor must have a sufficient number of BHS Agents, line management staff as well as maintenance technicians, (as permitted by local CBP officials) badged with Federal Inspection Station (FIS) credentials, to ensure adequate staff on all shifts are capable of responding to FIS calls without escort.

1.8. EMERGENCY RESPONSE

1.8.1. Emergency Response - The Contractor shall provide all personnel and services requested by the Authority for emergency coverage/response. The Contractor shall familiarize its employees and subcontractors with the procedures and responsibilities specified in the Authority's Emergency Procedures document pertaining to Elevators, Escalators, and Wheelchair Lift. Copies of all applicable procedures will be furnished to the Contractor at Contract commencement.

1.8.2. In the event that the Authority declares that an emergency condition exists, the Contractor may be asked to perform additional functions or duties beyond the normal equipment maintenance and repair functions described herein. These additional Contractor functions and duties during an emergency condition shall be considered a part of the normal Work services provided to the Authority. If

the Contractor's employees are required by the Authority to work beyond their scheduled (i.e. 8 hour) shift, the Authority will reimburse the Contractor for any overtime expenses. The Authority will not reimburse the Contractor for expenses related to food, lodging, or any other incidental costs arising from this requirement.

- 1.8.3. In the event an emergency condition is declared by the Authority's Executive Director, Deputy-Executive Director, Director of Operations or their respective designees, the Contractor will perform work during such hours as specified by the Authority.

1.9. ITEMS PROVIDED BY THE AUTHORITY:

- 1.9.1. The Authority will provide reasonable job-related office space, workshop space, and storage space for parts, supplies, tools, and equipment at no cost to the Contractor.
- 1.9.2. The Authority will furnish the Contractor's employees, for a fee paid by Contractor, an identification badge (subject to the conditions set forth in **Paragraph 1.6** that will display their picture, name, and other critical information required by the Authority.
- 1.9.3. The Authority will provide job-related company-vehicle parking permits in the Authority's remote parking site, for a fee, to the Contractor. The Authority will provide Contractor one Management Parking permit for parking in the Authority's parking Garage at no cost to Contractor.
- 1.9.4. The Authority will pay the cost of utilities (electric, water, and sewage) used in the maintenance and repair of the Equipment covered under the Contract.
- 1.9.5. The Authority will provide for pick-up of non-hazardous solid wastes, generated in the maintenance and repair of the Equipment covered under the Contract. Contractor shall place all waste materials in the Authority's dumpster or other such common trash pickup point as approved by the AAR.
- 1.9.6. The Authority will pay the cost for each "Certificate of Operation (C/O)" as required by the State of Florida for the Elevators and Escalators.
- 1.9.7. The Authority shall provide a third-party inspection service for the safety inspections of elevators, escalator, and wheelchair lift as required by Section 399.061, Florida Statutes, as amended May 24, 2000.
- 1.9.8. All Authority-created procedures/documents (i.e. Emergency Procedures, Radio specifications, Entrapment procedures, etc.) referenced by this Contract will be provided to the Contractor prior to Contract commencement. These Specifications govern in the event of a conflict between the Specifications and the other Authority-created procedures. Referenced non-Authority documents (i.e. ASME A17 Codes, Southern Building Codes, ADA requirements, etc.) will not be provided and shall be obtained by the Contractor.
- 1.9.9. Two-way radios per Section 1.10.

1.10. TOOLS AND EQUIPMENT

- 1.10.1. The Contractor shall provide, at no additional cost to the Authority, all tools and equipment necessary to perform the Work required under the Contract. The Contractor shall provide evidence of its ability to execute efficient and timely repairs of the Equipment. Part of this evidence shall be an inventory list of special tools used in the maintenance and repair of Equipment covered under the Contract to be submitted within thirty (30) days after Contract Effective Date.
- 1.10.2. The Authority shall have the right at all times, but not the obligation, to examine all equipment, tools, materials and supplies used by the Contractor, or by its officers, employees, subcontractors or agents in the performance of the Contractor's obligations under the Contract. If any of the above is found to be unsafe or not in good working condition, the Authority has the right to direct the Contractor to remove it from service, and to repair or replace it promptly.
- 1.10.3. Each of the Contractor's motor vehicles brought onto the Authority's premises shall have the Contractor's business name and/or logo prominently displayed on both front doors of such vehicle.
- 1.10.4. All necessary signage and barricades shall be furnished by the Contractor at its sole cost. Sufficient quantities shall be stored on-site to safely and completely block-off and/or redirect passengers in case of multiple failures. Escalators shall be blocked off in a manner to prevent unauthorized use by placing an A17.1 approved barricade completely around the entry and exit platform. The use of safety cones or warning tape to block off the entry and exit platform is prohibited. Single bank public-use elevators removed from service shall have signage placed at each level indicating that the unit is out of service, the expected length of the outage, and directing passengers to the next available unit. All equipment outages shall be reported to the Authority as described elsewhere in this document.
- 1.10.5. The Contractor shall be responsible for pumping out or draining all pits and properly disposing of any water/oil, that may be the result of, but not limited to, flooding from storms, backing up of drains, broken pipes/fixtures, and/or ground water intrusion, in accordance with applicable laws and regulations. A portable fluid transfer pump capable of transferring a minimum of 40 G.P.M at a lift of 8 feet, and with a minimum of eight feet of intake hose and twenty-five feet of discharge hose, shall be stored on-site at all times. No additional compensation shall be provided for this action/requirement regardless of the cause of the flooding or seepage. Contractor shall report to the AAR the presence of any fluids in Equipment pits and any potential damages to pit equipment. Contractor shall not be held responsible for damages to the equipment caused by water exposure unless Contractor is responsible to protect equipment against such damage or if the equipment damage is due to prolonged exposure to water where such prolonged exposure could have been prevented by timely action/response by the Contractor.

1.11. COMMUNICATION AND EQUIPMENT MONITORING

- 1.11.1. The Authority shall provide, at its sole cost a sufficient number of two-way radios to be used by its employees and subcontractors. The two-way radios shall be

compatible with the Authority's frequency to provide direct communication and/or dispatch with the Authority. While on duty, the on-site Foreman, and all service Mechanics and Helpers shall be equipped with two-way radios. The Contractor's employees and subcontractors shall abide by the Authority's established radio-use procedures and etiquette requirements at all times. No service Mechanic or Helper shall be permitted to work alone in a location that is out of the sight of others without a two-way radio or other form of two-way communication.

1.11.2. The Contractor shall be responsible for any damage to, or **loss** of, Authority's equipment and shall return all radio equipment to the Authority at the expiration of the Contract or earlier termination. Contractor shall either replace any lost or damaged equipment with the same or an equivalent model, or reimburse the Authority for the equipment at its current replacement cash value which is calculated as the cost of new replacement equipment less depreciation, if depreciation is warranted, as determined by the Authority.

1.11.3. The Contractor shall provide and maintain, at its sole costs (including any and all maintenance and replacement costs), a paging system for use with the LIFTNET monitoring system. The paging system shall be capable of receiving full text messages of pre-defined elevator faults or conditions. A minimum of four (4) active pagers will be maintained on site. The Paging System (pager) shall receive a text message indicating that a fault has occurred and correctly identify the equipment at fault by the GOAA unit designation/ID within 5 minutes of the LIFTNET system detecting the fault or failure. Contractor is responsible to ensure the pager (supplier/service) has the required response time described herein and is capable of receiving pages (a signal) in all areas of the airport where Contractor's personnel may be working.

1.12. WARRANTY:

1.12.1. The Contractor shall provide parts and labor warranty for a period of one (1) year following installation/repair/maintenance of Equipment. During the warranty period, Contractor shall at its sole cost and expense install a replacement for any defective part, and shall re-perform, at no additional cost to Authority, any defective services. This warranty shall not serve as a limitation on Contractor's liability for latent defects in any part or for any workmanship.

1.12.2. The Contractor shall provide to the Authority all manufacturers' product warranties for parts and equipment installed on OIA premises.

1.12.3. In the event that new, warranted equipment is added to this Contract, Contractor shall perform all maintenance and repairs to this additional Equipment as required by this Contract, to include but not limited to, services related to the warranty of the new Equipment. Contractor shall perform such services per the agreed upon rates so reflected in any resulting Amendment, which shall be based on rates for similar units contained in the Contract as described in Section 2.3 of these Specifications. Contractor shall be solely responsible for any effort associated with seeking additional compensation or reimbursement from the original Equipment manufacturer for performing warranty work, to include but

not limited to, any cost associated with warranted parts replacement. Under no circumstances shall the repair or service of any Equipment under this Contract be delayed as the result of a warranty issue/claim. In the event that the Contractor performs, or fails to perform, any action that voids the manufacturer's warranty, the Contractor shall assume the full liability and responsibility of the voided warranty.

PART 2 - PRODUCTS

2.1. PARTS INVENTORY - SUPPLIES

- 2.1.1. Contractor shall purchase at its sole cost and shall maintain, at all times, an on-site spare parts inventory with minimum items/parts listed in Attachment "C" (TBD), and shall use such spare parts exclusively for repair and maintenance of Authority's Equipment covered under this Contract.
- 2.1.2. The items listed in Attachment "C" (TBD) are the minimum requirements. It is Contractor's responsibility to stock a sufficient quantity of those parts and to add any parts not listed to the inventory that would be necessary to ensure all equipment can be maintained and repaired with minimal downtime. Contractor should expect multiple equipment failures of the same type of equipment during the same period and stock sufficient quantities to ensure downtime is minimized and to increase quantities stocked for those items with long lead times. The Authority reserves the right to require Contractor to stock additional parts and/or increase the quantities of items stocked.
- 2.1.3. The spare parts in Contractor's on-site inventory shall not be used for any other purposes or removed from this job site without the express written approval of the AAR. Contractor shall at its sole cost, insure the on-site spare parts inventory against damage or loss due to theft, vandalism, disappearance, or other similar cause.
- 2.1.4. Original equipment manufacturer (OEM) parts shall be purchased and used in the maintenance and repair of the Authority's Equipment. Non-OEM parts may be used, provided such parts have been approved prior to Contractor's use as being equal or of superior quality to OEM parts by either the manufacturer of the equipment or the AAR. Written approval must be obtained prior to using non-OEM parts.
- 2.1.5. The repair and/or replacement of any system component part (either OEM or Non-OEM), which is covered under the manufacturer's and/or Contractor's warranty, shall be a part of the Work under this Contract, and shall not result in any additional charge to the Authority.
- 2.1.6. The Pricing of all items listed in Attachment "C" (TBD), and any future price changes, shall reflect the price Contractor will/would sell each respective part listed to the Authority. At any time during this contract or at termination of the Contract, the Authority shall have the option of purchasing all or a portion of the required spare parts listed herein at the most recent prices submitted by the Contractor for Attachment "C" (TBD)

- 2.1.7. Contractor shall provide, at no additional cost to the Authority, annual updates to parts inventory to reflect any pricing changes. Any changes/increases in pricing shall be at the lowest price for which the Contractor sells such parts to its best customers or at the Contractor's cost plus five percent (5%) if no such sales of such part or parts have been made
- 2.1.8. Any price increase to the spare parts inventory must be approved by the AAR subject to verification that such increase is warranted and the amount of increase is appropriate. Price increases, per item/part, shall not exceed the maximum percentage allowed **(6%)** by this Contract for materials increases in any single year.
- 2.1.9. In the event that Additional Work is authorized by the Authority, the cost to the Authority for any parts or materials used in such Additional Work shall not exceed the prices provided by the Contractor regarding its most recent pricing/cost submission for Attachment "C" (TBD) as approved by the AAR.
- 2.1.10. The Authority may add or delete parts from the required spare parts inventory as deemed necessary or whenever conveyance equipment is added or deleted from the Contract.
- 2.1.11. Supplies, including maintenance office supplies, shop cleaning supplies, materials not categorized as spare parts but required in the operations/maintenance of the Equipment under Contract, and other expendable/consumable items and materials as required in the execution of the Work shall be the sole cost of the Contractor without reimbursement from the Authority.
- 2.1.12. The Contractor shall have ninety (90) days from the Contract Effective Date to obtain, and store on-site, all of the required spare parts listed in Attachment C (TBD). In the event that the Contractor fails to provide, and store on-site, the complete parts inventory, a performance deduction (Section **2.7.4** of General Conditions) shall be applied to the monthly maintenance invoice.

2.2. LUBRICANTS – OIL ANALYSIS

- 2.2.1. All lubricants used by Contractor shall comply with the specifications for lubricants recommended by the Equipment manufacturer for the particular unit or device to be lubricated. Rope lubricants shall conform to the manufacturer's recommendations and the ASME Inspector's Manual A17.2. Lubricants shall be stored in properly marked containers. Lubricants and other environmentally controlled substances shall be disposed of by Contractor as required by all applicable laws and environmental regulations. **Contractor is responsible for all costs associated with the cleanup and disposal of spilled or leaking fluids (excluding below ground leaks from hydraulic cylinders which are not caused by Contractor negligence).**
- 2.2.2. It is the Contractor's responsibility, where hydraulic equipment is installed, to monitor the temperature and condition of the oil. Oil temperatures must be maintained within the manufacturer's recommended safe operating range. If no specific manufacturer's recommendation is given, the maximum oil temperature

shall not be greater than 140 degrees Fahrenheit. Temperatures exceeding this requirement shall be reported to the AAR. The Contractor shall also maintain a written record in the machine rooms documenting the quantity of hydraulic fluid added to the system and emptied from leakage collection containers and pans. If the quantity of hydraulic fluid loss cannot be accounted for, the Contractor shall perform pressure tests and inspections of the system as outlined in ASME A17.1 (2000), sections 8.11.3.2.1 and 8.11.3.2.2.

- 2.2.3. The Contractor shall maintain an AAR-approved hydraulic oil sampling/testing program. At a minimum, the hydraulic oil shall be sampled/tested biannually. The oil analysis shall be performed on each oil sample by an independent and certified laboratory. The cost of these analyses shall be borne solely by the Contractor. The testing schedule, substances/materials tested for, and results of these analyses shall be provided to the AAR. If the oil analyses indicates or recommends that the oil should be replaced the Authority shall bear the cost for the materials (oil), transportation, disposal, and Contractor shall bear the cost for the labor to replace the oil.

2.3. NEW EQUIPMENT AND EQUIPMENT REMOVED FROM SERVICE

- 2.3.1. It is expected that new equipment will have lower repair requirements for a period of time, therefore all new Equipment added to this Maintenance and Repair Contract shall be maintained by Contractor at the reduced rate of twenty-five percent (25%) below the unit pricing on the Bid Form for similar Equipment. This pricing shall remain in effect for six (6) months.
- 2.3.2. The Authority may remove equipment from passenger service at its discretion at any time during this contract. In this event, the Authority shall deduct from the monthly invoice the amount charged (as indicated on the Bid Form) for the maintenance of the equipment. Deductions will not be taken if the equipment is removed from service for a period of less than 30 days. In the event, units are removed from service for more than 30 days, deductions will be taken based on one week (7 calendar day) intervals. Each interval will be deducted at the rate of twenty-five percent (25%) of the total monthly charge for the unit. If a unit is returned to service before the end of the interval, the deduction will not include that interval. For example if an elevator is removed from service on January 1, and returned to service on February 17th, the deduction would be for the period of time between February 1 and February 17. The deduction would include two intervals (Feb 1 to Feb 7, and Feb 8 to 14. But Feb 15 to Feb 17 would not be counted since that time period is not a full interval (the interval is less than 7 days). In this example, the deduction would be for two intervals which is 50% of the total monthly charge for the elevator.

PART 3 - EXECUTION

3.1. PERFORMANCE REQUIREMENTS

- 3.1.1. Contractor shall perform all of its obligations and functions under the Contract in accordance with the requirements specified herein, and to the highest industry standards ensuring that the elevators, escalators, and wheelchair lift at the

Orlando International Airport will operate at their original design efficiency, and in accordance with the manufacturer's specifications and all applicable code requirements. The Contractor shall coordinate its activities with and adjust its activities to the needs and requirements of the Authority and will perform its activities so as not to annoy, disturb, endanger, unreasonably interfere with, or delay the operations or activities of the Authority, any tenant, or occupant of the premises.

3.1.2. The Contractor shall not do or keep anything at the Airport site which will in any way conflict with any law, ordinance, rule or regulation which now or hereafter may be enacted or promulgated by any governing public authority agency; or which will create a safety hazard at the Airport; or create a nuisance; or in any way obstruct or interfere with the rights of other users at the Airport, except as reasonably required in the performance of its obligations and functions hereunder and which has been approved in writing in advance by the AAR; or commit or suffer to be committed any waste upon the site or allow the site to be used for any improper or unlawful purposes; or place any loads upon the floor, walls, or ceiling which endanger the structure; or obstruct the sidewalks or passageways or stairways in front of, within, or adjacent to the site, except as reasonably required in the performance of its obligations and functions hereunder and which has been approved in writing in advance by the AAR.

3.1.3. If repair, replacement, and/or refinishing of items not specified in the Contract are required because of the act or omission of the Contractor, the cost of making such repair, replacement and/or refinishing shall be borne solely by the Contractor.

3.2. EQUIPMENT MONITORING REQUIREMENTS (LIFTNET and TALK-A-PHONE)

3.2.1. The Contractor is responsible for maintaining the elevator and escalator, monitoring system (LIFTNET) which shall continuously remotely monitor key functions for all of the Authority's vertical and horizontal passenger conveyance systems.

3.2.2. The monitoring system is connected to each elevator controller in the elevator machine room, or to the individual controllers located in the pit(s) in the case of escalators. It shall monitor and analyze essential signals. The monitoring system shall transmit to the monitoring stations alarm detection conditions and equipment malfunctions. Equipment performance statistical data shall be continuously captured and stored in computer memory.

3.2.3. The Contractor shall maintain a minimum of one active and one spare LIFTNET monitoring stations at the Airport facility. Each station consists of a LIFTNET computer with a 19-20 inch LCD flat panel color monitor, keyboard, and mouse. One backup power supply (UPS) shall be maintained per active station.

3.2.3.1. The primary (master/server) LIFTNET monitoring station shall be located and maintained in the Contractor's Office Space.

3.2.3.2. The remainder of the monitoring stations shall be located at sites designated by the AAR.

3.2.3.3. Contractor shall be aware of any software/hardware updates or upgrades available for LiftNet. Contractor is responsible to install any software updates/patches required by LiftNet to preserve the integrity of the data/ system or to correct software issues/problems that prevent the system from functioning as intended at no additional cost to the Authority. The Authority will reimburse Contractor for any upgrades that are requested by the Authority to enhance or improve the system but which are not required by LiftNet.

3.2.4. All LIFTNET monitoring stations are to continuously receive messages, faults and alarms. At a minimum, the system shall monitor and report the following Elevator signals:

3.2.4.1. Alarms

- Alarm button
- Fire service

3.2.4.2. Faults

- Power on/off
- Door Detector
- Safety circuit open
- Door lock
- Machine room temperature exceeds 95 degrees
- Out of level

3.2.4.3. Messages and Status

- Car status (in or out of service)
- Car position (location in hoistway and direction of travel)
- Door status (open/closed)
- Emergency power
- Fault detected
- Group operational mode
- Location and direction of hall calls

3.2.5. All LIFTNET monitoring stations are to continuously receive messages, faults and alarms. At a minimum, the system shall monitor the following Escalator signals and faults:

- Equipment status (in or out of service)
- Emergency stop /stop button activation
- No power (electrical supply)
- Direction
- Cumulative run time
- Handrail entry device
- Handrail speed monitoring device

- Skirt obstruction device
 - Pit high water level
- 3.2.6. An emergency voice communication system (Talk-A-Phone) shall be maintained in each elevator. This system shall permit direct voice communication between the elevator car and the Authority's Communications Center Operator (911 system). When the emergency phone button is pressed in the elevator, a telephone connection shall be established between the elevator car and the Communications Center operator through the speaker and microphone components of the module. The Contractor shall be responsible for polling (testing) the elevator emergency phone system daily using the "Talk-A-Lert" computer program. If any of the phone lines are found to be out of service, the Contractor will investigate for possible causes. If the phone line to the controller is not in service, the Contractor shall notify Central Plant and/or the AAR as soon as possible.
- 3.2.7. Contractor shall be responsible for the testing/diagnostics, and the removal and replacement of the TALK-A-PHONE device in the elevator cab and all communication lines from the elevator cab to the elevator machine room. Contractor shall bear full responsibility for the cost of all repairs including the shipping and handling costs for off-site repairs of the TALK-A-PHONE equipment. Contractor is not responsible for repairs and/or diagnostics of the communication/phone lines to the elevator machine room.
- 3.2.8. LIFTNET monitoring stations shall receive all shutdown signals and faults. This will apply in situations where the car has either been taken out of service for maintenance and repair or a malfunction has caused the equipment to shutdown.
- 3.2.9. Each monitoring station's monitor screen shall present a graphical plan (layout) view of the elevators located throughout the building(s). When an alarm condition is encountered, the elevator in question shall be illuminated or identified on the screen.
- 3.2.10. Specified reports shall be provided to the AAR by the Contractor on a monthly basis. The reports shall be generated from written and stored data and shall supply the following information for each elevator:
- Total number of entrapments, cause for entrapments and the average per month
 - Total number of shutdowns and the average per month
 - Total number and type of faults and the average per month
 - Total number of accidents and average per month
 - Repair work completed in the last month and additional work status.

3.3. SYSTEM MAINTENANCE REQUIREMENTS

- 3.3.1. The Contractor shall maintain all Equipment under the Contract in compliance

with all requirements of the applicable American Standard Safety Code for Elevators and Escalators; ASME A17 codes; Florida Elevator Code, Chapter 61C-5; National Elevator Industry Field Service Manual; Southern Building Code, Chapter 506; State of Florida Department of Insurance, Division of State Fire Marshal, Chapter 4A47; and all other applicable Federal, State, and Local laws, regulations, ordinances, and codes. The above documents along with the ASME Standards and Inspector's Manual, and the original equipment manufacturers' O&M manual shall be used as a guide to establish that Equipment is operating safely.

- 3.3.2. The Contractor shall perform daily inspections on each unit of elevator, escalator, wheel chair lift, the component parts of each (including emergency telephones, in-car alarm systems and doors), and its operation in accordance with the original equipment manufacturer's maintenance recommendations and, as conditions warrant, shall adjust, lubricate, clean, repair, or replace parts and mechanisms as necessary to keep the Equipment in proper and safe operating condition. The LIFTNET monitoring system shall also be inspected each shift to ensure proper operation. A corrective maintenance work order shall be generated for any needed maintenance or repair tasks that the visual inspections identify. Contractor shall make/provide all elevator door adjustments as necessary to maintain elevator availability at no additional cost to the Authority even if such adjustments are required as the result of impacts (from baggage, carts, material deliveries, etc.) to doors. These impacts will not be considered misuse, abuse, vandalism, or third party damage. If the impact, or cumulative effect of multiple impacts over time, require the replacement of door parts (i.e. gibbs, door panel, etc.), the Authority will compensate Contractor for those parts and labor per the Additional Work terms of this Contract
- 3.3.3. The Contractor shall maintain the signal system, devices, lighting fixtures, including lamps and ballast, and fixture cover plates in proper working order at all times. Signal equipment shall include, but is not limited to, the elevator communication systems, signal buttons, direction indicator lights, position indicators, hall lanterns, mechanical lanterns, mechanical and electrical dials, signal bells, buzzers, gongs, and annunciators.
- 3.3.4. The Contractor shall maintain in proper working order at all times, and replace or repair as necessary, all operating accessories of cabs and hoist way doors and gates, including, without limitation, key switches, locking devices, electronic door edges and/or reopening devices, exhaust fans, plenum chambers, cab mounted air-conditioning units and related components.
- 3.3.5. The Contractor shall replace wire ropes as required to comply with ASNI standards and A17 code requirements. Periodically, the Contractor shall equalize the tensions of all hoist ropes, and lubricate per wire rope manufacturer's recommendations.
- 3.3.6. The Contractor shall examine all safety devices, including without limitation, associated fire alarm equipment and governors, and perform safety tests as required by current applicable codes.

- 3.3.7. The Contractor shall assist the Authority or the Authority's designee in smoke/heat detector testing and in ensuring that all fire safety and protection devices pertaining to the Equipment, function as required by applicable code.
- 3.3.8. The Contractor shall be responsible for testing and maintenance of the Firefighters' Service, including but not limited to, Phase I and II operation, switch operation, signaling devices, emergency identification signage/displays, emergency lights/jewels, LIFTNET monitoring system, TALK-A-PHONE emergency communication system, batteries for lighting, alarm button/bell, and related devices.
- 3.3.9. Adjustments to the electronic circuits and the sequence of operation of the components shall be in accordance with engineering tolerances established by the manufacturer of the Equipment, and the maintenance of mechanical clearances shall be in accordance with the manufacturer's engineering standard tolerances.
- 3.3.10. Contractor shall replace chipped/broken escalator and moving walkway combplates (as required by the safety code) without reimbursement from the Authority, regardless of the cause.

3.4. MAINTENANCE SCHEDULES

- 3.4.1. Any modifications or changes to the approved Preventative Maintenance Schedule must be authorized by the AAR in writing. The AAR's acceptance or approval of Contractor's maintenance schedule shall not in any way relieve the Contractor of any obligation for maintaining the Equipment in accordance with the requirements of the Contract including, but not limited to, maintaining all the Equipment in accordance with all applicable manufacturer's recommendations.
- 3.4.2. The following minimum preventive maintenance and comprehensive inspections shall be performed:

<u>Type of Equipment</u>	<u>Preventative Maintenance Frequency</u>
Inspection of equipment for Safety	Daily
Inspection of Elevator Cab interior/lighting	Daily
Inspection/testing of Elevator Phones	Daily
Inspection of Escalator steps/combplates	Daily
Geared Traction Elevators	Monthly
Gearless Traction Elevators	Monthly
Hydraulic Elevators	Monthly
Single Drive Escalators	Monthly
Multi-Drive Escalators	Monthly
Wheelchair Lift	Monthly

All Maintenance and Repairs shall be conducted on the work shift (time of day) specified by the AAR (additionally see **paragraph 1.4.1**).

- 3.4.3. The maintenance and/or inspections performed shall follow the manufacturer's inspection or preventative maintenance recommended procedures and checklist when available. In the event that the Equipment manufacturer does not provide an inspection or preventative maintenance checklist, the appropriate ASME Inspection Checklist for Elevators (A134C1, A050C7), Escalators (A141C1), or an equivalent form(s) shall be utilized. All Checklists shall be completed and a summary indicating defects and/or needed repairs, if any, shall be furnished to the AAR immediately after the inspection or preventative maintenance work is completed.

3.5. Additional Work

- 3.5.1. "Additional Work" shall refer to those repairs and/or parts replacement required as a result of vandalism or damage to Equipment caused by third parties. In the event that the damage or wear cannot clearly be attributed to vandalism, or third-party causes, the AAR shall make the final determination.
- 3.5.2. "Additional Work" shall also refer to upgrades, enhancements, modifications, and the replacement or refurbishment of any Equipment, component, or system, as deemed necessary by the Authority to improve the aesthetics, safety, reliability, or performance of the Equipment or system(s) maintained under the Contract.
- 3.5.3. Additional Work shall be performed only upon written authorization of the AAR or designee.

3.6. RECORDS MANAGEMENT AND REPORTING REQUIREMENTS

All reports, log books, work order forms, and other documentation required by the Contract or by any other regulation or code requirement shall be understood to be the property of the Authority. These documents shall be available for inspection at all times and turned over to the Authority at the termination of the Contract.

- 3.6.1. Contractor's Work Order Form - The Contractor shall complete a Contractor's work order (service receipt) for all Additional Work to be performed and submit it to the AAR for written approval. The Contractor's work order form shall be approved by the AAR prior to its use. The Authority reserves the right to modify or replace the Contractor's work order form at any time during the Contract. The Authority may require the Contractor to complete a work order in the Authority's computerized maintenance system (program) in addition to the Contractor's work order form.
- 3.6.2. Maintenance and Status Report - A written Status report shall be delivered to the AAR monthly, including but not limited to, total number of entrapments, cause for entrapments, and the average per month, the number of shutdowns and the average per month, the number and type of faults and the average per month, total number of accidents with causes and average per month, a notice of potential and discovered deficiencies, project/construction (Additional Work) schedules/updates, and planned or scheduled heavy maintenance and/or repairs for all Equipment. The Contractor shall also include in these report details of the nature and extent of any major adjustment, parts replacement, or repairs made

to the Equipment.

3.6.3. Testing Schedules

3.6.3.1. The Contractor shall notify the AAR of the time and place of tests no later than 48 hours in advance of regularly scheduled inspections/safety tests, including pressure tests and full load tests. The AAR or designee must be notified of the results of each test in writing no later than 72 hours after test completion.

3.6.3.2. The Contractor shall maintain a database of all required testing/inspection pertaining to the Equipment covered by the Contract and notify the AAR if any required testing/inspection is outstanding or delinquent, regardless of whether the testing/inspection is the responsibility of the Contractor or the Authority.

3.6.4. **Response Time** - Service mechanics shall respond to any entrapment to which they are dispatched within fifteen (15) minutes of notification. For all other service calls and/or dispatches where the Equipment is out of service (not an entrapment), the Contractor shall respond to restart (escalator or moving walk), or commence repair within twenty (20) minutes from the time that LIFTNET detects that the equipment is out of service or the Contractor is notified.

3.6.5. Reporting Equipment shutdowns - Any Equipment that is removed from service, for unscheduled repair, where the estimated or expected time that it will be out of service will be longer than 30 minutes shall immediately be reported to the Authority Central Plant Dispatcher. The time of day that the Equipment is taken out of service, or discovered inoperative and the estimated time when the Equipment will be returned to service shall be reported. In the event that the Equipment is estimated to be out of service for longer than two (2) hours, the Contractor shall also notify the AAR or designee. The Authority Central Plant Dispatcher shall be notified when the unit is returned to service. Scheduled repairs where the repair is estimated to take over 4 hours to complete shall have a Utility Outage Notice (UON) form completed and submitted to the AAR 72 hours in advance. Equipment shut downs for Preventative Maintenance do not require a UON provided the work is accomplished within the shift identified by the AAR.

3.7. USE OF PREMISES

During the progress of the specified Work, the Contractor shall keep the premises free from accumulation of waste materials, rubbish, and other debris resulting from the Work. At the completion of the Work, the Contractor shall remove all waste materials, rubbish, and debris from, and about the premises as well as all tools, appliances, machinery, and surplus materials, and leave the site clean and ready for occupancy by the Authority. All waste materials associated with this project shall be handled in accordance with all federal, state and local regulations.

3.8. SAFETY AND PROTECTION

The Contractor shall be solely and completely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. The Contractor shall take all necessary precautions for the safety of, and shall provide the

necessary protection to prevent damage, injury or loss to all employees on the work site and other persons including, but not limited to, the general public who may be affected thereby.

* * * * * END OF SPECIFICATIONS * * * * *

ATTACHMENTS

- Attachment C

SECTION 14 21 00 - TRACTION ELEVATORS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Division includes:
 - 1. ASC: Provide thirty-one (31) MRL gearless service and passenger elevators. Two (2) of the thirty elevators are planned as future elevators.
 - 2. LSC: Provide twenty-three (23) MRL gearless service and passenger elevators.
 - 3. PKG: Provide six (6) Overhead Geared passenger elevators.
 - 4. GTF: Provide three (3) MRL gearless passenger-shaped and service-shaped passenger elevators.
 - 5. Coordinate the work of this Division with work of other Divisions as required to properly execute the work as necessary to maintain satisfactory progress of the work of other Divisions.
- B. Related Work (to include but not limited to the following by other trades):
 - 1. Elevator pit, including sump with pump, elevator machine foundation with block-outs in machine room floor slabs and other similar concrete work such as grouting thresholds.
 - 2. Hoistway enclosures, including cutouts for elevator equipment and components penetrating enclosures, building in and grouting hoistway door frames, grouting thresholds.
 - 3. Structural steel work, including intermediate floor framing where floor height exceeds 14 feet, elevator pit ladders, elevator buffer ladders and/or platforms (as required by pit depth), railings, wire mesh partitions, machine room floor grates and hoisting beam(s) at top of the elevator machine room, and/or hoistway.
 - 4. Waterproofing of elevator pits.
 - 5. Machine room heating, ventilation and air conditioning and temperature control of the machine rooms, hoistway ventilation and sprinklers to meet applicable Codes.
 - 6. Electrical service to fused lockable main disconnects in elevator machine rooms and/or machine or control spaces or closets; electrical service to fused lockable disconnect for each elevator's car lighting; electrical power for elevator installation and testing; electrical disconnecting device to elevator equipment prior to activation of the sprinkler system; electrical service for the machine room (spaces, or closet); receptacles with ground-fault current protection in machine room (spaces, or closet), secondary areas, hoistway, and pit; lighting in the machine room (spaces, or closets), secondary areas and pits; wiring for telephone service to the machine room (spaces, or closet).

7. Standby-power supply systems including emergency generators and transfer switches for elevator operation. An electrical control connection needs to be established between standby power system and elevator controls. Additional control features need to be included in electrical switchboards, and transfer switches.
8. Standby power of normal voltage characteristics via normal electrical feeders to run elevators at full-contract car speed and capacity.
9. Conductor from auxiliary form "C" dry contacts, located in the standby power transfer switch to a designated elevator control panel. Provide a time delay of 30 - 45 seconds for pre-transfer signal in either direction.
10. Standby single-phase power to group controller, and each elevator controller for car lighting, exhaust blower, emergency signaling device, air conditioner unit (if equipped with one).
11. Standby power to machine room, and pit lighting.
12. Standby power to machine room ventilation or air conditioning.
13. Standby power to emergency communications devices.
14. Fire alarm systems including fire initiated devices and interconnecting devices; fire alarm signal lines (main, auxiliary, and machine/control room, space, or closet to contacts in the machine/control room, space, or closet).

1.3 SUBMITTALS

- A. Product Data: Submit manufacturer's product data for each system proposed for use. Include the following:
 1. Signal and operating fixtures, operating panels and indicators.
 2. Cab design, dimensions and layout.
 3. Hoistway door and frame details.
 4. Electrical characteristics and connection requirements.
 5. Expected heat dissipation of elevator equipment in machine room, control space or closet.
- B. Shop Drawings: Submit no less than five copies (unless otherwise directed by the architect) of approval layout drawings. Include the following:
 1. Driving machine, controller, governor and other machine or controller room component locations.
 2. Car, counterweight, sheaves, guide rails, buffers, suspension means, and other components in hoistway.
 3. Rail bracket spacing; maximum loads imposed on guide rails requiring load transfer to building structural framing.
 4. Load reactions at all points of support.
 5. Location of hoisting beams for machine room equipment.
 6. Clearances and over travel of car and counterweight.
 7. Locations in hoistway and machine room of traveling cables and connections for car light and telephone.
 8. Location and sizes of access doors and frames.
 9. Hoistway door and frame details
- C. Samples: All exposed materials with finish and all custom fixture fabrications.
 1. Omit all logos from exposed finishes or components.
 2. All cab finishes.

3. All entrance finishes
 4. Of handicapped Braille tags for car and hall buttons
 5. Of handicapped Braille plates for hoistway door jamb
- D. Maintenance Data: Provide written information necessary for proper maintenance and adjustment of the equipment prior to final acceptance as follows:
1. Straight line wiring diagrams of as-installed elevator circuits with index of location and function of all components. Leave one set in machine rooms. Provide 2 corrected sets for Owner's file 90 days after acceptance.
 2. Lubricating instructions and recommended lubricant grade.
 3. Parts catalogs and maintenance manuals not limited to repair, diagnostic, parts and service, necessary for the maintenance and repair of the elevator equipment shall be provided to the Aviation Authority.
 4. Provide at no additional cost any special tools, laptops, pass words and manuals that are required for maintenance, trouble shooting, adjustments, door operation or performance of safety or code related tests for the Owner's use.
 5. If the Contractor requires the Owner to sign any documents for the special trouble-shooting tool(s), a copy of the agreement, shall be submitted with the bid.
 6. Provide 5 keys for each elevator switch and function. Match existing key system for the project. WD01 fireman's switches, 501CH Access switch, F315 On / Off, F501 Service panel door.
 7. Contractor shall furnish to Aviation Authority any proprietary tools or diagnostic equipment that is required for the maintenance, repair or troubleshooting of the elevator related systems that would prevent an outside elevator company that is not related to the elevator manufacturer from providing maintenance and repair functions / services, or which would prevent the outside elevator company from performing future upgrades or modifications to the elevator or related building systems. (ie, security, fire protection system, etc.)
 8. Submit the recommended monthly and annual testing and inspection schedule for each unit, as applicable, to be incorporated into the Service Contract, as Attachment D.

1.4 SUBSTANTIAL COMPLETION SUBMITTALS

- A. In addition to all other Contract requirements to achieve Substantial Completion, the Contractor shall, as a condition of Substantial Completion of the construction subcontract and before the effective date of the Service Contract, execute and/or deliver the following to the Authority: the Contract, a copy of the Bidder's valid business or occupational license, a copy of Bidder's W-9 Form (Request for Taxpayer Identification Number and Certification), certificate of insurance, performance bond or letter of credit, final approved staffing plan and inventory list, final approved testing and inspection schedule and all other documents and information required by the Contract Documents or the Owner. All of the above documents and information must be furnished and the Contract Documents executed by Contractor, and delivered to Authority, before the Contract will be executed by the Authority
- B. The failure to timely fulfill these obligations shall be just cause for the Authority's withdrawal of such Notice of Intent to Award. In such case, the Contract may be re-advertised and the Authority shall be entitled to receive its damages and costs, including, but not limited to, its attorneys' fees caused by or in connection with the Contractor's failure to fulfill its obligations under this Section.
- C. The Contract shall not be binding upon the Authority until it has been executed by the Authority

and a copy of such fully executed Contract is delivered to the Contractor. The Authority reserves the right to cancel the award without liability to any Bidder at any time before the Contract has been fully executed by the Authority and delivered to the Contractor. Accordingly, the Contractor is hereby warned that it should not commence performance or incur costs or expenses in connection with the Contract obligations until it has received from the Authority a final, fully executed copy of the Contract.

1.5 PRE-INSTALLATION CONFERENCE

- A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.
1. Participants:
 - a. Architect.
 - b. OAR.
 - c. Contractor, including superintendent.
 - d. Installer, including project manager and supervisor.
 - e. Manufacturer's qualified technical representative.
 - f. Installers of other construction interfaced with Work.
 2. Minimum Agenda: Installer shall demonstrate understanding of the Work required by describing detailed procedures for preparing, installing, and cleaning the Work. Demonstration shall include, but not be limited to, following topics:
 - a. Tour representative areas of Work, inspect and discuss condition of substrate, and other preparatory work performed by other trades.
 - b. Review Contract Document requirements.
 - c. Review approved submittals.
 - d. Review inspection and testing requirements.
 - e. Review environmental conditions and procedures for coping with unfavorable conditions.
 - f. Resolve deviations or differences between Contract Documents and the manufacturer's specifications.
 3. Record discussions, including decisions and agreements, and prepare report.

1.6 REFERENCES

- A. Comply with applicable building codes and elevator codes at the project site, including but not limited to the following:
1. ASME A17.1 Safety Code for Elevators and Escalators, current adopted edition or as required by the authority having jurisdiction. In areas not covered by AHJ use latest edition of ASME Code.
 - a. NFPA 70 National Electrical Code.
 - b. NFPA 80 Fire Doors and Windows.
 - c. Americans with Disabilities Act – Accessibility Guidelines (ADAAG).
 - d. ASME A17.1, Buildings and Facilities, Providing Accessibility and Usability for

- Physically Handicapped People.
- e. ASME UL 10B and ASTM E152 (or approved equal), Fire tests of door assemblies.
 - f. Model building codes.
 - g. Florida Building Codes, Statutes, Administrative Codes and Safety Guidelines
 - h. All other local applicable codes.

- B. Make application for, secure and pay for all necessary permits and certificates of inspection/operation for all equipment included herein, as required by the various departments of the Local and State Authorities. Furnish the Owner certificates and approval as required by the local governing authorities having jurisdiction.
- C. In addition to the permits, inspections and test specified and the governing codes, the elevator contractor will be required to have performed speed and load carrying capacity and heat tests at his own expense.
- D. Make applications for secure and pay for all necessary delays, waivers, or required to obtain certificate of compliance.
- E. Any damage of any kind to the car or the adjoining structure which may develop through performance of any tests shall be repaired at no additional costs to the Owner.

1.7 CONTRACTORS RESPONSIBILITY

- A. The Elevator Contractor shall coordinate installation and inspection of their work with all trades to ensure timely installation, inspections and overall construction schedule sequencing. Failure of the Elevator Contractor to not coordinate in a timely manner with other trades shall not warrant a delay in schedule or additional costs.
- B. In order to discover and resolve conflicts or lack of definition which might create problems, elevator manufacturer must review contract documents for compatibility with its product prior to bidding. Review structural, architectural, electrical, mechanical documents, and elevator specifications.
- C. Contractor must review all drawings associated with the project to ensure architectural design intents are full achieved, executed and coordinated as needed with other trades.
- D. Submit specific written exception and or clarification with quotation. Compliance with provisions of contract documents is assumed and required in absence of written exception.
- E. Owner will not pay for change to structural, mechanical, electrical, or other systems required to accommodate manufacturer's equipment if not identified before contract award.
- F. The electrical and mechanical design is based on the power characteristics and heat releases outlined in the drawings. The Contractor shall submit with bid any power characteristics or heat releases of this equipment that exceeds those listed in the drawings. Any additions or modifications requested at a later date will be at the expense of the Contractor.

Heat release given as BTU/elevator/hour. All amperages based on 480 volt system. Maintain 50 to 90 degrees F temperature with 90% non-condensing humidity.

- G. Storage of materials: Store materials in a dry protected area. Handle materials in accordance

with manufacturer's recommendations to prevent damage, soiling, or deterioration.

1.8 WARRANTY

- A. Provide warranty to replace, repair, or restore parts or components that fail or do not operate properly due to poor field or factory workmanship, engineering or design for a period of 12 months from the date of Substantial Completion. If turnover for beneficial use occurs prior to Substantial Completion, provide interim warranty/maintenance between turnover and substantial completion, so that 12 month Warranty period is maintained starting at Substantial completion.

1.9 MAINTENANCE

- A. Furnish a preventable maintenance schedule, including all testing and inspection services identified for each elevator for a period of twelve (12) months as a condition of Substantial Condition. The maintenance service shall comprise of regular examinations of the installation by competent and trained mechanics on a routine basis, and shall include all necessary adjustments, greasing, oiling, cleaning, and supply parts and accessories necessary to keep the equipment in good operating condition, except such replacement of parts made necessary by misuse, accidents not attributable to failure of equipment or workmanship, and negligence by the Owner.
- B. A list of manufacturers recommended spare parts to be stocked (included in the unit price bid) shall be provided by the contractor for approval by the Owner as a condition of substantial completion of the elevator installation. Substantial deviators between the proposed and final inventory list may justify an adjustment to the bid price, if fully documented and approved by the Owner.
- C. Provide in accordance with Section 14 00 00 Escalator, Escalator Maintenance and Repair. Provide bid on a per unit basis with a monthly and annual total outlined in the Contractors bid submittal.
- D. In the event there is a conflict between this Specification and the Service Contract, the Service Contract will govern on all matters that arise after Substantial Completion.
- E. If turnover for beneficial use occurs prior to Substantial Completion, provide interim warranty/maintenance between turnover and substantial completion, so that 12 month Warranty period is maintained starting at Substantial completion.

1.10 QUALITY ASSURANCE

- A. The specific product or material manufactured by any of the following listed manufacturers is "acceptable" only if the specific product or material can evidence exact compliance with the contract documents and governing codes.
 - 1. KONE Elevator Company
 - 2. Otis Elevator Company
 - 3. Schindler Elevator
 - 4. ThyssenKrupp Elevator

- B. Elevator Contractor must be able to demonstrate that it is a Manufacturer of similar elevators to those specified and which have given satisfactory service; has been in successful operation for at least ten (10) years; maintains locally, an adequate stock of parts for replacement or emergency purposes; has available qualified persons to do the work. Manufacturer means, for the purpose of this Specification section, a legal entity that is regularly engaged in the business of manufacturing the equipment required by this Specification and does not include independent "assemblers" of component parts.

1.11 PARTS AND PRINTED CIRCUIT BOARDS

- A. Contractor guarantees they will sell original manufactured parts and printed circuit boards to the Owner or the Owner's Agent. The same shall not be dependent on an exchange component.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. The following manufacturers and dispatching are acceptable:
1. KONE Elevator KCM 831
 2. Otis Elevator GCS
 3. Schindler Elevator Miconic TX
 4. ThyssenKrupp Elevator TAC32T
- B. For cabs and entrances:
1. Eklunds
 2. Hauenstein & Burmeister
 3. KONE Elevator
 4. Otis Elevator
 5. Schindler Elevator
 6. ThyssenKrupp Elevator
 7. Travertine
 8. Tyler Elevator Products
- C. Type and general characteristics:
1. Review drawings for more details. In the event of conflict, drawings supersede.

Building	HNTB Tag	Levels	Stops	Doors	Notes
ASC	Elevator 14.1	1 to 6	4 Stops	Front @1, 2, 4, 6	5,000 MRL Service Car, 350 fpm, Simplex Elevator
ASC	Elevator 14.2	1 to 4	2 Stops	Front @ 1, 4	5,000 MRL Service Car, 350 fpm. Non-Conveyable, Simplex Elevator
ASC	Elevator		3 Stops	Front	4,000 MRL, 350 fpm, glass, passenger

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ASC	Elevator 15.1	1 to 4	3 Stops	Front	5,000 MRL Service Car, 200 fpm
ASC	Elevator 16.1	2 to 4	2 Stops	Front @2 /Rear @ 4	4,500 MRL, 200 fpm, "service shape" passenger. Occupied space below pit.
ASC	Elevator 16.2	2 to 4	2 Stops	Front @2 /Rear @ 4	4,500 MRL, 200 fpm, "service shape" passenger. Occupied space below pit.
ASC	Elevator 16.3	2 to 4	2 Stops	Front @2 /Rear @ 4	4,500 MRL, 200 fpm, "service shape" passenger. Occupied space below pit.
ASC	Elevator 18.1	2 & 4	2 stops	Front	4,000 MRL 200 fpm Passenger. Occupied space below pit.
ACS	Elevator 21.1	1 to 2	2 stops	Front	4,000 MRL, Service Shape, 200 fpm
ASC	Elevator 24.2	1, 2, 4	3 Stops	Front @ 1,4 Rear @ 1,2, 4	5,000 MRL Service Car, 350 fpm
ASC	Elevator 24.3	2 to 4	2 stops	Front	FUTURE ELEVATOR 4,000 MRL 200fpm Passenger
ASC	Elevator 24.4	2 to 4	2 stops	Front	FUTURE ELEVATOR 4,000 MRL 200fpm Passenger, Occupied space below pit.
ASC	Elevator 25.1	1 to 6	4 Stops	Front 1, 2, 4, 6	5,000 MRL Service Car, 350 FPM
ASC	Elevator 25.2	1 to 4	2 Stops	Front @ 1, 4	5,000 MRL, Service Car, 350 FPM Non-Conveyable
ASC	Elevator 25.3	2, 4, 6	3 stops	Front	4,000 MRL 350 fpm, glass passenger
ASC	Elevator 26.1	1 to 2	2 stops	Front	"JetBlue" elevator. 4,000lb. capacity MRL; passenger-shaped, 200 FPM
ASC	Elevator 28.1	1 to 2	2 Stops	Front	4,000 MRL passenger shaped, 200 fpm. Service Car.
ASC	Elevator 31.1	1 to 2	2 Stops	Front	4,000 MRL passenger shaped, 200 fpm
ASC	Elevator 34.1	1 to 2	2 stops	Front	4,000lb. capacity; MRL; passenger-shaped; 200 FPM
ASC	Elevator 35.1	1 to 4	3 stops	Front @ 1, 2 Rear @ 4	4,500lb. capacity; MRL; service-shaped; 200FPM
ASC	Elevator 35.2	1 to 4	3 stops	Front @ 1, 2 Rear @ 4	4,500lb. capacity; MRL; service-shaped; 200FPM
ASC	Elevator 36.1	1 to 4	3 stops	Front @ 1, 2 Rear @ 4	4,500lb. capacity; MRL; service-shaped; 200FPM

ASC	Elevator 36.2	1 to 4	3 stops	Front @ 1, 2 Rear @ 4	4,500lb. capacity; MRL; service-shaped; 200FPM
ASC	Elevator 37.1	1 to 2	2 stops	Front	4,000lb. capacity; MRL; passenger-shaped; 200FPM
ASC	Elevator 37.2	1 to 2	2 stops	Front	4,000lb. capacity; MRL; passenger-shaped; 200FPM
ASC	Elevator 38.1	1 to 4	3 stops	Front @ 1, 2 Rear @ 4	4,500lb. capacity; MRL; service-shaped; 200FPM
ASC	Elevator 38.2	1 to 4	3 stops	Front @ 1, 2 Rear @ 4	4,500lb. capacity; MRL; service-shaped; 200FPM
ASC	Elevator 39.1	1 to 4	3 stops	Front @ 1, 2 Rear @ 4	4,500lb. capacity; MRL; service-shaped; 200FPM
ASC	Elevator 39.2	1 to 4	3 stops	Front @ 1, 2 Rear @ 4	4,500lb. capacity; MRL; service-shaped; 200FPM
ASC (Ramp Loading Connector)	Elevator 39.3	1 to 4	3 stops	Front	4,000lb. capacity; MRL; passenger-shaped; 200FPM
ASC (Ramp Loading Connector)	Elevator 39.4	1 to 4	3 stops	Front	4,000lb. capacity; MRL; passenger-shaped; 200FPM
LST	Elevator 2.1	1 to 6	3 Stops (1,2,6)	Front @ 2, 6 / Rear @ 1	5,000 MRL Service Cars, 350 fpm Non-Conveyable.
LST	Elevator 2.2	1 to 6	5 Stops (1,2,3,6,7)	Front @ 2,3,6,7 / Rear @ 1	5,000 MRL Service Cars, 350 fpm; Non-Conveyable.
LST	Elevator 2.3	1 to 6	3 Stops	Front	3,000lb passenger car, 200fpm
LST	Elevator 5.1	1 to 4	4 Stops (1,2,4,6)	Front	4,000 MRL Passenger, 350 fpm, Glass Cab
LST	Elevator 5.2	1 to 4	4 stops (1,2,4,6)	Front	4,000 MRL Passenger, 350 fpm, Glass Cab
LST	Elevator 5.3	1 to 4	4 Stops (1,2,4,6)	Front	4,000 MRL Passenger, 350 fpm, Glass Cab

LST	Elevator 5.4	1 to 4	4 Stops (1,2,4,6)	Front	4,000 MRL Passenger, 350 fpm, Glass Cab
LST	Elevator 6.1	1 to 4	4 Stops (1,2,4,6)	Front	4,000 MRL Passenger, 350 fpm, Glass Cab
LST	Elevator 6.2	1 to 4	4 Stops (1,2,4,6)	Front	4,000 MRL Passenger, 350 fpm, Glass Cab
LST	Elevator 6.3	1 to 4	4 Stops (1,2,4,6)	Front	4,000 MRL Passenger, 350 fpm, Glass Cab
LST	Elevator 6.4	1 to 4	4 Stops (1,2,4,6)	Front	4,000 MRL Passenger, 350 fpm, Glass Cab
LST	Elevator 4.1	1 to 7	5 stops	Front	5,000 MRL Service, 350 fpm Non-Conveyable
LST	Elevator 12.1	3 to 6	2 Stops	Front	5,000 MRL, 200 fpm Service, Walk in pit
LST	Elevator 12.2	1 to 7	4 Stops	Front	5,000 MRL, 350 fpm Service
LST	Elevator 10.1	1 to 6	3 Stops	Front @ 2/ Rear @ 1,6	5,000 MRL Service Cars, 350 fpm Non-Conveyable
LST	Elevator 10.2	1 to 7	5Stops	Front @ 2, 7 / Rear @ 1,3,6	5,000 MRL Service Cars, 350 fpm Non-Conveyable
LST	Elevator 8.1	1 to 3	2 Stops	Front @ 1/ Rear @ 3	5,000 MRL, Service, 200 fpm. Non-conveyable
LST	Elevator 8.2	1 to 3	2 Stops	Front @ 1/ Rear @ 3	5,000 MRL, Service, 200 fpm. Non-conveyable
LST	Elevator 8.3	1 to 2	2 Stops	Front	3,000 MRL Passenger, 200 fpm.
LST	Elevator 6.5	2 to 6	3 Stops (2,4,6)	Front	4,000 MRL, Passenger, 350 fpm. Occupied space below pit.
LST	Elevator 6.6	2 to 6	3 Stops (2,4,6)	Front	4,000 MRL, Passenger, 350 fpm. Occupied space below pit.
LST	Elevator 6.7	2 to 6	3 Stops (2,4,6)	Front	4,000 MRL, Passenger, 350 fpm. Occupied space below pit.
LST	Elevator 6.8	2 to 6	3 Stops (2,4,6)	Front	4,000 MRL, Passenger, 350 fpm. Occupied space below pit.
GARAGE	Elevator 3.1	1-6	6 Stops	Front Only	Triplex. 7,000lb overhead geared traction. 5' center opening doors. 350 fpm See Drawings.
GARAGE	Elevator 3.2	1-6	6 Stops	Front Only	Triplex. 7,000lb overhead geared traction. 5' center opening doors. 350 fpm See Drawings.
GARAGE	Elevator 3.3	1-6	6 Stops	Front Only	Triplex. 7,000lb overhead geared traction. 5' center opening doors. 350 fpm See Drawings.

GARAGE	Elevator 4.1	1-6	6 Stops	Front @ 1,3 Rear @ 2,3,5,6	Triplex. 7,000lb overhead geared traction. 5' center opening doors. 350 fpm See Drawings.
GARAGE	Elevator 4.2	1-6	6 Stops	Front @ 1,3 Rear @ 2,3,5,6	Triplex. 7,000lb overhead geared traction. 5' center opening doors. 350 fpm See Drawings.
GARAGE	Elevator 4.3	1-6	6 Stops	Front @ 1,3 Rear @ 2,3,5,6	Triplex. 7,000lb overhead geared traction. 5' center opening doors. 350 fpm See Drawings.
GTF	Elevator 5.1	3 to 5	3	Front @ 3, 5 Rear @ 4	4,500lb. capacity; MRL; service-shaped; 200FPM; Occupied space below pit.
GTF	Elevator 5.2	3 to 5	3	Front @ 3, 5 Rear @ 4	4,500lb. capacity; MRL; service-shaped; 200FPM; Occupied space below pit.
GTF	Elevator 2.1	1 to 4	3	Front @ 1, 2, 4	5,000lb.AIA capacity; MRL; service-shaped; 200FPM; Class C platform.

2.2 PERFORMANCE

- A. Speed: +/- 3% under any loading condition.
- B. Capacity: Safely lower, stop and hold up to 125% rated load. As required by ASME A17.1 Code.
- C. Leveling: +/- 1/8" under any loading condition.
- D. Door Closing Time, Force and Kinetic Energy: Comply with ASME A17.1 Code and ADA requirements.
- E. Floor-to-Floor Performance Time: Floor to floor performance time (from time door starts closing at one floor to fully opened and level on next successive typical floor, regardless of loading conditions or direction of travel). Performance requirements are based on 12' 0" typical floor-to-floor heights. Adjust times by .2 seconds for each foot of travel.
 1. 200 Feet Per Minute 48" Center Opening Doors: 11.0-11.5 Seconds
 2. 200 Feet Per Minute 54" Side Opening Doors: 14.0-14.5 Seconds
 3. 350 Feet Per Minute 48" Center Opening Doors: 10.0-10.5 Seconds
 4. 350 Feet Per Minute 54" Side Opening Doors: 13.0-13.5 Seconds
 5. 350 Feet Per Minute 60" Center Opening Doors: 9.5-10.0 Seconds
- F. Ride Quality:
 1. The following parameters define the standard for quality elevator ride for the high speed elevators:

Design Speed	Adjacent Peak to Peak	Acceleration
200 FPM	17 mg (mille g's)	3.0 ft./sec ²
350 FPM	17 mg (mille g's)	3.0 ft./sec ²

2. Recording accelerometer tests shall be conducted on each elevator traveling at design speed between terminal landings without stopping in both the Up and Down directions with a maximum load of 500 pounds placed symmetrically in the car. Recordings shall be taken with the accelerometer on the platform in the plane of the car guide rails and perpendicular to the plane of the car guide rails. The accelerometer tests shall be made with the sensing unit placed in the center of the elevator car enclosure mounted directly on top of the car platform. The accelerometer and the recording device shall be calibrated just prior to the test, shall provide continuous direct reading on paper tape at a speed not less than 1 inch per second, shall be sensitive to the accelerations in a band width from 0.25 to 10 hertz and be equipped with an ISO2631 filter or equivalent. One set of recordings for each elevator shall become the property of the Owner as a permanent record.
 - a. The maximum horizontal acceleration permitted in each plane shall be determined from the charts of "Elevator Motion Measurement" in accordance with the following criteria and evaluation method:
 - 1) If the results exceed the maximum specified, the rail alignment, the rail joints, and the guides shall be adjusted to correct the ride characteristic in each plane separately to this maximum.
 - 2) The instantaneous acceleration recorded for a trip of the full travel of the elevator in both the Up and Down directions shall not exceed the tabulated values. Adjacent peak-to-peak values of instantaneous acceleration shall be used to determine the zero reference line.

2.3 MACHINE ROOM EQUIPMENT

- A. Identification: Provide identifying numbers on drive, machine, governor, controller and disconnect switch, and car light disconnect switch.
- B. MRL Gearless: Elevators shall have permanent magnet gearless machines located in the overhead of the hoistway. All components shall be located so that safe and efficient access is provided from the top of the elevator car top. Machine shall be effectively isolated from the building structure.
- C. Geared Machine: The garage elevator machines shall be of the geared single wrap traction type with the motor, brake, and traction sheave mounted on a continuous bedplate. Sound isolation pads shall be installed beneath the machine bedplate to reduce vibration and noise transmission to the building structure.
- D. Motors: The motor shall be designed for elevator service with high starting torque and low starting current and be provided with devices to protect against overloading. The motor shall be of alternating current type. Motor armature shall be dynamically balanced and supported by appropriate ball or roller bearings.
- E. Brake: The brake shall be spring applied and electrically released and designed to hold the car at the floor after it has come to rest and provide smooth stops under variable loads.
- F. Governor: The car safety shall be operated by a centrifugal speed governor located at the top of the hoistway or the machine room. The governor shall actuate a switch when excessive speed occurs, disconnecting power to the motor and applying the brake application of the safety.

G. Drive System:

1. A variable voltage variable frequency AC drive system shall be provided. Power for the system will be taken from the building 3 phase power supply. The AC voltage will be changed to DC, and a power transistor inverter circuit will change the DC voltage to AC to power the elevator motor. Motor speed and torque will be controlled by varying the frequency and amplitude of the AC. A digital velocity encoder shall be provided on the motor giving feedback to the controller on motor speed and position. Provide line filters, noise spike or notching suppressors on regenerative systems to insure other computer-operated equipment in the building will not be affected.
2. The system shall meet or exceed all requirements of IEEE 519 standard for general systems. The position selector shall be part of the microprocessor system. The car position in the hoistway shall be digitized through a primary position encoder. The microprocessor control system shall store the floor position and slowdown points in memory.
3. The drive control system shall be a dual-loop feedback system based primarily on car position. The velocity profile shall be calculated by the microprocessor control system producing extremely smooth and accurate stops. The velocity encoder shall permit accurate position/velocity feedback and shall permit a fast and accurate control of acceleration and deceleration. The vertical acceleration rate shall be not less than 3.3 ft./sec.² for speeds through 700 fpm, and 4 ft./sec.² for speeds over 700 fpm.
4. The drive shall be the Contractor's Regenerative Version, and the system shall be designed such that on emergency power there will be no regenerative power returned to the temporary power system.

H. Unintended Motion:

1. Provide a device to stop the car in case of unintended movement with the doors open or overspeed in the up direction.

2.4 AUTOMATIC TWO WAY LEVELING.

- A. Each elevator will have two-way leveling to automatically bring the car to a stop level with any floor for which a stop has been initiated, regardless of load, rope stretch or direction of travel.

2.5 NORMAL STOPPING DEVICES

- A. Provide slow-down and normal stopping devices on top of each car.

2.6 GUARDS

- A. In addition to guards for sheaves and other similar items hereinafter specified, attention is directed to the requirements relative to guarding of exposed gears, counterweights, sprockets, tape or rope sheaves, or devices of selectors, floor controllers, or signal machines, and the ropes, chains, or tapes for driving same in machine rooms, pits, car tops and secondary spaces. Kick angles shall be included around all unprotected openings in the machine room floor.

2.7 OPERATION AND CONTROL SYSTEMS

- A. Provide "Simplex Collective" operation for single elevators using a microprocessor- based controller. Operation shall be automatic by means of the car and hall buttons. If all calls in the system have been answered, the car shall park at the last landing served.
- B. Provide "Group Automatic" operation and control systems for each group of elevators.

2.8 OPERATION

- A. General Operation and Control: A microprocessor based control system shall be provided to perform all of the functions of safe elevator motion and elevator door control. This shall include all of the hardware required to connect, transfer and interrupt power, and protect the motor against overloading. The system shall also perform car operational and group supervisory control. Each controller cabinet containing memory equipment shall be properly shielded from line pollution. Micro- computer system shall be designed to accept reprogramming with minimum system down time.
- B. Anticipated in Rush Device: To maintain sufficient lobby elevator capacity to handle anticipated heavy in rush traffic the system shall include a device to call all of the cars in the group to the lobby without waiting for a lobby call. The device shall only operate predetermined heavy rush periods. During these periods, cars shall be automatically dispatched from the lobby when they become loaded nearly to capacity or, if not loaded to capacity, on a variable time interval calculated on the basis of the number of cars at the lobby and other data representative of traffic in the system. The cars shall continue to operate in this manner until the end of the pre-determined period.
- C. Off Peak Geographical Spacing: When the cars are at rest, they shall be assigned throughout the building to pre-determined zones. The first car entering a zone shall become assigned to that zone. A car may run through an occupied, assigned zone in search of an occupied zone in which to park. While there are no calls registered the cars shall remain in a zone parked with door closed. The lowest zone shall consist of the main floor and adjacent floor, above or below, as required to suit design requirements. The remaining floors shall be divided into equal zones with one car randomly assigned to each zone. Optimized response to hall calls shall be below, as required to suit design requirements. The remaining floors shall be divided into equal zones with one car randomly assigned to each zone. Optimized response to hall calls shall be achieved by computing a relative system response (RSR) time for each registered hall call. The computation of each car's (RSR) time to a hall call shall be based on, but not limited to, such relevant factors as distance, service to previously assigned car, and hall calls, car load, direction, door and car motion status, and coincidence of car and hall calls. The car with the least RSR shall have this call assigned to it. RSR computations for each hall call are repeated several times a second and the hall call assignment might be changed if a more suitable car is found.
- D. Moderate Up and Moderate Down Traffic programs: When incoming traffic at the lobby floor increases as indicated by two cars leaving the lobby in the up direction, filled to capacity with a predetermined adjustable time period, cars assigned to upper zones shall be called to the lobby without waiting for a lobby call. Calls shall be automatically dispatched from the lobby when they become loaded nearly to capacity or, if not loaded to capacity, on a variable time interval calculated on the basis of the number of cars at the lobby and other data representative of traffic in the system. The cars shall continue to operate in this manner until the lobby traffic has been reduced to a predetermined level. When down calls above the lobby increases to a predetermined level, assignment of a car to the lobby ceases and the lobby car shall travel up to assist the other cars. Cars arriving at the lobby, after discharging passenger shall be

dispatched upward. The cars shall continue to operate in this manner until the down traffic has been reduced to a pre-determined level.

- E. Anticipated Exit Device: To prepare the system for heavy outgoing traffic, operation shall be such that upon arrival at the lobby of any car, loaded more than a pre-determined capacity during a regularly anticipated exit period, assignment of a car to the lobby ceases and the lobby car shall travel up to assist the other cars. Cars arriving at the lobby, after discharging passengers, shall be dispatched upward. The cars shall continue to operate in this manner until the end of the regularly anticipated exit period.
- F. Load Weighing Dispatching: A load weighing device shall be provided which shall dispatch the cars away from the main lobby floor when the load in the car reaches a pre-determined capacity. The load dispatch weight shall be adjustable.
- G. Load Weighing Bypass: A load weighing device shall be provided which shall be set to operate at a pre-determined percentage of the load in the car. The car shall bypass hall calls when this device is actuated. The bypass load weight shall be adjustable and separate from the load weighing dispatch weight.
- H. Anti-nuisance: A system shall be provided so that when the number of car calls is greatly disproportionate with the weight of the car all car calls shall be canceled without making any stops. The ratio of calls to weight shall be adjustable.
- I. Car Button Independent Service all Elevators: A Switch shall be provided in the car operating station which, when actuated, shall disconnect the elevator from the hall buttons, and permit operation from the car buttons only.
- J. Car Reversal Operation: A car without registered car call arriving at a floor where both up and down hall calls are registered shall initially respond to the hall call in the direction that the car was traveling. If no car call or hall call is registered for further travel in that direction, the car shall close its doors and immediately reopen them in response to the hall call in the opposite direction.
- K. Car Delay Operation: If, for any reason, the doors are prevented from closing and the car is unable to respond to a call, the calls shall be transferred to another car.

2.9 GENERAL OPERATIONS AND CONTROL

- A. Control of the elevator shall be automatic in operation by means of pushbuttons in the car numbered to correspond to floors served, for registering car stops and by up/down push buttons at each intermediate landing and call pushbuttons at terminal landings.
- B. The momentary pressing of one or more buttons shall dispatch the car to designated landings in the order in which the landings are reached by the car, irrespective of the sequence in which buttons are pressed.
- C. Each landing call shall be canceled when answered.
- D. When the car is traveling in the up direction, it shall stop at all floors for which car buttons or up hall buttons have been pressed. It shall not stop at floors where down buttons only have been pressed unless the stop for the floor has been registered by a car button, or unless the down call is at the highest floor for which any buttons have been pressed.

- E. The pressing of an up button when the car is traveling in the down direction shall not interrupt the travel unless the stop for that floor has been registered by a car button, or unless the up call is the lowest for which any button has been pressed.
- F. When the car has responded to high or lowest stop, and stops are registered for the opposite direction, its travel shall reverse automatically and it shall then clear the calls registered for that direction.
- G. Should both up and down call be registered at an intermediate floor, only the call corresponding to the direction in which the car is traveling shall be canceled upon the stopping of the car at the landing.
- H. An adjustable time delay shall be provided so that after the car has stopped in response to a hall button, the entering passenger may register his car button before the car will reverse to answer calls in opposite direction.
- I. Car station shall contain a key operated toggle switch for the car light, a fan switch and a door open button for stopping the closing motion of the doors and causing them to return automatically to their position.
- J. The buttons in the car and hall stations shall be of the light-up type and shall indicate that a call has been registered for that landing.
- K. Elevators shall have car button independent service. When a key operated switch in the car panel is activated the car shall be disconnected from the hall buttons and shall only respond to car buttons. Car doors shall be closed by pressing the door close button.
- L. Elevator Successive Starting. After all drives in a group have been shut down, only a single drive shall be allowed to start up at one time.
- M. Contractor must review elevator drawings and inventory to ensure control system's have proper operation design and functionality based on the intended use and floors served. Elevators appearing to share the same general location may or may not be grouped together.

2.10 AUXILIARY OPERATION AND CONTROLS

- A. General: In addition to primary control system features, provide the following controls or operational features for the passenger and service elevators, except where otherwise indicated.
- B. Special Emergency Service – Phase I: The activation of a key switch in a lobby level hall station shall return all cars in the group express to the designated floor and by-pass all car and hall calls. The cars shall park at the designated floor with the doors open and will not respond to car or hall calls unless the SES-II switch in the car is activated. This system shall be in conformance with the applicable ASME code. The key switch shall comply with local code requirements.
- C. Special Emergency Service – Phase II: In-car control of each elevator during the emergency operation, by means of a key switch in each car shall be provided. Operation shall be per ASME A17.1. The key switch shall comply with local code requirements.
- D. Emergency Lighting and alarm Bell (Power to Car): Remote emergency alarm bell, located where directed, so it can be heard outside the hoistway, to be arranged to sound automatically

in response to activation of alarm button.

- E. Emergency lighting and Alarm Bell (No Electrical Power to Car): Car mounted 12 volt battery unit including solid state charger and testing means enclosed in common metal container rechargeable lead acid or nickel cadmium battery with 10 year minimum life expectancy. When normal power to the car fails the system shall automatically provide power to the car emergency light and to the alarm bell circuit. Operation shall be in accordance with ASME A17.1.
- F. Emergency power operation: Elevators shall be designed to operate from the stand by power system. Coordinate with MEP provider to determine the number of elevators in the group that can be run at any given time. Provide a manual key switch for selection of elevators after automatic selection occurs.
- G. Emergency Exhaust Fan: Any glass elevators located where direct sunlight can reach the cab must be equipped with a battery backup exhaust fan, three speed. Provide industry standard three speed ventilation fan elsewhere capable of providing code compliant operation based on the size of the cab.
- H. Hoistway Access Switches: Hoistway access switches shall be provide at the top and bottom landings in the hoistway door jamb as required by local code.
- I. Liftnet system: Provide Liftnet system components and all connections to communicate with the Owners existing system. Include sensor for pit water level monitoring.
- J. Auto light / fan shutdown: Provide auto shut down function for car lights and fans. Time to be field programmable.
- K. Provide door hold function in all service elevators. Activation will hold doors open for 20-30 seconds or until a door close or floor registration occurs.

2.11 GUIDE RAILS

- A. Car and counterweight guide rails, brackets and bracket spacing shall conform to ASME A17.1 Code requirements. Design brackets to accommodate offsets or variations in hoistway walls. Include ladder brackets where necessary. Rail alignment shall be within 1/16 inch. Provide rail backing and intermediate counterweight tie brackets. Provide structural steel or supports to achieve code-required rail deflection limits, as required by manufacturer's design and system. Provide intermediate structural supports as required for manufacturer's design and system. Any vertical structural members spanning between hoistway divider beams must be included in the scope of execution, if required by the selected manufacturer's design. No additional structural points of attachment other than those shown on the Contract Documents will be provided.

2.12 MACHINE AND EQUIPMENT SUPPORT BEAMS

- A. Provide structural steel beams required for direct support of and attachment to building structure of hoist machine, governor, and hoist rope dead-end hitch assemblies.
- B. Provide bearing plates, anchors, shelf angles, blocking, embedment, etc. for support and fastening of hoisting beams, machine beams, or equipment to the building structure.

- C. Isolate machine beams to prevent noise and vibration transmission to building structure.
- D. A suspension by means that cannot be physically examined shall be provided with a tool that allows inspection of the suspension means.

2.13 PIT SWITCH

- A. Provide a lockable pit switch adjacent to the pit ladder. Provide an additional pit stop switch where the pit depth exceeds 66 inches.

2.14 SUSPENSION MEANS

- E. Suspension means and their connections shall conform to ASME A17.1.
- F. A suspension by means that cannot be physically examined shall be provided with a tool that allows inspection of the suspension means.
- G. Provide all tools required by local codes to inspect the means of inspection

2.15 ELEVATOR COUNTERWEIGHTS

- A. A counterweight shall be provided for each elevator equal in weight to approximately the weight of the car plus a minimum of 40 to 45 percent of the rated load. Counterweight fillers shall be fabricated of precision flame cut steel plates. They shall lay flat in the weight frame and not rattle when the car is in motion. They shall be sized in a way to facilitate accurate balance of the elevator car,
- B. Provide Counterweight Guard where compensation is not provided and where counterweights are adjacent to other elevators.
- C. Counterweight safeties shall be provided if there is occupied space below the pit level.

2.16 CAR AND COUNTERWEIGHT BUFFERS

- A. Suitable oil buffers with necessary blocking and extensions shall be provided under the elevator car and counterweight. Oil buffers shall be provided with a switch that prevents the car from moving if the plunger is not in it's fully extended position.

2.17 OVERHEAD SWITCHES

- A. One emergency stop switch shall be located beside top access door of elevators without overhead machine location.

2.18 HOISTWAY DOOR INTERLOCK

- A. Each elevator hoistway door shall be equipped with a hoistway unit system hoistway door

interlock. The interlock shall prevent the operation of the elevator driving machine by the normal operating device unless the hoistway is locked in the closed position. The interlock shall also prevent the opening of the hoistway door from the landing side unless the car is either stopped or being stopped. Provide door restrictors.

2.19 HOISTWAY DOOR UNLOCKING DEVICES

- A. Unlocking devices shall be provided at all floors where allowed by code. Escutcheons shall be provided in all openings; finish of escutcheons shall be metal and match door finish.

2.20 ELEVATOR COMPENSATION

- A. Compensation, when required by drive design, shall be provided for the weight of hoisting ropes and unbalanced portion of traveling cables. Such compensation shall consist of iron or steel wire ropes or Whisperflex at duties below 500 fpm attached to the underside of the car and counterweight.

2.21 ELECTRICAL WIRING

- A. Electrical wiring shall comply with the ASME A17.1 and NFPA 70, National Electrical Codes and all applicable local codes. Wiring shall be included for all devices installed.
 - 1. Furnish and install complete insulated wiring to connect all parts of the equipment. Properly ground all components as required by NFPA 70, National Electric Code.
 - 2. Insulated wiring shall have a flame retarding and moisture resisting outer cover and shall be run in a metal conduit, metallic tubing, or wire ducts.
 - 3. Provide 10 percent spare wires between each controller, leveling device, hoistway junction box, and control panel, also, provide 10 percent spare conductors in each trail cable; all spares shall be properly tagged or otherwise identified with clear and indelible markings.
 - 4. Tag code all field wiring at junction points; control wiring in traveling cables at their terminals in the machine room: elevator car junction box and connections within the car. Test entire wiring system for insulation to ground.
 - 5. Provide total of six (6) shielded pairs for security use in the traveling cables for each elevator. The shielded pairs shall be located in a cable which is not used to carry alternating current circuits. The shielded wiring shall extend from the top of the elevator to a junction box in the elevator machine room.
 - 6. Provide two separate stranded Coaxial Cable for camera usage. Assist in camera installation with security camera contractor, both inside elevator, on top of elevator and in control room. Coax cables shall be ran separate from elevator traveling cable and be a home run from the elevator machine room to the top of the elevator in order to reach the top back corner of the elevator with a 6 foot extra loop. The security camera contractor intends on housing converter for security wiring within the car operating panels, elevator contractor to open car operating panels to assist security provider with safe access.

2.22 TOP OF CAR OPERATING DEVICE

- A. Each elevator shall be provided with an operation device mounted from or on the car cross-

head which will permit slow speed (150 fpm or less) operation for purposes of adjustment, inspection, maintenance, and repair. A transfer switch shall be provided in the top of the car operating device fixture, which will permit the disconnection of hoistway switch or switches and render the top of car operating device operative. The operating device shall be mounted in a metal box and shall be rigidly secured in a position conveniently accessible to workmen on top of the car and accessible from the landing side without getting on the car top.

2.23 LUBRICATION

- A. Suitable means shall be provided for lubrication, with oil or grease, for all bearing surfaces in connection with the elevator installation.

2.24 CAR TOP LIGHTS

- A. Electric light with wire guard and GFCI convenience outlet fixture on car top, which shall meet the requirements of ASME A17.1.

2.25 DOOR OPERATOR

- A. A heavy duty, master door operator capable of opening door at not less than 1½" fps and accomplishing reversal in 2½" maximum door movement. Doors shall open automatically when car arrives at floor to permit transfer of passengers; after timed interval, door shall automatically close. Arrange operator so doors can be opened by hand from inside car in case of power failure, if car is within leveling zone.
- B. Door operation shall be "closed loop" system which gives constant feedback of the position and velocity of the elevator doors. System shall automatically overcome door resistance by increasing the power supply to the motor and increasing the torque required to maintain velocity. If a service tool is needed to make digital adjustments, provide the Owner with the service tool and all required manuals.

2.26 DOOR OPENING AND DOOR CONTROL DEVICE

- A. Provide Tri Tronics proximity type door protection for all elevators.
- B. Door open timing feature.
 - 1. Operate in conjunction with proximity devices to provide adjustable, reduced, hold open time once beams are broken and re-established.
 - 2. When doors are held open beyond an adjustable time, buzzer sounds and doors shall close at reduced speed.
 - 3. The door hold open times between car and hall calls shall be separately adjustable. Door speed, thrust and kinetic energy shall comply with the ASME A17.1 Code. Door hold open times for both car and hall shall comply with "Handicapped Requirements".

2.27 FINAL LIMIT SWITCHES

- A. In addition to the normal limit switches, a hoistway final limit switch shall be installed at the top and at the bottom of each hoistway.
- B. Final limit switches shall be so located that they open at or about the time the buffer is engaged by the time the buffer is engaged by the car or counterweight.

2.28 CAR FRAME AND SAFETY

- A. Car frame shall be fabricated from formed or structural steel members and shall have adequate bracing to support the platform and car enclosure. The car safety shall be an integral part of the car frame with safety blocks located in the bottom members of the car frame. The safety shall be flexible guide clamp type. Car frame shall be designed for Class A loading for all passenger use elevators and Class C loading for all service elevators.

2.29 PLATFORM

- A. The car platform shall be constructed of steel with $\frac{3}{4}$ " plywood sub-floor and fire proofing on the underside. The platform shall rest on rubber pads designed to form an isolating cushion between the car and car frame. Coordinate sill height with flooring. Design platform for Class A loading for all passenger use elevators and Class C loading for all service elevators.

2.30 ROLLER GUIDES

- A. Rubber synthetic tired roller spring guides, set in adjustable castings, shall be mounted on the top and bottom of the car and counterweight to engage the guide rails.

2.31 CAR DOOR HANGERS AND TRACKS

- A. Hang doors on sheave type hangers with polyurethane rollers that roll on a polished steel track and guided at the bottom by non-metallic shoes sliding in a smooth threshold groove. Minimum two shoes per door panel.

2.32 CAR DOOR ELECTRICAL CONTACT

- A. Shall operate in conjunction with car door so elevator cannot operate unless doors are closed or within the tolerance allowed by Code.
- B. A car door interlock shall be provided for all glass elevators to prevent car door from being opened out of the locking zone given there is no fascia requirement.

2.33 HOISTWAY ENTRANCES

- A. Entrances shall be complete with frames, doors, sight guards, sills, fascia plates, toe guards, headers, struts, hanger covers, tracks, hangers, miscellaneous hardware and related parts. Entrances shall carry UL label for Class "B" 1 ½ hour fire rating (or approved equal). Entrance profiles, finishes and details as shown on the drawings.

- B. Frames: Frame finish for all entrances shall be satin stainless steel, see architectural drawings.
- C. Doors and Sight Guards: Provide horizontal sliding doors of flush construction and sound deadened. Doors shall be fabricated from a minimum of #16 gauge satin stainless steel, unless the cab is specified to be a glass cab with glass cab doors, at which point the hoistway doors shall have a portion of glass with a stainless trim extending at least 4 inches around the entire door. Glass shall adhere to ASME A17.1 requirements, and meet design requirements shown in Contract documents.
- D. Sills: Extruded nickel silver at all floors. Sills shall be level with finished floor.
- E. Sill Supports: Any support angles required shall be furnished and installed by the elevator contractor.
- F. Hanger Supports: Hanger supports or headers shall be formed sections securely bolted to the strut angles.
- G. Fascia Plates: Concealed fascia plates shall be steel, material reinforced to insure a flat even surface throughout, and shall be securely fastened to hanger housings and sill above. Fascia plates shall be finish painted with one coat of rust inhibitive prime paint or of galvanized material.
- H. Struts and Closers: Structural steel angles and other similar methods shall be furnished of sufficient size to accommodate the door closers. Angles shall be continuous and be securely bolted to the sills and building beams above.
 - 1. Hoistway door closers for all elevators shall utilize Smart-Tork reel closures to ensure varying building air pressure does not impact the elevator door closing performance.
- I. Header: 3/16" thick steel formed to provide stiffening flanges.
- J. Door Hangers and Tracks: Hangers for each hoistway entrance shall be of the sheave type arranged for two point suspension of the doors, and shall have brackets integral with door, or applied. Sheave and rollers shall be of steel with sealed ball bearings and there shall be adjustable ball bearings rollers to take up thrust of doors. Tracks shall be cold drawn or cold rolled steel of smooth surface and working section and shall be oiled with wick type lubrication. All hanger assemblies must have door retainer devices at top and bottom of hoistway doors.
- K. Hanger Cover Plates: Shall be made of steel and shall be removable type. Cover plates shall be arranged to assure hanger accessibility from within the car. Cover plates shall be finish painted with one coat of rust-inhibitive prime paint.
- L. Floor Numbers: Provide floor numbers within the hoistway in compliance with ASME A17.1 Code.
- M. Guides: Each door panel shall contain two gibs with fire tabs.
- N. Jamb and Plates: Provide cast plates on each elevator entrance jamb in compliance with requirements of A.D.A. Submit sample for approval.

2.34 PASSENGER CAR ENCLOSURE

- A. Passenger Car interiors as shown in the Architect's drawings and standards described further herein. Provide custom cab interior finishes, custom cab shells, as required to comply with design shown in Contract documents.
- B. Provide self-contained roof top air conditioners for parking garage elevators. Place thermostat and controls in cab service cabinet. Include top mounted condensate boiler system to vaporize condensation water.
- C. Ventilation: Morrison Products, Inc. three-speed model or pre-approved equal that meets the noise and vibration requirements as well as air flow volume requirements dictated by code. Provide auxiliary power for ventilation on glass observation elevators.
- D. Cab shells shall be constructed of a minimum of 14-gauge re-enforced satin finish stainless steel formed panels. Elevators feature Glass walls shall include glass that meets ASME 17.1 requirements.
- E. Canopy: Reinforced 12-gauge furniture steel formed panels with lockable, contacted, hinged emergency exit. Interior finish white reflective baked enamel.
- F. Front and Rear Return Panels: Reinforced 14-gauge furniture steel clad with minimum 16-gauge satin stainless steel.
- G. Entrance Columns and Transom: Reinforced 14-gauge furniture steel clad with minimum 16-gauge satin stainless steel.
- H. Canopy: Reinforced 12-gauge furniture steel formed panels with lockable, contacted, hinged emergency exit.
- I. All materials must meet applicable code requirements, including but not limited material flame spread application and glass enclosure code requirements.
- J. See Architectural drawings and material specifications for additional details.

2.35 SERVICE CAR ENCLOSURE

- A. Flooring: 1/4" stainless steel checker plate over 3/4" thick marine plywood sub-floor.
- B. Canopy: Reinforced 12-gauge furniture steel formed panels with lockable, contacted, hinged emergency exit. Interior finish white reflective baked enamel.
- C. Front and Rear Return Panels: Reinforced 14-gauge furniture steel clad with minimum 16-gauge satin finish stainless steel.
- D. Entrance Columns and Transom: Reinforced 14-gauge furniture steel clad with minimum 16-gauge satin finish stainless steel.
- E. Shell/Side/Rear Wall Finish: Heavily Reinforced 14-gauge satin finish stainless steel formed panels no more than 18" wide with light-proof joints. There shall not be any flex to the panels if reinforced sufficiently. Apply sound deadening mastic to exterior.

- F. Lighting: LED flat lighting fixtures flush mounted in canopy with expanded metal protective diffuser and steel guard over fixtures on car top. Provide protective covers. Lighting shall not be impacted by cab extension provisions that may exist. Lighting shall achieve 200lx at floor of interior.
- G. Handrails/Guardrails: Two lines. Top handrail line minimum 1½" diameter stainless steel grab bar with backing plates and captive nuts. Lower guardrail line 4" x 3/8" solid stainless steel flatstock bars mounted on both sides and rear of the car. Locate bottom guardrail line at 8" above car floor and handrail line at 32" above the car floor. Bolt rails through car walls from back and mount on 1½" deep solid round stainless steel standoff spacers no more than 18" O.C. Return handrail/guardrail ends to car walls. Note: for rear opening elevators, rear hand and guardrails not required.
- H. Ventilation: Provide inconspicuous ventilation means to comply with Code.
- I. Pads and Permanently Mounted Hooks: Removable pads. Two pads covering side walls and adjacent front returns and one covering rear wall. Provide cutouts to access main car operating panel and fire service panel. Color to be determined by Facility.
- J. Cab Interior and Door Opening Dimensions per Architectural Drawings.

2.36 CAR DOORS

- A. Car doors shall be 1 inch thick, of flush design metal construction, with interior reinforcing and sound deadening insulation. They shall be adequately reinforced to withstand operational stresses and as required to accept hangers, interlocks and other accessories.
 - 1. The finish of the car doors shall be as detailed in the architectural drawings.
- B. The car door system shall be designed so that the car doors may not be opened more than 4" from the inside of the car if the car is outside the unlocking zone of a landing.
- C. Car door guides: Car doors shall have a minimum of two gibs per panel.
- D. Car sills: Car sills shall be extruded nickel silver.
- E. Infrared door protection: The contractor shall furnish and install only Tri-Tronics model infrared safety edges. Interruption of one or more of the beams shall cause the doors to stop and reopen.

2.35 EMERGENCY EXITS

- A. All cars shall have ceiling emergency exits. Including interlocks as required by ASME A17.1 Code.

2.36 HALL BUTTON FIXTURES

- A. Elevators shall have two (2) flush mounted pushbutton fixtures at each floor when more than one

elevator is present, otherwise where single (simplex) elevators are present, provide one (1) flush mounted pushbutton fixture at each floor level. Where designated by architectural drawings, provide custom fixture, fixture housing, fixture location and or fixture installation coordination with other trades.

- B. Passenger Elevators: Provide EPCO WA-9PC or pre-approved equal. Include up and down arrow integral with button face. Illumination shall be white.
- C. Service Elevators: Provide buttons as specified in the car operating panel
- D. Include rated boxes and wiring as required.
- E. Including phase I key with, Phase I engraved instructions and emergency power jewel in first floor hall station. Coordinate key switch with existing switches.
- F. Provide emergency communication phone line monitoring device in accordance with code requirements in first floor hall station.
- G. Provide engraved "flame" emergency signage integral with hall pushbutton fixtures in accordance with code requirements.

2.37 HALL LANTERN FIXTURES

- A. Provide a hall lantern with an audible signal at each landing entrance for each elevator. The lanterns, when illuminated, shall indicate which elevator car will stop at the landing and in which direction the car is set to travel. When the car reaches a predetermined distance from the floor where it is going to stop, the corresponding hall lantern shall illuminate and the gongs sound once for up and twice for down. The hall lantern shall remain illuminated until the car doors close in preparation for leaving the floor. Provide on all floors.
 - 1. Faceplates shall have a satin stainless steel finish.
 - 2. Provide LED bulbs arrow indications.
 - 3. Shall be easily visible from anywhere in the corridor area.
 - 4. Fixtures design shall be pre-approved by GOAA and in accordance with the ITF and PDL elevators as well as in accordance with the architectural drawings.
 - 5. Illumination shall be green in the up direction and red in the down direction.
 - 6. Fixture shall be vandal resistant for service elevators, 7 jewel type design arrows.
 - 7. Fixture shall be digital type lantern for passenger elevators.
 - 8. Fixture shall have flush design.
 - 9. Hall Lanterns must be designed with gongs/chimes that can be heard clearly within a noisy airport corridor space. Volumes must be set to the maximum level.

2.38 CAR POSITION INDICATOR

- A. The elevators shall have one digital readout fixture, with 2" high characters, above each car operating panel.
- B. Fixtures shall be LED type and include floor sounding adjustable electronic chime of no less than 20 Decibels at not more than 1500 hertz, shall sound as the car is passing or stopping at a floor.

- C. Electronic Voice Annunciator shall have a selectable voice male or female and be able to announce floor, floor selection and direction of travel.
- D. Illumination of LED digital fixture shall be red.

2.39 CAR OPERATING PANELS

- A. The elevators shall have the following quantity of custom car operating panels:
 - 1. Center Opening, Front Only Doors: Two (2) Car Operating Panels
 - 2. Side Opening, Front Only Doors: One (1) Car Operating Panel
 - 3. Center Opening, Front and Rear Doors: Four (4) Car Operating Panels
 - 4. Side Opening, Front and Rear Doors: Two (2) Car Operating Panels
 - 5. Glass Enclosure Elevators to utilize an applied car operating panel with 45 degree angled metal edge with security fasteners, positioned on the side walls in between glass panels as shown in architectural drawings.
 - 6. Remaining car operating panels are to be full swing car operating panels.
 - 7. All car operating panels to have satin stainless finish.
- B. The car operating panels shall include the following:
 - 1. Passenger Elevators: Self-illuminating floor registration elongated metal faced bar buttons. Match design of current GOAA ITF & PDL elevators. Buttons shall have floor designation engraved. Buttons shall illuminate white. Provide EPCO RB-9 button or pre-approved equal. Alarm, door control buttons shall be EPCO SSL-PC button or pre-approved equal.
 - 2. Service Elevators: Self-illuminating floor registration vandal resistant metal buttons. Match design of current GOAA ITF & PDL elevators. Buttons shall have floor designation engraved to the side of the button in 1" letters. Buttons shall illuminate white. Provide EPCO SURVPL-SPC button or pre-approved equal. Alarm, door control buttons shall be EPCO SURVPL-SPC button or pre-approved equal.
 - 3. Firefighter's key switch, pilot light, call cancel and buzzer in a locked cabinet with graphics as required by local code. Key cabinet to match existing units.
 - 4. All buttons shall be designated by raised markings with Braille, applied with concealed fasteners to meet ADA requirements. Stick-on markings are not acceptable.
 - 5. Engraved elevator number, Phase II fireman's instructions, no smoking sign and elevator capacity on each faceplate or return panel as required by local code.
 - 6. Lockable service cabinet containing controls for fan switch, car light switch, light rheostat, independent service, inspection service, 120 volt convenience outlet and incorporate an Emergency light test button. Cabinet lockset to be Illinois type F315 keyed.
 - 7. ADA hands free phone compatible with Owners existing systems shall be flush mounted in the swing front return.
 - 8. Logos or manufacturer's name are not permitted on exposed surfaces.
 - 9. Certificate holder compatible with the certificate furnished by the AHJ.

2.40 COMMUNICATIONS SYSTEMS

- A. The emergency communication system shall be mounted behind the main car operating panel and be designed to provide two-way communication between the elevator and a point outside the hoistway. Audio and visual two-way communication is required. System shall automatically dial a programmable number to a point outside hoistway.
- B. Visual messages shall be provided to indicate the status of an emergency call. The visual

message will illuminate and shall read: "Message Received" when the emergency call button is pressed.

- C. Raised letter and Braille shall be integrated and permanently marked on the faceplate identifying the device as a speech independent emergency telephone. Surface painted or applied graphics shall not be acceptable.
- D. Emergency communication system must be able to provide receiving agent with information identifying building and elevator number whenever an emergency call is placed.
- E. Emergency communication system shall comply with Federal Communication Commission (FCC) regulations and Americans with Disabilities Act (ADA).
- F. When the party called by someone in the cab hangs up, the telephone shall disconnect immediately without giving a busy signal in the cab.
- G. The instruments shall be designed in a way that up to six (6) instruments can operate on a single telephone line and provide connection to all six (6) cars at the same time.
- H. The system shall have the ability to communicate from Machine room to each individual car.
- I. System shall be compatible with Owner's existing systems.

2.41 SMOKE SENSOR TIE-IN

- A. System to interface with smoke sensors, including alternate level refuge. (Others will run wiring from the smoke sensors to the elevator machine room interface where the elevator contractor connects to their controls).
- B. Elevator contract to provide all necessary interface equipment with their submittal drawings.

2.42 SECURITY INTERFACE FOR ELEVATORS WITH CARD READERS

- A. Elevator contractor shall provide cut-out in the COP faceplate (including mounting studs) with a tinted non-scratch flush mounted window and space behind within each elevator that requires a security cardholder. Refer to the security section. The security contractor shall furnish the card reader or key pad to the elevator contractor for mounting. The elevator contractor shall provide all required mounting accessories and shall mount the card reader within the elevator cab. Brackets to hold the card reader in place shall be durable and non-metallic.
- B. The security contractor shall co-ordinate with the elevator contractor to connect the traveling cable provided by the elevator contractor within the elevator cab to the mounted card reader. The elevator contractor shall provide and mount glass panel to cover the mounted card reader. Mount the card reader so the window panel is flush to the front of the swing front return.
- C. The security contractor shall connect the traveling cable provided by the elevator contractor within the elevator machine room to the security remote field panel.
- D. The security contractor shall provide an interface panel within the elevator machine room. This panel shall contain two terminal strips. The security contractor shall label the terminal strips with

the required connections from the elevator controller. The elevator contractor shall wire from the elevator controller to these terminal strips. Coordinate with the security contractor to provide all required connections and compatible low voltage contact closures from the elevator controller to this terminal strip to allow the following operation:

1. Signal from the security system to initiate elevator control by the card reader.
 2. On card reader mode: The security system shall indicate to the elevator controller which floors are selectable by the cardholder within that elevator. The elevator controller shall enable those floor selection buttons only. When a floor is selected, the elevator controller should disable all other floors from being selected and signal the security system that a selection has been made.
 3. Signal from the security system to remove the elevator from under card reader control to normal operation.
- E. Submit an alternate price at bid if this interface can be accomplished via an RS-32 protocol interface.

2.43 ELEVATOR MANAGEMENT SYSTEM

- A. For all of the vertical transportation herein, a Lift-Net Elevator Monitoring and Management system shall be provided. The system shall comply with the requirement's set forth herein and shall include a monitoring system in each machine room and connected to existing Lift-Net system in central command.
- B. General: Provide an interactive system to monitor and manage the elevator equipment ("units") hereinafter called "system." Data collection, data storage, and real-time monitoring portion of the system shall be based on Microsoft Windows and be able to run on Windows 2000 Pro, XP Pro, or later operating systems. Provide the following features:
- A. Network based, capable of interfacing with control systems via either serial data link or hardwired interface connections.
 - B. Operate on any TCP/IP based network system including but not limited to an Ethernet, Token Ring, Arc-Net, Lift-Net, etc.
 - C. Expansion capability to add unlimited number of monitoring terminals on the network.
 - D. Monitoring terminals shall operate peer-to peer or with a single client server. Failure of a single network device shall not affect the operation of the remainder of the system.
 - E. Complete backup of system data shall be accomplished at any single terminal/server location.
 - F. Display multiple banks, including multiple buildings, on a single monitoring terminal screen.
- C. Monitoring Display: The system shall be capable of simultaneous monitoring of at least five hundred units on a single monitoring station utilizing a graphical representation of a plan view of the facility. Each elevator shown on the plan view shall be individually displayed and shall be visible on the monitoring system display terminal without the need to scroll. Each individual unit, when operating "normally," shall be displayed in green. In the event of a malfunction of any individual unit, the unit shall be displayed by a red blinking light on the monitoring system display. Units which are intentionally placed out of service shall be shown as yellow in the display mode. When malfunctioning units, or

units intentionally placed out of service are returned to normal operation the graphical representation for that unit(s) shall automatically return to green. The user shall have the ability to display additional information, such as the cause of fault/alarm, for all units by selecting the unit with a "mouse click" from the plan view of the facility. All monitored units shall be visible from any monitoring terminal on the network. Entry into the network shall be multi-level password protected.

- D. System Capabilities:
 - A. The system shall be capable of real time display of all monitored status points on all monitored equipment. Fault and event notification screens and audible alarms shall be immediately displayed on selected monitoring stations. Different fault and event tables shall be defined on a per-bank basis. The system shall collect and store all status, fault, and event information for later reporting and analysis. The system shall provide statistical analysis of hall call response times, traffic patterns, fault conditions, service logs, and security usage in graphical and tabular format.
 - B. The system shall maintain a record of every status point change occurring on the monitored equipment and provide the ability to replay these events in a simulation at a later time in real time, slow speed, single step, reverse, or fast forward. This information shall be retained for a period of at least twenty-six weeks and a mechanism shall be provided whereby this information may be archived.
 - C. The system shall store traffic fault and statistical data for a period of at least three (3) years. The system shall log error type, car number, floor position, and major system status points whenever a fault or logged event occurs.
 - D. The system shall provide interactive control of certain features provided in the elevator control system. These features may be revised as the requirements of the building change. Some of these interactive controls may include, but are not limited to: Security floor lockouts, entering car and hall calls, Firefighters' service, lobby recall, VIP service, up/down peak service, etc.
 - E. In the case of a power failure the system shall be capable of connecting to emergency power back-up unit. The loss of power shall not affect any stored data. The system shall have the capability to detect the loss (disconnect) of any individual unit from the monitoring system by periodically polling all units to ensure that normal communications between the unit(s) and the terminals/server are maintained.
 - F. The system will automatically re-boot the program and continue to operate after a power loss or other system malfunction.
- E. Monitoring Equipment: The monitoring equipment shall have these minimum characteristics:
 - A. Monitoring Station Hardware: Provide a monitoring station in each machine room and on for each facility in central command.
 - a. Central Processing Unit: IBM compatible microcomputer – desk top or mini-tower (multiple machine rooms or lobby displays)
 - b. Type: Pentium or most current high-performance processor
 - c. Speed: Most current high-performance
 - d. Internal Hard Drive: Adequate storage for three years data for entire system
 - e. Modem: Most current high-performance
 - f. Display Monitor: 19" – 20" LCD flat panel, color, capable of simultaneous display of all monitored units
 - g. Printer: Current HP Color Desk Jet Series
 - h. Keyboard: MS Windows compatible
 - i. Mouse: MS Windows compatible

- j. Power Requirements: 90-230 Volts AC, 50-60Hz @ 8A
- B. Monitoring Station Operating System Software
 - a. MS Windows 2000 Pro, XP Pro, or later
 - b. MS Windows 2000 Server or later
- F. Network requirements:
 - A. Maximum local network rated distance (2-20 gauge shielded TP): > 10 miles
 - B. Elevator Contractor shall provide assistance to Network Contractor with installation of network system in elevator equipment spaces at no additional cost.
 - C. Elevator Contractor is responsible for material and labor required for the connectivity and testing of all elevator management
 - D. Refer to Division 28 for Network information.
- G. Monitoring Requirements: The system shall display and record the following information for each monitored unit. Serial data links may include many more points. Items listed below are minimum requirements.
 - A. Group status:
 - a. Group operational mode
 - b. All units to be monitored on the same screen in a graphical format
 - c. In/out of service
 - d. Standby power
 - e. Supervisory failure
 - f. Location and direction of hall calls
 - g. Shunt Trip status.
 - B. Individual car status, expandable menus:
 - a. Direction of travel
 - b. Independent service
 - c. Inspection service
 - d. Firefighters' service
 - e. Position of elevator
 - f. Door status (open, opening, closing, closed)
 - g. Door dwell time
 - h. Load by-pass
 - i. Standby power
 - j. Power on/off
 - k. Door detector
 - l. Safety circuit
 - m. Door zone
 - n. Stop switch
 - o. Alarm button
 - p. Registered car calls
 - q. Out of level
 - r. Machine room temperature exceeds 95 degrees
 - s. Stop counter (number of starts)
 - t. Car speed
 - u. Door open times
 - v. Door close time
 - w. Start to stop motion time
 - x. Emergency 2-way communication device
 - y. Air conditioner/heater
 - C. Keyboard, mouse, and time clock control capabilities:
 - a. Floor lockouts (car or hall)
 - b. Lobby recall

- c. VIP service
 - d. Firefighters' service
 - e. Up/down peak
 - D. Faults monitored with visual and audible alarm, triggered by combinations of any of the above status points:
 - a. Safety circuit
 - b. Alarm bell
 - c. Stop switch
 - d. Emergency 2-way communication device
 - e. Door reversal device
 - f. At least six (6) user selectable faults or events (i.e. water in pit, high machine room/cab temperature)
- H. Reporting Requirements: System shall provide reports in color graphical format both on-screen and in printed form capability to conveniently switch from one report type to another and from one bank to another using minimal mouse clicks and key strokes. Reports shall be displayed after minimal waiting time. Data for all reports shall be continuously recorded and stored. Reports shall be displayed by simply selecting a date and time range, bank of equipment and report type. Date and time range selections shall carry forward from one report selection to the next. Reporting functions shall be sub-divided into the following categories:
 - A. Traffic Reports:
 - a. Number of hall calls per floor (hall call distribution on a per floor basis)
 - b. Number of hall calls per hour (24 hour time-line)
 - c. Hall call waiting times per floor (hall call waiting time distribution on a per floor basis)
 - d. Hall call waiting times per hour (24 hour time-line)
 - e. Distributed hall call response graph (24 hour time-line)
 - f. Detailed hall call response graph (% calls / n seconds)
 - g. Longest wait times including floor #, wait time, date, time and direction
 - B. Fault Reports:
 - a. Ten most recent faults (most recent faults listed per bank)
 - b. Fault Log: Displays the entire fault log for a given time period
 - c. Faults per car (fault distribution on a per car basis)
 - d. Faults per floor (fault distribution on a per floor basis)
 - e. Faults per day/week/month (fault distribution on a per unit or group basis)
 - C. Car Use Statistics:
 - a. Car use by hour (24 hour time-line of car calls, car starts, door cycles, delayed car, load by pass)
 - b. Car use statistics (same as above, shown for an entire bank)
 - D. Group Service Log:
 - a. Cars in service (24 hour time-line with text log of group availability of each car)
 - b. Group functions (24 hour time-line with text log of actuation of group functions – Up peak, down peak, fire service, emergency power, etc.
- I. Interactive Features: The control system shall be capable where desired of operating interactive control features provided in the elevator control system. These features may be revised as the requirements of the building change. Some of these interactive controls may include but are not limited to: security floor lockouts, entering car and hall calls, Firefighters' return service, lobby recall, VIP service, up/down peak or hospital Code Blue service. Local codes may affect the availability or operation of these features.

- A. Security Access Features: The monitoring system shall be capable of providing security enable/disable of all hall and car calls through on-screen menus at a minimum. The monitoring system shall also be capable of interfacing directly with card readers and security keypads in stand-alone mode, and indirectly through a serial interface with a third party security system. When in stand-alone mode, the monitoring system shall maintain a database of elevator users and security pass codes. When on secure mode the use of each elevator will be recorded in a file together with the time, authorized pass code and destination for each call.
- B. Elevator Control Features: Each elevator shall be capable of being controlled through the monitoring system. All control points shall be capable of seven-day twenty-four hour time clock automatic operation or manual operation from the mouse and keyboard. The control points shall include, but not be limited to, the following (where allowed by local codes):
 - a. Lobby recall
 - b. Car call security lockout
 - c. Hall call security lockout
 - d. Independent service
- C. Paging Feature: The monitoring system shall be capable of paging a service technician or other personnel based on pre-defined parameters of elevator faults or conditions. The paging system shall provide the ability to page multiple numbers determined by the type of event triggering the notification and shall be able to page different numbers based on preset times of day (i.e. different shifts). The system shall be capable of sending text messages to full text pagers in addition to supporting standard DTMF pagers.
- D. Remote Access Feature: The monitoring system shall be capable of allowing approved individuals under multi-level password control to access all system features via the local area network, internet, or via modem over the public telephone network to review the performance of the equipment or to evaluate a fault condition. The remote access feature shall be integrated into the monitoring system and shall not use third party "remote control" software products.
- J. Elevators to be integrated into existing Lift Net monitoring system and communicate to the Central Control room of the facility. Coordinate use of LAN with the Owner. For non LAN functions provide wiring and conduit for all components furnished.
- K. Lift-net system shall be connected to a new USP power back up system furnished fully by Elevator Contractor.

PART 3 – EXECUTION

3.1 SCOPE

- A. Installation shall meet all of the standard requirements outlined herein and inspection, tolerances, and qualifications. All work required for completion of a first-class installation is the responsibility of the Contractor, even if not included in this specification.
- B. Labeling of disconnects with feed location information and shunt trip locations to be by the elevator contractor.

3.2 HOISTWAYS

- A. Entire front of hoistway will be left open until the hoistway entrances have been installed. After the guide rails have been erected and aligned, install frames in alignment with the guide rails, after which the wall may be completed. Coordinate this phase of the work to provide minimum delay in completion.

3.3 PAINTING

- A. All elevator equipment not painted, located within the machine room or hoistway, shall be given a finish coat of paint. Material that has factory finish paint shall have all scratches or mars repainted after installation. Any galvanized finishes do not need to be painted.
- B. Finish coat shall have hard, tough semi-gloss surface.
- C. Elevator machine room and pit floors shall be painted with an oil resistant polyurethane high gloss enamel paint or approved equivalent. Color shall be terra cotta (Tough Shield #1231-108) or approved equivalent.

3.4 CLEAN UP

- A. Remove trash daily from hoistways, pits, and machine rooms including all packing material and debris resulting from this work. Leave all elevator spaces broom clean.

3.5 ACCEPTANCE TESTING

- A. Tests shall be performed by the Elevator Contractor at his expense in the presence of the Owner's representative. The elevators shall be subjected to the following acceptance inspection and tests:
 - 1. Inspection and tests required by applicable portions of Requirements, 1.03.
 - 2. Inspection and tests required by Federal, State, and Local codes and ordinances.
 - 3. Test safety circuit, loop circuit, and the drive circuits at 500 volts. Minimum resistance to ground shall be one megohm.
 - 4. General riding quality, leveling accuracy, and quietness of operation shall be acceptable to the Owner's representative.

3.6 USE OF ELEVATORS

- A. The elevators shall not be used for construction purposes or during the period prior to turning over the project to the Owner, without Owner's written authorization. Should the elevators be authorized for temporary use, the following conditions shall apply:
 - 1. The Elevator Contractor shall provide a temporary acceptance form for the user to sign.
 - 2. The Warranty period commences upon Substantial Completion and GOAA receives and approves the recommended spare parts list and staffing plan, regardless of any temporary use agreement.

3. The user shall provide, if job conditions require, all temporary enclosures, guards or other projection of the hoistway openings, power, signal devices, car lights, protection of any elevator entrances, cars, fixtures, and any other equipment that is installed.
4. The user shall return the elevators in the same condition they were in when placed on temporary service and shall pay the Elevator Contractor for repairs or clean up.
5. The user shall allow the Elevator Contractor to perform routine maintenance or repairs.
6. The cost of temporary service shall be worked out between the Elevator Contractor and the user.

B. As elevators are completed, the Owner shall have the prerogative of accepting and using them, shutting them down, or accepting them under an Interim Service Agreement described below:

1. The Owner shall have the prerogative of continuing the Interim Service Agreement until all elevators in the group (or building or APM/ITF Programs) are completed.
2. The Warranty period commences upon Substantial Completion and GOAA receives and approves the recommended spare parts list and staffing plan, regardless of any Interim Use Agreement.
3. Cost of interim service shall not exceed the prorated unit price for Year One included on the Bid Form.

3.7 INSTRUCTIONS TO OWNER

- A. Before final acceptance, Contractor shall instruct Owner's personnel how to use elevator during automatic operation, independent service, secured mode and fireman's service.

3.8 ACCEPTANCE

- A. Final acceptance of the installation shall be made only after all field inspections and tests are complete, punch list items are complete, all Owner's information items listed in 1.4 have been furnished, and the Owner's representative is satisfied that the installation has been satisfactorily completed.

END OF SECTION 14 21 00

SECTION 14 31 00 – ESCALATORS**PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections (including all sustainability requirements), apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Escalator Technical Specifications.
 - 2. Performance criteria.
 - 3. Provide Escalators per drawings.
- B. Related Requirements:
 - 1. Structural work to support escalator truss.
 - 2. Pit at bottom. Division 03
 - 3. Completion of finished floor to the level of floor plates. Division 09.
 - 4. Enclose sides of truss. Division 09.
 - 5. Temporary power for starting, testing and adjusting. Division 26.
 - 6. Electrical power to machine room including correct sized circuit breakers, lighting and convenience outlets. Division 26.

1.3 SUBMITTALS

- A. Product Data: Submit manufacturer's product data for each system proposed for use. Include the following:
 - 1. Indicators.
 - 2. Dimensions and layout.
 - 3. Motor data.
 - 4. Balustrade details.
 - 5. Step details.
 - 6. Walk on plate details.
 - 7. Skirt details
 - 8. Decking details.
 - 9. Electrical characteristics and connection requirements.
 - 10. Expected heat dissipation of Escalator equipment in equipment space.
- B. Shop Drawings: Submit no less than five copies (unless otherwise directed by the architect) of approval layout drawings. Include the following:
 - 1. Design information, including equipment lists and compliance with applicable agencies.

BP-S195
Terminal C

Airside Concourse

SECTION 14 31 00

2. Escalator layout in plan and section.
 3. Details of escalator controls including but not limited to emergency stop switches, key switches and access panels.
 4. Control plate complete with exact representation of graphics.
 5. Dimensioned layout of escalator pit showing escalator equipment, mechanical, electrical and structural elements and all accessories required to complete the work in compliance with Contract Documents.
- C. Samples: All exposed materials with finish and all custom fabrications.
1. Omit all logos from exposed finishes or components.
 2. Glass. Provide three (3) 8" x 8" samples
 3. Stainless Steel. Provide three (3) 8" x 8" samples
- D. Maintenance Data: Provide written information necessary for proper maintenance and adjustment of the equipment prior to final acceptance as follows:
1. Straight line wiring diagrams of as-installed Escalator circuits with index of location and function of all components. Leave one set in machine rooms. Provide 2 corrected sets for Owner's file 90 days after acceptance.
 2. Lubricating instructions and recommended lubricant grade.
 3. Parts catalogs and maintenance manuals not limited to repair, diagnostic, parts and service, necessary for the maintenance and repair of the Escalator equipment shall be provided to the Aviation Authority.
 4. Provide at no additional cost any special tools, laptops, pass words and manuals that are required for maintenance, trouble shooting, adjustments, door operation or performance of safety or code related tests for the Owner's use.
 5. If the Contractor requires the Owner to sign any documents for the special trouble- shooting tool(s), a copy of the agreement, shall be submitted with the bid.
 6. Provide 5 keys for each escalator switch and function. Match existing key system for the project.
 7. Contractor shall furnish to Aviation Authority any proprietary tools or diagnostic equipment that is required for the maintenance, repair or troubleshooting of the Escalator related systems that would prevent an outside Escalator company that is not related to the Escalator manufacturer from providing maintenance and repair functions / services, or which would prevent the outside Escalator company from performing future upgrades or modifications to the Escalator or related building systems. (ie, security, fire protection system, etc.)
 8. Submit the recommended monthly and annual testing and inspection schedule for each unit, as applicable, to be incorporated into the Service Contract.

1.4 SUBSTANTIAL COMPLETION SUBMITTALS

- A. In addition to all other Contract requirements to achieve Substantial Completion, the Contractor shall, as a condition of Substantial Completion of the construction subcontract and before the effective date of the Service Contract, execute and/or deliver the following to the Authority: the Contract, a copy of the Bidder's valid business or occupational license, a copy of Bidder's W -9 Form (Request for Taxpayer Identification Number and Certification), certificate of insurance, performance bond or letter of credit, final approved staffing plan and inventory list, final approved testing and inspection schedule and all other documents and information required by the Contract Documents or the Owner. All of the above documents and information must be furnished and the Contract Documents executed by Contractor, and delivered to Authority, before the Contract will be executed by the Authority
- B. The failure to timely fulfill these obligations shall be just cause for the Authority's withdrawal of such Notice of Intent to Award. In such case, the Contract may be re-advertised and the Authority shall be entitled to receive its damages and costs, including, but not limited to, its attorneys' fees caused by or in connection with the Contractor's failure to fulfill its obligations under this Section.
- C. The Contract shall not be binding upon the Authority until it has been executed by the Authority and a copy of such fully executed Contract is delivered to the Contractor. The Authority reserves the right to cancel the award without liability to any Bidder at any time before the Contract has been fully executed by the Authority and delivered to the Contractor. Accordingly, the Contractor is hereby warned that it should not commence performance or incur costs or expenses in connection with the Contract obligations until it has received from the Authority a final, fully executed copy of the Contract.

1.5 PRE-INSTALLATION CONFERENCE

- A. Pre-installation Conference: Conduct conference at Project site.
- B. Minimum Agenda: Installer shall demonstrate understanding of the Work required by describing detailed procedures for preparing, installing, and cleaning the Work. Demonstration shall include, but not be limited to, following topics:
 - 1. Tour representative areas of work, inspect and discuss condition of substrate, and other preparatory work performed by other trades.
 - 2. Review Contract Document requirements.
 - 3. Review approved submittals.
 - 4. Review inspection and testing requirements.
 - 5. Review environmental conditions and procedures for coping with unfavorable conditions.

6. Resolve deviations or differences between Contract Documents and the manufacturer's specifications.
 - C. Record discussions, including decisions and agreements, and prepare report.
- 1.6 REFERENCES
- A. Comply with applicable building codes and Escalator codes at the project site, including but not limited to the following:
 1. ASME A17.1 Safety Code for Elevators and Escalators, current adopted edition or as required by the authority having jurisdiction. In areas not covered by AHJ use latest edition of ASME Code.
 - a. NFPA 70 National Electrical Code.
 - b. NFPA 80 Fire Doors and Windows.
 - c. Americans with Disabilities Act – Accessibility Guidelines (ADAAG).
 - d. ASME A17.1, Buildings and Facilities, Providing Accessibility and Usability for Physically Handicapped People.
 - e. ASME UL 10B and ASTM E152 (or approved equal), Fire tests of door assemblies.
 - f. Model building codes.
 - g. Florida Building Codes, Statutes, Administrative Codes and Safety Guidelines.
 - h. All other local applicable codes.
 - B. Make application for, secure and pay for all necessary permits and certificates of inspection/operation for all equipment included herein, as required by the various departments of the Local and State Authorities. Furnish the Owner certificates and approval as required by the local governing authorities having jurisdiction.
 - C. In addition to the permits, inspections and test specified and the governing codes, the escalator contractor will be required to have performed speed and load carrying capacity and heat tests at his own expense.
 - D. Make applications for secure and pay for all necessary delays, waivers, or required to obtain certificate of compliance.
 - E. Any damage of any kind to the car or the adjoining structure which may develop through performance of any tests shall be repaired at no additional costs to the Owner.
- 1.7 CONTRACTORS RESPONSIBILITY
- A. The Escalator Contractor shall coordinate installation and inspection of their work with all trades to ensure timely installation, inspections and overall construction schedule sequencing. Failure of the Elevator Contractor to not coordinate in a

timely manner with other trades shall not warrant a delay in schedule or additional costs.

- B. In order to discover and resolve conflicts or lack of definition which might create problems, escalator manufacturer must review contract documents for compatibility with its product prior to bidding. Review structural, architectural, electrical, mechanical documents, and escalator specifications.
- C. Contractor must review all drawings associated with the project to ensure architectural design intents are full achieved, executed and coordinated as needed with other trades.
- D. Submit specific written exception and or clarification with quotation. Compliance with provisions of contract documents is assumed and required in absence of written exception.
- E. Owner will not pay for change to structural, mechanical, electrical, or other systems required to accommodate manufacturer's equipment if not identified before contract award.
- F. The electrical and mechanical design is based on the power characteristics and heat releases outlined in the drawings. The Contractor shall submit with bid any power characteristics or heat releases of this equipment that exceeds those listed in the drawings. Any additions or modifications requested at a later date will be at the expense of the Contractor.
- G. Heat release given as BTU/escalator/hour. All amperages based on 480 volt system. Maintain 50 to 90 degrees F temperature with 90% non-condensing humidity.
- H. Storage of materials: Store materials in a dry protected area. Handle materials in accordance with manufacturer's recommendations to prevent damage, soiling, or deterioration

1.8 WARRANTY

- A. Provide warranty to replace, repair, or restore parts or components that fail or do not operate properly due to poor field or factory workmanship, engineering or design for a period of 12 months from the date of Substantial Completion. If turnover for beneficial use occurs prior to Substantial Completion, provide interim warranty/maintenance between turnover and substantial completion, so that 12 month Warranty period is maintained starting at Substantial completion.

1.9 MAINTENANCE

- A. Furnish a preventable maintenance schedule, including all testing and inspection services identified for each escalator for a period of twelve (12) months as a condition of Substantial Condition. The maintenance service shall comprise of regular examinations of the installation by competent and trained mechanics on a routine basis, and shall include all necessary adjustments, greasing, oiling, cleaning, and supply parts and accessories necessary to keep the equipment in good operating condition, except such replacement of parts made necessary by misuse, accidents not attributable to failure of equipment or workmanship, and negligence by the Owner.
- B. A list of manufacturers recommended spare parts to be stocked (included in the unit price bid) shall be provided by the contractor for approval by the Owner as a condition of substantial completion of the escalator installation. Substantial deviators between the proposed and final inventory list may justify an adjustment to the bid price, if fully documented and approved by the Owner.
- C. Provide in accordance with Section 14 00 00 Escalator, Escalator Maintenance and Repair. Provide bid on a per unit basis with a monthly and annual total outlined in the Contractors bid submittal.
- D. In the event there is a conflict between this Specification and the Service Contract, the Service Contract will govern on all matters that arise after Substantial Completion.
- E. If turnover for beneficial use occurs prior to Substantial Completion, provide interim warranty/maintenance between turnover and substantial completion, so that 12 month Warranty period is maintained starting at Substantial completion.

1.10 QUALITY ASSURANCE

- A. The specific product or material manufactured by any of the following listed manufacturers is "acceptable" only if the specific product or material can evidence exact compliance with the contract documents and governing codes.
 - 1. KONE Escalator Company – Heavy Duty Grade Escalator
 - 2. Otis Escalator Company - Heavy Duty Grade Escalator
 - 3. Schindler Escalator - Heavy Duty Grade Escalator
 - 4. ThyssenKrupp Escalator - Heavy Duty Grade Escalator
- B. Escalator Contractor must be able to demonstrate that it is a Manufacturer of similar Escalators to those specified and which have given satisfactory service; has been in successful operation for at least ten (10) years; maintains locally, an adequate stock of parts for replacement or emergency purposes; has available qualified persons to do the work. Manufacturer means, for the purpose of this Specification section, a legal entity that is regularly engaged in the business of

manufacturing the equipment required by this Specification and does not include independent "assemblers" of component parts.

PART 2 - PRODUCTS**2.1 MANUFACTURERS****A. The following manufacturers are acceptable:**

1. Heavy Duty Escalators:
 - a. Kone
 - b. Otis
 - c. Schindler
 - d. ThyssenKrupp

B. Type and General Characteristics:

Bldg.	Type/HNTB Tag	Levels	Step Size	Notes
ASC	Escalator 16.1	2 to 3	40"	Three Flat Steps, 100 FPM, Step Loading Rating minimum 245lbs per step. See Drawings
ASC	Escalator 16.2	2 to 3	40"	Three Flat Steps, 100 FPM, Step Loading Rating minimum 245lbs per step. See Drawings
ASC	Escalator 16.3	Future	Future	Future
ASC	Escalator 33.2	1 to 2	40"	15'-6" travel. Three Flat Steps, 100 FPM, Step Loading Rating minimum 245lbs per step. See Drawings
ASC	Escalator 35.1	2 to 4	40"	17'-6" travel. Three Flat Steps, 100 FPM, Step Loading Rating minimum 245lbs per step. See Drawings
ASC	Escalator 36.1	2 to 4	40"	17'-6" travel. Three Flat Steps, 100 FPM, Step Loading Rating minimum 245lbs per step. See Drawings

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ASC	Escalator 38.1	2 to 4	40"	17'-6" travel. Three Flat Steps, 100 FPM, Step Loading Rating minimum 245lbs per step. See Drawings
ASC	Escalator 39.1	2 to 4	40"	17'-6" travel. Three Flat Steps, 100 FPM, Step Loading Rating minimum 245lbs per step. See Drawings
ASC (Ramp Loading Connector)	Escalator 39.2	1 to 2	40"	15'-6" travel. Three Flat Steps, 100 FPM, Step Loading Rating minimum 245lbs per step. See Drawings
ASC (Ramp Loading Connector)	Escalator 39.3	2 to 4	40"	16'-0" travel. Three Flat Steps, 100 FPM, Step Loading Rating minimum 245lbs per step. See Drawings
LST	Escalator 5.1	1 to 2	40"	Three Flat Steps, 100 FPM, Step Loading Rating minimum 245lbs per step. See Drawings
LST	Escalator 5.2	1 to 2	40"	Three Flat Steps, 100 FPM, Step Loading Rating minimum 245lbs per step. See Drawings
LST	Escalator 5.3	1 to 2	40"	Three Flat Steps, 100 FPM, Step Loading Rating minimum 245lbs per step. See Drawings
LST	Escalator 5.4	1 to 2	40"	Three Flat Steps, 100 FPM, Step Loading Rating minimum 245lbs per step. See Drawings
LST	Escalator 5.5	1 to 2	40"	Three Flat Steps, 100 FPM, Step Loading Rating minimum 245lbs per step. See Drawings
LST	Escalator 5.6	1 to 2	40"	Three Flat Steps, 100 FPM, Step Loading Rating minimum 245lbs per step. See Drawings

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LST	Escalator 5.7	2 to 4	40"	Three Flat Steps, 100 FPM, Step Loading Rating minimum 245lbs per step. See Drawings
LST	Escalator 5.8	2 to 4	40"	Three Flat Steps, 100 FPM, Step Loading Rating minimum 245lbs per step. See Drawings
LST	Escalator 5.9	2 to 4	40"	Three Flat Steps, 100 FPM, Step Loading Rating minimum 245lbs per step. See Drawings
LST	Escalator 5.10	2 to 4	40"	Three Flat Steps, 100 FPM, Step Loading Rating minimum 245lbs per step. See Drawings
LST	Escalator 5.11	2 to 4	40"	Three Flat Steps, 100 FPM, Step Loading Rating minimum 245lbs per step. See Drawings
LST	Escalator 5.12	2 to 4	40"	Three Flat Steps, 100 FPM, Step Loading Rating minimum 245lbs per step. See Drawings
LST	Escalator 5.13	4 to 6	40"	Three Flat Steps, 100 FPM, Step Loading Rating minimum 245lbs per step. See Drawings
LST	Escalator 5.14	4 to 6	40"	Three Flat Steps, 100 FPM, Step Loading Rating minimum 245lbs per step. See Drawings
LST	Escalator 5.15	4 to 6	40"	Three Flat Steps, 100 FPM, Step Loading Rating minimum 245lbs per step. See Drawings
LST	Escalator 5.16	4 to 6	40"	Three Flat Steps, 100 FPM, Step Loading Rating minimum 245lbs per step. See Drawings
LST	Escalator 5.17	4 to 4	40"	Three Flat Steps, 100 FPM, Step Loading Rating minimum 245lbs per step. See Drawings

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LST	Escalator 5.18	4 to 6	40"	Three Flat Steps, 100 FPM, Step Loading Rating minimum 245lbs per step. See Drawings
LST	Escalator 6.1	4 to 6	40"	Three Flat Steps, 100 FPM, Step Loading Rating minimum 245lbs per step. See Drawings
LST	Escalator 6.2	4 to 6	40"	Three Flat Steps, 100 FPM, Step Loading Rating minimum 245lbs per step. See Drawings
LST	Escalator 6.3	Future	Future	Future
GTF/PG	Escalator 3.1	4 to PG 2	40"	Three Flat Steps, 100 FPM, Step Loading Rating minimum 245lbs per step See Drawings
GTF/PG	Escalator 3.2	4 to PG 2	40"	Three Flat Steps, 100 FPM, Step Loading Rating minimum 245lbs per step. See Drawings
GTF/PG	Escalator 3.3	4 to PG 2	40"	Three Flat Steps, 100 FPM, Step Loading Rating minimum 245lbs per step. See Drawings
GTF/PG	Escalator 3.4	4 to PG 2	40"	Three Flat Steps, 100 FPM, Step Loading Rating minimum 245lbs per step. See Drawings
GTF	Escalator 3.5	4 to Prom	40"	Three Flat Steps, 100 FPM, Step Loading Rating minimum 245lbs per step. See Drawings
GTF	Escalator 3.6	4to Prom	40"	Three Flat Steps, 100 FPM, Step Loading Rating minimum 245lbs per step. See Drawings
GTF	Escalator 3.7	4 to Prom	40"	Three Flat Steps, 100 FPM, Step Loading Rating minimum 245lbs per step. See Drawings

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GTF	Escalator 3.8	4 to Prom	40"	Three Flat Steps, 100 FPM, Step Loading Rating minimum 245lbs per step. See Drawings
GTF	Escalator 3.1	3 to 4	40"	10'-2" travel. Three Flat Steps, 100 FPM, Step Loading Rating minimum 245lbs per step. See Drawings
GTF	Escalator 3.2	3 to 4	40"	10'-2" travel. Three Flat Steps, 100 FPM, Step Loading Rating minimum 245lbs per step. See Drawings
GTF	Escalator 3.3	Pkg Lvl 2 to 4	40"	25'-4" travel. Three Flat Steps, 100 FPM, Step Loading Rating minimum 245lbs per step. See Drawings
GTF	Escalator 3.4	Pkg Lvl 2 to 4	40"	25'-4" travel. Three Flat Steps, 100 FPM, Step Loading Rating minimum 245lbs per step. See Drawings
GTF	Escalator 5.1	4 to 5	40"	13'-10" travel. Three Flat Steps, 100 FPM, Step Loading Rating minimum 245lbs per step. See Drawings
GTF	Escalator 5.2	4 to 5	40"	13'-10" travel. Three Flat Steps, 100 FPM, Step Loading Rating minimum 245lbs per step. See Drawings
GTF	Escalator 5.3	3 to 4	40"	10'-2" travel. Three Flat Steps, 100 FPM, Step Loading Rating minimum 245lbs per step. See Drawings
GTF	Escalator 5.4	3 to 4	40"	10'-2" travel. Three Flat Steps, 100 FPM, Step Loading Rating minimum 245lbs per step. See Drawings

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PKG	Escalator E122	1-2	40"	Three Flat Steps, 100 FPM, Step Loading Rating minimum 245lbs per step. See Drawings
PKG	Escalator E123	1-2	40"	Three Flat Steps, 100 FPM, Step Loading Rating minimum 245lbs per step. See Drawings

2.2 DESIGN AND FABRICATION

- A. Escalators shall be heavy duty design, capable of operating in a 24 hour facility with heavy usage. The escalators shall be designed and manufactured to include all energy saving/reduction methods and means (see alternates also). Moisture resistant design shall be incorporated for vertical transportation that is exposed to outside air. Vandal resistant design shall be incorporated for all vertical transportation on this project.
- B. The escalators shall also comply with applicable wind load standards if escalators are designated for outside exposure.

2.3 PERFORMANCE REQUIREMENTS

- A. Speed shall be +/- 3% under any loading condition
- B. The escalator shall not make any objectionable noise during operation such as grinding, squeaking and or noise that exceed 60dB measured from 3' from the step or landing plate.

2.4 TRUSS

- A. Type: Truss shall be designed and constructed of structural steel, ASTM A36, to safely carry the entire load of the escalator including all parts of same, together with the full capacity load and including the weight of the balustrade and truss covering as detailed on the drawings.
 - 1. Top end of truss shall carry the drive machine and controller.
 - 2. Trusses shall be designed to support the cladding over the exterior of truss.
 - 3. Trusses shall have a safety factor in accordance with the requirements of the Safety Code and other codes having jurisdiction.
 - 4. Clad any exposed portion of truss in satin stainless steel, grade 308.

2.5 INTERMEDIATE STRUCTURAL SUPPORT FOR TRUSSES

- A. Provide intermediate structural support for escalator truss as required based on manufacturer's requirements. Due to travel length intermediate structural supports will be required for some escalators, including Escalators 3.3 and 3.4,

Escalators 6.7 – 6.12, and PKG Garage Escalators. Escalator scope must include all required intermediate supports as part of complete installation scope.

2.6 STEPS

A. Step Design:

1. Steps shall be of the horizontal tread formation.
 - a. Vertical Rise Between Steps: 8-1/8" maximum.
 - b. Horizontal Distance Between Noses of Steps: 13-3/4" minimum.
 - c. Clearance Between Steps: 1/8" maximum.
2. Step Frames: Cast aluminum reinforced and braced to carry step threads and maximum load per stop under eccentric loading conditions without distortion.
3. Step Wheels: Shall be designed for quiet operation and must be of a type which will ensure rotation and prevention of flat spots, complete with bearings and provisions for retention of ample lubricant to ensure satisfactory operation without frequent lubrication.
4. Design of steps and required attachments shall permit the steps to be removed without disturbing the balustrades or dismantling any part of the chains.
5. Design of stairway shall permit chain to run without the steps for convenience in cleaning and inspection.
6. Exposed Gearing, Sprockets, Chains: Shall be covered with guards.
7. Side Panels or Guards: Removable type for inspection and maintenance.
8. Provide 3 flat steps at the entrance of each escalator landing.
9. Steps shall be 40" wide.
10. Step loading capabilities should be equal to or greater than 245lbs per step.

B. Step Treads:

1. Type: One-piece cast aluminum cleat type, with square edges, designed to ensure a secure foothold and comfortable tread surface, mill finish, black in color.
2. Cleats: 1/8" wide maximum, spaced so that ends are flush with step riser.
3. Grooves: 1/4" wide maximum, 7/16" deep minimum.
4. Sides: To be located with minimum clearance at adjustable curtain boards.

C. Step Risers:

1. Cleat type constructed of aluminum.

D. Step Drive Units:

1. Top Member of Step Driving Unit: Shall be carried on two brackets rigidly attached to truss to ensure and maintain proper alignment of the unit, and shall be removable intact from the truss.
2. Lower Member of Step Driving Unit: Shall be removable intact from the truss, and be mounted on supporting brackets or pedestals provided with

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rollers which operate on tracks located at each side of truss, and be designed and installed to automatically maintain proper tension on the step chains by means of either tension weights or compression springs.

3. Bearings: Ball or roller type, dustproof and self-aligning, complete with ample means for lubricating and adjustment for wear.
4. Chain Sprockets for Step Drive Units: Shall be designed for smooth operation, and be accurately machined to distribute load evenly on sprocket teeth and on chain rollers.
5. Contractor's Option: Instead of step drive units specified above, provide a step driving arrangement utilizing laminating plates secured to each other by means of step axles to drive the step wheels.

E. Step Chains:

1. Type: Endless roller type, one located on each side of steps made of high grade steel links with hardened pins and rollers designed to accurately engage the drive sprockets to ensure smooth operation.
2. Provision shall be made to prevent sagging or buckling of chains and to prevent the steps from coming in contact with each other and to also maintain substantially constant distances between step axles of all exposed steps.
3. Step chain shall be provided with a tension device at lower landing to maintain proper tension.
4. Safety Factor: Not less than ten and shall consist of hardened steel links throughout.

2.7 HANDRAIL AND BALUSTRADE ASSEMBLY

- A. Type: Traction or positive handrail drive complete with balustrade and interior panels.
- B. Handrails: Fabricated of laminated canvas and black rubber, spliced and vulcanized to create a strong and smooth splice.
 1. Handrail shall operate on brass, bronze or steel guides of sealed type, complete with provisions for lubrication.
 2. Canvas shall not be exposed.
 3. The extended newel shall be designed and fabricated so that the handrail will disappear into the balustrade at a point difficult to reach.
 4. Where adjacent escalators share a common landing, newels must align. Top end newels must align with bottom end newels where adjacent escalators share a common landing.
- C. Balustrades: Tempered glass complete with covers, moldings, skirt panels and all accessories required for complete installations, fabricated of stainless steel with No. 4 satin finish.

1. Glass Panels: 3/8" clear tempered glass, ASTM C1048, Condition A (uncoated) without vertical metal mullions at interior panels, with glass joints vertical to landing not to truss.
 2. Skirt Panels: 16 gauge stainless steel No. 4 finish laminated to fire-retardant rubberized sound-deadening board. Provide temporary strippable factory applied protective coating on exposed surfaces.
- D. Balustrade Lighting: Provide continuous LED lighting strips under handrail guides at structural glass interior panels consisting of key-operated switch to control lighting. Color shall be white. Provide integral 3500°K LED balustrade lighting to target a minimum illuminance of 10 fc.

2.8 MISCELLANEOUS COMPONENTS

- A. Exterior Quality:
1. Contractor shall ensure that all measures are taken to include exterior escalator quality components, design and construction to withstand temperature, humidity, water, appropriate wind load conformance requirements and direct sunlight impact. Contractor must detail these inclusions in their bid submittal. This applies to any escalator designated for exterior building installation per the architectural drawings.
- B. Landing and Floor Plates:
1. Type: Cast aluminum of slip-resistant design, removable for access to drive machines and pits.
 2. Design of landing and floor plates shall harmonize with steps and comb plates.
 3. Transition at landing shall have 3 flat steps
- C. Drip Pans: Oil-tight construction is required for entire length and width of each truss.
- D. Tracks:
1. Type: "Closed", smooth for continuous support of chain wheels from sprocket to sprocket, constructed of drawn steel or other alloy, of proper rigidity, and installed and supported to ensure perfect alignment and smooth operation of the running gear under all conditions.
 2. All tracks shall have a smooth finish track surface.
 3. Carriages and curved tracks for guiding the steps at the upper and lower landings shall be provided with machined guiding surfaces, or formed from cold rolled steel bars.
 4. Curved chain wheel tracks at upper landing shall be made easily removable and replaceable.
 5. Tracks at lower landing shall be designed to accommodate movement of carriage unit.

6. Transition between incline and upper landing shall be accomplished by a curved track system with a minimum of 70" radius.
 7. Transition between incline and lower landing, a minimum of 48" radius.
- E. Comb Plates:
1. Type: Shall have yellow metal surfaces, with comb teeth spaced so that cleats of step treads will pass between combs with minimum clearance.
 2. Comb teeth shall be made in sections so that damaged or worn section can be readily replaced without disturbing balance of comb.
 3. Comb teeth shall be formed to correspond to form of treads to obtain uniform side clearance.
- F. Deck Covers and Moldings: Constructed of metal and finished to match skirt panels, adequately reinforced.
- G. Barrier Panels: Clear, tempered glass panels, cantilevered from deck cover between adjacent, parallel escalators.
- H. Where required by code, anti-slide devices shall be provided.
- I. Fault Indicator: Provide upper and lower end of truss with fault indicator to display source of fault without removal of equipment access plate. Locate indicator in handrail inlet box or deck board visible from landing plate.
- J. Pit Flood Detector: Provide a high level water alarm switch in the escalator pits, interconnected to the control system as required to stop the escalator in the event water is detected in the pits. The escalator shall stop "gently" to prevent harm to passengers. The device shall be able to be turned off and reset via a key switch external to the escalator.

2.9 OPERATION

- A. Driving Machine:
1. Type: Worm gear type especially designed for escalator service, provided with accurately machined worm and gear driven by a moderate speed motor.
 2. Motors: Shall be designed to operate on 460-480 volt, 3 phase, 60 hertz electric current.
 3. Driving Machine: Shall be located at upper end of truss.
 4. Contractor's Option: Machines may be located along the incline provided easy access is provided for maintenance and inspection.
 5. Units shall operate at 100 feet per minute (FPM) and shall have the ability to be field adjusted to normally operate <80 FPM should GOAA elect to have a normal slower operating speed than industry standard.
- B. Controller:

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1. Type: Full magnetic, continuous duty and reversing type designed to protect the motor against overload.
 2. Control Transformers: Provide in each controller to reduce control voltage to pushbutton circuit, etc., 110-120 volt single phase, 60 hertz, AC.
 3. Should power failure occur, or any safety device operate, the controller shall automatically cut off power to the motor and apply the service brake to bring the escalator to a quick and smooth stop.
 4. Controllers and all wiring for outside units to be NEMA 4 or equivalent and rated for exterior operation including temperature and humidity conditions.
 5. Provide Contractor's Variable Voltage Variable Frequency Drive.
 6. Alternate (If not standard in Contractor's product line, list as separate cost for all escalators in package as part of bid submittal): Provide escalator power feedback drive units. Provide a regenerative drive system. The system shall produce clean power with harmonic distortion within the guidelines of IEEE 519.
 7. Alternate (If not standard in Contractor's product line, list as separate cost for all escalators in package as part of bid submittal): Standby Speed Operation: Provide inverter control that will run the escalator at reduced speed when no passengers are on the step band.
 - a. Speed shall change from the Owner specified speed to no less than 10fpm. Passenger detection means shall be provided at both landings of the escalator. Detection of any approaching passenger shall occur sufficiently in advance of boarding to cause the escalator to reach full operating speed before a passenger walking at 270 feet per minute reaches the comb plate.
 - b. Passenger detection shall remain active at the egress landing to detect a passenger approaching against the direction of escalator travel and shall cause the escalator to accelerate to full speed and sound the alarm at the approaching landing before the passenger reaches the comb plate.
 - c. Automatic deceleration shall not occur at less than three times the time it takes to transfer a passenger between landings. A means shall be provided to detect failure of the passenger detection means and shall cause the escalator to operate at owner specified speed not to exceed rated speed
- C. Emergency Stop Buttons:
1. Shall be located at top and bottom landings and on controller and shall be designed, on momentary pressure of either button, to cut off the current supply to the motor and bring the escalator to rest. All controls and switches to be NEMA 4 rated or equivalent for units located outside air conditioned spaces.
- D. Safety Brake:

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1. Shall be of a type which is positive in operation and shall be brought into action each time the escalator is stopped, and shall automatically stop the escalator whenever the power is interrupted from any cause or by any of the safety devices, and shall hold the escalator stationary with full load.
 2. If the escalator shall be operated by main drive chain and sprocket driving chains, a broken chain safety shall be provided which will set an emergency brake mounted on the upper sprocket shaft, and will stop the escalator.
 3. Units outside air condition spaces to have shrouds or means to protect brake from water intrusion.
- E. Overspeed Governor:
1. Shall be designed to cut off current supply to motor and bring escalator to rest, should it attain a speed in excess of 140 percent of rated speed.
- F. Non-Reversing Device:
1. Shall be designed to stop escalator automatically should the direction of travel be accidentally reversed while escalator is operating in ascending direction.
- G. Control Buttons and Key-Operated Switches:
1. Shall be provided in the lower ends of the upper and lower newels of escalator to control the following.
 - a. The stopping of all motion of escalator - pushbuttons (both at top and bottom).
 - b. The direction of travel of escalator - key switches (at top and bottom).
 - c. The starting of escalators (at top and bottom).
 2. Plates shall be of matching material, flush mounted, and suitably inscribed with letters, figures and direction arrows which are readily visible from a standing position.
 3. Bottom plate, at the bottom and top of escalator, shall contain a stop button and key switch which will permit the operation of the escalator in either up or down direction.
 4. Stop button and the key switch shall be interconnected so that the escalator can be brought to rest before the direction of travel can be changed.
 5. Contractor shall connect with approved type conduit and wiring all of the above buttons and switches to the controller which shall be located in the machine space at the top of escalator.
 6. Escalators that are located outside in non-air conditioned spaces shall have NEMA 4 or equivalent components.
 7. Provide 5 keys for each function, match all keys to Owners standard key system.
- H. Safety Devices:

1. Safety devices shall consist of a broken chain device, overspeed governor, non-reversing device, safety brake, emergency stop buttons, and such other safety devices as may be included in applicable safety codes.
 2. Contractor shall furnish and install a step skirt safety device on each escalator.
 3. Device shall consist of safety switches so mounted alongside the steps that they will effectively stop the escalator should the steps be forced out of line due to the introduction of an object between the escalator and step riser.
- I. Broken Chain Device:
1. Shall be provided with electric contacts which will be opened and cause the brake to be applied when step chains break or should the tension on the chains drop below or exceed a predetermined value.

2.10 ESCALATOR MANAGEMENT SYSTEMS

- A. For all of the vertical transportation herein, a Lift-Net Elevator Monitoring and Management system shall be provided. The system shall comply with the requirement's set forth herein and shall include a monitoring system in each machine room and connected to existing Lift-Net system in central command.
- B. General: Provide an interactive system to monitor and manage the elevator equipment ("units") hereinafter called "system." Data collection, data storage, and real-time monitoring portion of the system shall be based on Microsoft Windows and be able to run on Windows 2000 Pro, XP Pro, or later operating systems. Provide the following features:
1. Network based, capable of interfacing with control systems via either serial data link or hardwired interface connections.
 2. Operate on any TCP/IP based network system including but not limited to an Ethernet, Token Ring, Arc-Net, Lift-Net, etc.
 3. Expansion capability to add unlimited number of monitoring terminals on the network.
 4. Monitoring terminals shall operate peer-to peer or with a single client server. Failure of a single network device shall not affect the operation of the remainder of the system.
 5. Complete backup of system data shall be accomplished at any single terminal/server location.
 6. Display multiple banks, including multiple buildings, on a single monitoring terminal screen.
- C. Monitoring Display: The system shall be capable of simultaneous monitoring of at least five hundred units on a single monitoring station utilizing a graphical representation of a plan view of the facility. Each elevator shown on the plan view shall be individually displayed and shall be visible on the monitoring system display terminal without the need to scroll. Each individual unit, when operating "normally," shall be displayed in green. In the event of a malfunction of any individual unit, the unit shall be displayed by a red blinking light on the monitoring system display. Units which are intentionally placed out of service shall be shown as yellow in the display mode. When malfunctioning units, or units intentionally placed out of service are returned to normal operation the graphical representation for that

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unit(s) shall automatically return to green. The user shall have the ability to display additional information, such as the cause of fault/alarm, for all units by selecting the unit with a "mouse click" from the plan view of the facility. All monitored units shall be visible from any monitoring terminal on the network. Entry into the network shall be multi-level password protected.

D. System Capabilities:

1. The system shall be capable of real time display of all monitored status points on all monitored equipment. Fault and event notification screens and audible alarms shall be immediately displayed on selected monitoring stations. Different fault and event tables shall be defined on a per-bank basis. The system shall collect and store all status, fault, and event information for later reporting and analysis. The system shall provide statistical analysis of hall call response times, traffic patterns, fault conditions, service logs, and security usage in graphical and tabular format.
2. The system shall maintain a record of every status point change occurring on the monitored equipment and provide the ability to replay these events in a simulation at a later time in real time, slow speed, single step, reverse, or fast forward. This information shall be retained for a period of at least twenty-six weeks and a mechanism shall be provided whereby this information may be archived.
3. The system shall store traffic fault and statistical data for a period of at least three (3) years. The system shall log error type, car number, floor position, and major system status points whenever a fault or logged event occurs.
4. The system shall provide interactive control of certain features provided in the elevator control system. These features may be revised as the requirements of the building change. Some of these interactive controls may include, but are not limited to: Security floor lockouts, entering car and hall calls, Firefighters' service, lobby recall, VIP service, up/down peak service, etc.
5. In the case of a power failure the system shall be capable of connecting to emergency power back-up unit. The loss of power shall not affect any stored data. The system shall have the capability to detect the loss (disconnect) of any individual unit from the monitoring system by periodically polling all units to ensure that normal communications between the unit(s) and the terminals/server are maintained.
6. The system will automatically re-boot the program and continue to operate after a power loss or other system malfunction.

E. Monitoring Equipment: The monitoring equipment shall have these minimum characteristics:

1. Monitoring Station Hardware: Provide a monitoring station in each machine room and on for each facility in central command.
 - a. Central Processing Unit: IBM compatible microcomputer – desk top or mini-tower (multiple machine rooms or lobby displays)
 - b. Type: Pentium or most current high-performance processor
 - c. Speed: Most current high-performance
 - d. Internal Hard Drive: Adequate storage for three years data for entire system
 - e. Modem: Most current high-performance
 - f. Display Monitor: 19" – 20" LCD flat panel, color, capable of simultaneous display of all monitored units
 - g. Printer: Current HP Color Desk Jet Series
 - h. Keyboard: MS Windows compatible

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- i. Mouse: MS Windows compatible
 - j. Power Requirements: 90-230 Volts AC, 50-60Hz @ 8A
 - 2. Monitoring Station Operating System Software
 - a. MS Windows 2000 Pro, XP Pro, or later
 - b. MS Windows 2000 Server or later
- F. Network requirements:
 - 1. Maximum local network rated distance (2-20 gauge shielded TP): > 10 miles
 - 2. Elevator Contractor shall provide assistance to Network Contractor with installation of network system in elevator equipment spaces at no additional cost.
 - 3. Elevator Contractor is responsible for material and labor required for the connectivity and testing of all escalator management.
 - 4. Refer to Division 28 for Network information.
- G. Monitoring Requirements: The system shall display and record the following information for each monitored unit. Serial data links may include many more points. Items listed below are minimum requirements.
 - 1. Group status:
 - a. Group operational mode
 - b. All units to be monitored on the same screen in a graphical format
 - c. In/out of service
 - d. Standby power
 - e. Supervisory failure
 - f. Location and direction of hall calls
 - g. Shunt Trip status.
 - 2. Individual car status, expandable menus:
 - a. Direction of travel
 - b. Independent service
 - c. Inspection service
 - d. Firefighters' service
 - e. Position of elevator
 - f. Door status (open, opening, closing, closed)
 - g. Door dwell time
 - h. Load by-pass
 - i. Standby power
 - j. Power on/off
 - k. Door detector
 - l. Safety circuit
 - m. Door zone
 - n. Stop switch
 - o. Alarm button
 - p. Registered car calls
 - q. Out of level
 - r. Machine room temperature exceeds 95 degrees
 - s. Stop counter (number of starts)
 - t. Car speed
 - u. Door open times
 - v. Door close time
 - w. Start to stop motion time

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- x. Emergency 2-way communication device
 - y. Air conditioner/heater
 - 3. Keyboard, mouse, and time clock control capabilities:
 - a. Floor lockouts (car or hall)
 - b. Lobby recall
 - c. VIP service
 - d. Firefighters' service
 - e. Up/down peak
 - 4. Faults monitored with visual and audible alarm, triggered by combinations of any of the above status points:
 - a. Safety circuit
 - b. Alarm bell
 - c. Stop switch
 - d. Emergency 2-way communication device
 - e. Door reversal device
 - f. At least six (6) user selectable faults or events (i.e. water in pit, high machine room/cab temperature)
- H. Reporting Requirements: System shall provide reports in color graphical format both on-screen and in printed form capability to conveniently switch from one report type to another and from one bank to another using minimal mouse clicks and key strokes. Reports shall be displayed after minimal waiting time. Data for all reports shall be continuously recorded and stored. Reports shall be displayed by simply selecting a date and time range, bank of equipment and report type. Date and time range selections shall carry forward from one report selection to the next. Reporting functions shall be sub-divided into the following categories:
 - 1. Traffic Reports:
 - a. Number of hall calls per floor (hall call distribution on a per floor basis)
 - b. Number of hall calls per hour (24 hour time-line)
 - c. Hall call waiting times per floor (hall call waiting time distribution on a per floor basis)
 - d. Hall call waiting times per hour (24 hour time-line)
 - e. Distributed hall call response graph (24 hour time-line)
 - f. Detailed hall call response graph (% calls / n seconds)
 - g. Longest wait times including floor #, wait time, date, time and direction
 - 2. Fault Reports:
 - a. Ten most recent faults (most recent faults listed per bank)
 - b. Fault Log: Displays the entire fault log for a given time period
 - c. Faults per car (fault distribution on a per car basis)
 - d. Faults per floor (fault distribution on a per floor basis)
 - e. Faults per day/week/month (fault distribution on a per unit or group basis)
 - 3. Car Use Statistics:
 - a. Car use by hour (24 hour time-line of car calls, car starts, door cycles, delayed car, load by pass)
 - b. Car use statistics (same as above, shown for an entire bank)
 - 4. Group Service Log:
 - a. Cars in service (24 hour time-line with text log of group availability of each car)
 - b. Group functions (24 hour time-line with text log of actuation of group functions – Up peak, down peak, fire service, emergency power, etc.

- I. Interactive Features: The control system shall be capable where desired of operating interactive control features provided in the elevator control system. These features may be revised as the requirements of the building change. Some of these interactive controls may include but are not limited to: security floor lockouts, entering car and hall calls, Firefighters' return service, lobby recall, VIP service, up/down peak or hospital Code Blue service. Local codes may affect the availability or operation of these features.
 1. Security Access Features: The monitoring system shall be capable of providing security enable/disable of all hall and car calls through on-screen menus at a minimum. The monitoring system shall also be capable of interfacing directly with card readers and security keypads in stand-alone mode, and indirectly through a serial interface with a third party security system. When in stand-alone mode, the monitoring system shall maintain a database of elevator users and security pass codes. When on secure mode the use of each elevator will be recorded in a file together with the time, authorized pass code and destination for each call.
 2. Elevator Control Features: Each elevator shall be capable of being controlled through the monitoring system. All control points shall be capable of seven-day twenty-four hour time clock automatic operation or manual operation from the mouse and keyboard. The control points shall include, but not be limited to, the following (where allowed by local codes):
 - a. Lobby recall
 - b. Car call security lockout
 - c. Hall call security lockout
 - d. Independent service
 3. Paging Feature: The monitoring system shall be capable of paging a service technician or other personnel based on pre-defined parameters of elevator faults or conditions. The paging system shall provide the ability to page multiple numbers determined by the type of event triggering the notification and shall be able to page different numbers based on preset times of day (i.e. different shifts). The system shall be capable of sending text messages to full text pagers in addition to supporting standard DTMF pagers.
 4. Remote Access Feature: The monitoring system shall be capable of allowing approved individuals under multi-level password control to access all system features via the local area network, internet, or via modem over the public telephone network to review the performance of the equipment or to evaluate a fault condition. The remote access feature shall be integrated into the monitoring system and shall not use third party "remote control" software products.
- J. Elevators to be integrated into existing Lift Net monitoring system and communicate to the Central Control room of the facility. Coordinate use of LAN with the Owner. For non LAN functions provide wiring and conduit for all components furnished.
- K. Lift-net system shall be connected to a new USP power back up system furnished fully by Elevator Contractor.

PRODUCT DATA SHEET 1 - PART 3 – EXECUTION

3.1 SCOPE

- A. Installation shall meet all of the standard requirements of paragraph 1.03 for installation and inspection, tolerances, and qualifications. All work required for completion of a first-class installation is the responsibility of the Contractor, even if not included in this specification.
- B. Performance of the Escalator shall meet requirements outlined in Division 14 documents.
- C. Labeling of disconnects with feed location information and shunt trip locations to be by Escalator contractor.

2.2 3.3 PAINTING

- A. All escalator equipment not painted, located within the machine room or hoistway, shall be given a finish coat of paint. Material that has factory finish paint, shall have all scratches or mars re-painted after installation. Any galvanized finishes do not need to be painted.
- B. Finish coat shall have hard, tough semi-gloss surface.
- C. Escalator machine room and pit floors shall be painted with an oil resistant polyurethane high gloss enamel paint or approved equivalent. Color shall be terra cotta (Tough Shield #1231-108) or approved equivalent.

3.4 CLEAN UP

- A. Remove trash daily from hoistways, pits, and machine rooms including all packing material and debris resulting from this work. Leave all Escalator spaces broom clean.

3.5 ACCEPTANCE TESTING

- A. Tests shall be performed by the Escalator Contractor at his expense in the presence of the Owner's representative. The Escalators shall be subjected to the following acceptance inspection and tests.
 - 1. Inspection and tests required by applicable portions the Construction Documents.
 - 2. Inspection and tests required by Federal, State, and Local codes and ordinances.
 - 3. Test safety circuit, loop circuit, and the drive circuits at 500 volts. Minimum resistance to ground shall be one megohm.
 - 4. General riding quality, leveling accuracy, and quietness of operation shall be acceptable to the Owner's representative.

- B. The Escalators shall not be used for construction purposes, or during the period prior to turning over the project to the Owner, without Owner written authorization. Should the Escalators be authorized for temporary use, the following conditions shall apply:
- C. The Escalator Contractor shall provide a temporary acceptance form for the user to sign.
- D. The Warranty period commences upon Substantial Completion, regardless of any temporary use agreement.
- E. The user shall provide, if job conditions require, all temporary enclosures, guards or other project of the hoistway openings, power, signal devices, car lights, protection of any Escalator equipment that is installed.
- F. The user shall return the Escalators in the same condition they were in when placed on temporary service and shall pay the Escalator Contractor for repairs or clean up.
- G. The user shall allow the Escalator Contractor to perform routine maintenance or repairs.
- H. The cost of temporary service shall be worked out between the Escalator Contractor and the user.

- 2.3 I. As Escalators are completed, the Owner shall have the prerogative of accepting and using them, shutting them down, or accepting them under an interim Service Agreement described below:
- 2.4 1. The Owner shall have the prerogative of continuing the Interim Service Agreement until all Escalators in the group (or building or APM/ITF Programs) are completed.
- 2.5 2. The Warranty period commences upon Substantial Completion, regardless of any Interim Use Agreement.
- 2.6 3. Cost of Interim Service shall not exceed the prorated unit price for Year One included on the Bid Form.
- 2.7 3.6 INSTRUCTIONS TO OWNER
- 2.8 A. Before final acceptance, Contractor shall instruct Owner's personnel not to use Escalator during automatic operation, independent service, secured mode and fireman's service.
- 2.9 3.7 ACCEPTANCE
- 2.10 A. Final acceptance of the installation shall be made only after all field inspections and tests are complete, punch list items are complete, all Owner's representative is satisfied that the installation has been satisfactorily completed.

END OF SECTION 14 31 00

SECTION 14 91 82 - TRASH CHUTES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Waste chutes.
- B. Related Requirements:
 - 1. Section 05 50 00 "Metal Fabrications" for metal supporting framework at floor penetrations.
 - 2. Section 07 62 00 "Sheet Metal Flashing and Trim" for roof-vent flashing.
 - 3. Section 21 13 13 "Wet-Pipe Sprinkler Systems" for fire-suppression water-service connections to automatic sprinklers in the chute.
 - 4. Section 22 11 16 "Domestic Water Piping" for water-service connections to chute-flushing or -sanitizing equipment.

1.3 DEFINITIONS

- A. Chase: The shaft that encloses a chute.
- B. Intake Door: Door or hatch that penetrates the chase wall and chute, and through which materials are fed into the chute.
- C. Discharge Door: Door or hatch at the bottom of a chute, through which materials exit the chute.
- D. Access Door: Door other than an intake or discharge door that penetrates the chase wall for service access to devices in the chase.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for chutes.
- B. Sustainable Design Documentation Submittals: Refer to section 01 81 13.14 "Sustainable Design Requirements – LEED V4 BD+C".

1. Product Data: Documentation for Leadership Extraction Practices in the following:
 - a. Leadership Extraction Practices for Recycled Content
 2. Product Certificates: Provide the following:
 - a. Environmental Product Declarations (EPD's)
- C. Shop Drawings:
1. Include plans, elevations, sections, and mounting and attachment details.
 2. Include dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 3. Include each type and location of intake, discharge, and access door.
 4. Include diagrams for power, signal and control wiring.

1.6 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Plan(s) 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:
1. Size and construction of chase enclosing each chute; locations for power, signal, and control wiring; and sprinkler-piping and water-service connections.
 2. Chute-discharge locations coordinated with compactor-intake or container locations.
- B. Product Certificates: For each type of chute, from manufacturer.

1.7 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For chutes to include in operation and maintenance manuals.
1. Include manufacturer's recycling plan guidelines.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. 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:
1. American Chute Systems, Inc.
 2. Chutes International.
 3. U.S. Chutes; U.S.C. Group.

2.2 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing and inspecting agency, for fire-protection ratings indicated.
1. Test Pressure: Test at atmospheric (neutral) pressure according to NFPA 252 or UL 10B.

2. Intake Doors: Labeled, 1-1/2-hour fire-resistance rated with 30-minute temperature rise of 250 deg F.
3. Access Doors: Labeled, 1-1/2-hour fire-resistance rated with 30-minute temperature rise of 250 deg F.
- B. Discharge-Door Assemblies: Labeled, 1-1/2-hour fire-resistance rated according to NFPA 252 or UL 10B requirements for fire-rated door assemblies.
- C. 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.
- D. Standard: Provide chutes complying with NFPA 82.

2.3 CHUTES

- A. Chute Metal: Type 304 stainless steel, ASTM A 240/A 240M.
 1. Thickness: 0.060 inch.
- B. Chute Size: As indicated on Drawings.
- C. External Reinforcing for Offsets: Additional thickness of 0.11-inch-thick chute metal with bracing to structure.
- D. Vent: Full diameter vent of same gauge extending 3 feet (914mm) above roof with metal safety cap, in accordance with NFPA Code 82, 2008 edition.

2.4 DOORS

- A. Intake-Door Assemblies: ASTM A 240/A 240M, Type 304, stainless-steel self-closing units with positive latch and latch handle, with stainless-steel trim; constructed as required for performance requirements indicated; and with frame suitable for the enclosing chase construction.
 1. Door Type: Hopper.
 2. Size: Manufacturer's standard size for door type, chute type, and diameter indicated.
 3. Finish: Manufacturer's standard satin or No. 3 directional polish.
 4. Lockset: T-handle-type cylinder lock that releases latch with key that is removable only when cylinder is locked.
 - a. Lock Cylinder: Cylinders standard with manufacturer.
 - b. Keying: For each chute, key cylinders alike to master key system.
 - c. Keys: Two for each cylinder.
 5. Mechanical Interlocks: Interlock system for system servicing, operated from discharge door to automatically lock intake doors.
 6. Baffles: Rubber backdraft baffles at each intake.
- B. Discharge-Door Assemblies: Aluminum-coated steel; direct vertical-discharge type, inclined, and horizontally closing and latching; constructed as required for performance requirements indicated; and equipped with 165 deg F fusible links that cause doors to close in the event of fire.

- C. Detector System: Heat- and smoke-detecting interlock system with temperature-rise elements that locks chute doors when temperature in chute reaches a predetermined, adjustable temperature.
 - 1. Locate smoke detector outside discharge door with solenoid to close discharge door.
- D. Access-Door Assemblies: Manufacturer's standard ASTM A 240/A 240M, Type 302/304, stainless-steel doors with trim; constructed as required for performance requirements indicated; with frame suitable for the enclosing chase construction; and in satin or No. 3 directional polish finish; equipped with cylinder locks that release latch with keys that are removable only when cylinder is locked.
 - 1. Lock Cylinder: Cylinders standard with manufacturer.
 - 2. Keying: Key access-door cylinders alike to master key system.
 - 3. Keys: Two for each cylinder.

2.5 ACCESSORIES

- A. Chute Fire Sprinklers: NFPA 13; manufacturer's standard, recessed, automatic, NPS 1/2 sprinklers; ready for piping connections.
- B. Flushing Spray Unit: NPS 3/4 spray-head unit located in chute above highest intake door, ready for hot-water piping connection, and with access door for spray-head and piping maintenance.
- C. Sanitizing Unit: NPS 3/4 disinfecting and sanitizing spray-head unit located in chute above highest intake door, including 1-gal. tank and adjustable proportioning valve with bypass for manual control of sanitizing and flushing operation, ready for hot-water piping connection, and with access door for spray-head and piping maintenance.
- D. Intake-Door Baffles: Rubber baffles, 1/8 inch thick.
- E. Sound Dampening: Manufacturer's standard sound and vibration isolator pads at supporting frame at each floor penetration and sound-insulating wrap around exterior of chute and intake assemblies.

2.6 FABRICATION

- A. General: Factory-assemble chutes to greatest extent practicable with nonleaking, continuously welded or lock-seamed joints without bolts, rivets, or clips projecting into chute interior. Include intake-door assemblies, metal supporting framing at each floor, and chute expansion joints between each support point.
- B. Offsets: Construct offsets where indicated on Drawings. Fabricate so that installed chute is without obstructions that might prevent materials from free falling within chute.
 - 1. Offsets below Intake Doors: Unless otherwise indicated, do not exceed a 15 degree maximum offset angle at any point, or place offset closer than 48 inches to nearest door above offset.

2. Offset above Top Intake Door: Do not exceed a 45 degree maximum offset angle between the highest intake door and the upper termination of chute.
 3. Offsets at Floors: Complete offset between floors by returning chute to plumb before penetrating floors.
 4. External Reinforcing: Externally reinforce impact area of offsets located below top intake door. Install vibration isolators where braced to structure.
- C. Roof Vent: Fabricate vent unit as full-size extension of chute, open to the atmosphere. Extend vent to height above roofing surface as indicated on Drawings. Equip vent with full insect screening and metal explosion-release cap. Fabricate with roof-deck flange, counterflashing, and clamping ring of nonferrous metal compatible with chute metal.
- D. Chute Fire Sprinklers: Install internally within chute, recessed out of the chute area through which material travels, and according to NFPA 13. Locate fire sprinklers at or above the top service opening of chutes, within the chute at alternate floor levels in buildings more than two stories tall, and at the lowest service level.
- E. Equipment Access: Fabricate chutes with access for maintaining equipment located within the chute, such as flushing and sanitizing units, fire sprinklers, and plumbing and electrical connections.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install and test chutes before installing enclosing chase construction.
- B. Install chutes according to NFPA 82 and manufacturer's written instructions. Assemble components with tight, nonleaking joints. Anchor chutes securely to supporting structure to withstand impacts and stresses. Install chute and components to maintain fire-resistive performance of chute and the enclosing chase construction.
- C. Install chutes plumb, without obstructions that might prevent materials from free falling within chutes.
- D. Anchor flanges of chute vents to roof curbs before installing roofing and flashing. Install chute-vent counterflashing after roofing and roof-penetration flashing are installed.
- E. Intake and Discharge Doors: Interface door units with throat sections of chutes for safe, snag-resistant, sanitary depositing of materials in chutes.
1. Interconnect sanitizer control with door interlock system.
- F. Test and adjust chute components after installation. Operate doors, locks, and interlock systems to demonstrate that hardware operates properly and smoothly and electrical wiring is connected correctly.
- G. Test heat- and smoke-sensing devices for proper operation.

- H. Operate sanitizing unit through one complete cycle of chute use and cleanup, and replenish chemicals or cleaning fluids in unit containers.
- I. Plumbing Access Doors: After construction of chase enclosure, verify that access doors have been correctly located and properly installed for their purpose.

3.2 CLEANING

- A. After completing chase enclosure, clean exposed surfaces of chute system's components. Do not remove labels of testing and inspecting agencies.
- B. Refer to Section 01 35 46 "Indoor Air Quality" and Section 01 74 23 "Final Cleaning" for additional requirements.

3.3 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain each chute and related equipment.
- B. Demonstrate replenishment of sanitizing-unit chemicals or cleaning fluids.

END OF SECTION 14 91 82

SECTION 210517 - SLEEVES AND SLEEVE SEALS FOR FIRE-SUPPRESSION PIPING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Sleeves.
 - 2. Sleeve-seal systems.
 - 3. Grout.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 SLEEVES

- A. Cast-Iron Wall Pipes: Cast or fabricated of cast or ductile iron and equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.
- B. Galvanized-Steel Wall Pipes: ASTM A 53/A 53M, Schedule 40, with plain ends and welded steel collar; zinc coated.
- C. Galvanized-Steel-Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, with plain ends.
- D. Black-Steel Pipes: ASTM A 53/A 53M, Schedule 40, with plain ends and welded steel collar
- E. PVC-Pipe Sleeves: ASTM D 1785, Schedule 40.
- F. Galvanized-Steel-Sheet Sleeves: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.

2.2 SLEEVE-SEAL SYSTEMS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Advance Products & Systems, Inc.
 - 2. CALPICO, Inc.
 - 3. Metraflex Company (The).
 - 4. Pipeline Seal and Insulator, Inc.
 - 5. Proco Products, Inc.

- B. Description: Modular sealing-element unit, designed for field assembly, for filling annular space between piping and sleeve.
 - 1. Sealing Elements: EPDM-rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
 - 2. Pressure Plates: Plastic.
 - 3. Connecting Bolts and Nuts: Carbon steel, with corrosion-resistant coating, of length required to secure pressure plates to sealing elements.

2.3 GROUT

- A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
- B. Characteristics: Nonshrink; recommended for interior and exterior applications.
- C. Design Mix: 5000-psi, 28-day compressive strength.
- D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION

- A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.
- B. For sleeves that will have sleeve-seal system installed, select sleeves of size large enough to provide 1-inch annular clear space between piping and concrete slabs and walls.
 - 1. Sleeves are not required for core-drilled holes.
- C. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.
 - 1. Cut sleeves to length for mounting flush with both surfaces.
 - a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level.
 - 2. Using grout, seal the space outside of sleeves in slabs and walls without sleeve-seal system.
- D. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestopping specified in Section 078413 "Penetration Firestopping."

3.2 SLEEVE-SEAL-SYSTEM INSTALLATION

- A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at service piping entries into building.

- B. Select type, size, and number of sealing elements required for piping material and size and for sleeve ID or hole size. Position piping in center of sleeve. Center piping in penetration, assemble sleeve-seal system components, and install in annular space between piping and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make a watertight seal.

3.3 SLEEVE AND SLEEVE-SEAL SCHEDULE

- A. Use sleeves and sleeve seals for the following piping-penetration applications:
1. Exterior Concrete Walls above Grade:
 - a. Piping Smaller Than NPS 6: Galvanized-steel-pipe sleeves.
 - b. Piping NPS 6 and Larger: Galvanized-steel-pipe sleeves.
 2. Exterior Concrete Walls below Grade:
 - a. Piping Smaller Than NPS 6: Galvanized-steel-pipe sleeves with sleeve-seal system.
 - 1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.
 - b. Piping NPS 6 and Larger: Galvanized-steel-pipe sleeves with sleeve-seal system.
 - 1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.
 3. Concrete Slabs-on-Grade:
 - a. Piping Smaller Than NPS 6: Galvanized-steel-pipe sleeves with sleeve-seal system.
 - 1) Select sleeve size to allow for 1-inch (25-mm) annular clear space between piping and sleeve for installing sleeve-seal system.
 - b. Piping NPS 6 and Larger: Galvanized-steel-pipe sleeves with sleeve-seal system.
 - 1) Select sleeve size to allow for 1-inch (25-mm) annular clear space between piping and sleeve for installing sleeve-seal system.
 4. Concrete Slabs above Grade:
 - a. Piping Smaller Than NPS 6: Galvanized-steel-pipe sleeves.
 - b. Piping NPS 6 and Larger: Galvanized-steel-pipe sleeves.
 5. Interior Concrete Walls:
 - a. Piping Smaller Than NPS 6: Black-steel-pipe
 - b. Piping NPS 6 and Larger: Black-steel-pipe

END OF SECTION 210517

SECTION 211200 - FIRE-SUPPRESSION STANDPIPES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Pipes, fittings, and specialties.
2. Fire-protection valves.
3. Hose connections.
4. Fire-department connections.
5. Alarm devices.
6. Pressure gages.

B. Related Sections:

1. Section 211313 "Wet-Pipe Sprinkler Systems" for wet-pipe sprinkler piping.

1.2 SYSTEM DESCRIPTIONS

- A. Automatic Wet-Type, Class I Standpipe System: Includes NPS 2-1/2 (DN 65) hose connections. Has open water-supply valve with pressure maintained and is capable of supplying water demand.

1.3 PERFORMANCE REQUIREMENTS

- A. Fire-Suppression Standpipe System Component: Listed for 175-psig (1200-kPa) minimum working pressure or 250 psig working pressure where required.
- B. Layout: Layout fire-suppression standpipes using requirements and design criteria indicated. Layout and pipe sizes not to be less than those shown on plan documents.
- C. Fire-suppression standpipe design shall be approved by authorities having jurisdiction.
1. Minimum residual pressure at each hose-connection outlet is as follows:
 - a. NPS 2-1/2 (DN 65) Hose Connections: 100 psig
 2. Maximum residual pressure at required flow at each hose-connection outlet is as follows unless otherwise indicated:
 - a. NPS 2-1/2 (DN 65) Hose Connections: 175 psig

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Each product shall be FM approved and shall be indicated on the product data submitted.
- B. Shop Drawings: For fire-suppression standpipes. Include plans, elevations, sections, details, and attachments to other work.

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

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Approved Standpipe Drawings: Working plans, prepared according to NFPA 14, that have been approved by authorities having jurisdiction, including hydraulic calculations if applicable. Provide coordination drawings as a separate submittal. Coordination shall be the responsibility of the installing contractor and coordination drawings shall include the verification of coordination by the fire sprinkler contractor, plumbing, HVAC and electrical contractor at a minimum.
- C. Welding certificates.
- D. Field Test Reports and Certificates: Indicate and interpret test results for compliance with performance requirements and as described in NFPA 14. Include "Contractor's Material and Test Certificate for Aboveground Piping" and "Contractor's Material and Test Certificate for Underground Piping."
- E. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications:
 1. Installer's responsibilities include designing, fabricating, coordinating, and installing fire-suppression standpipes. Base calculations on results of fire-hydrant flow test or existing fire pump test report as applicable.
- B. Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.
- C. 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.
- D. NFPA Standards: Fire-suppression standpipe equipment, specialties, accessories, installation, and testing shall comply with NFPA 14, "Installation of Standpipe and Hose Systems."

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

- A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, and fitting materials, and for joining methods for specific services, service locations, and pipe sizes.

2.2 STEEL PIPE AND FITTINGS

- A. Standard Weight, Black-Steel Pipe: ASTM A 53/A 53M, Type E. Pipe ends may be factory or field formed to match joining method.
- B. Schedule 30, Galvanized and Black-Steel Pipe: ASTM A 135; ASTM A 795/A 795M, Type E or ASME B36.10M, wrought steel; with wall thickness not less than Schedule 30 and not more than Schedule 40. Pipe ends may be factory or field formed to match joining method.
- C. Standard-Weight, Galvanized and Black-Steel Pipe Nipples: ASTM A 733, made of ASTM A 53/A 53M, seamless steel pipe with threaded ends.
- D. Galvanized and Uncoated, Steel Couplings: ASTM A 865, threaded.
- E. Galvanized and Uncoated, Gray-Iron Threaded Fittings: ASME B16.4, Class 125, standard pattern.
- F. Malleable- or Ductile-Iron Unions: UL 860.
- G. Cast-Iron Flanges: ASME B16.1, Class 125.
- H. Steel Flanges and Flanged Fittings: ASME B16.5, Class 150.
- I. Steel Welding Fittings: ASTM A 234/A 234M and ASME B16.9.
- J. Grooved-Joint, Steel-Pipe Appurtenances:
 - 1. 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:
 - a. Anvil International, Inc.
 - b. Corcoran Piping System Co.
 - c. National Fittings, Inc.
 - d. Shurjoint Piping Products.
 - e. Tyco Fire & Building Products LP.
 - f. Victaulic Company.
 - 2. Pressure Rating: 250 psig (1725 kPa) minimum as necessary.
 - 3. Uncoated, Grooved-End Fittings for Steel Piping: ASTM A 47/A 47M, malleable-iron casting or ASTM A 536, ductile-iron casting; with dimensions matching steel pipe.
 - 4. Grooved-End-Pipe Couplings for Steel Piping: AWWA C606 and UL 213, rigid pattern, unless otherwise indicated, for steel-pipe dimensions. Include ferrous housing sections, EPDM-rubber gasket, and bolts and nuts.

2.3 PIPING JOINING MATERIALS

- A. Pipe-Flange Gasket Materials: AWWA C110, rubber, flat face, 1/8 inch (3.2 mm) thick or ASME B16.21, nonmetallic and asbestos free.
 - 1. Class 125, Cast-Iron Flat-Face Flanges: Full-face gaskets.
- B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.

- C. Welding Filler Metals: Comply with AWS D10.12M/D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

2.4 LISTED FIRE-PROTECTION VALVES

A. General Requirements:

1. All equipment shall be FM approved.
2. Minimum Pressure Rating: 175 psig (1200 kPa) or 250 psig where required

B. Check Valves:

1. 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:
 - a. AFAC Inc.
 - b. American Cast Iron Pipe Company; Waterous Company Subsidiary.
 - c. Anvil International, Inc.
 - d. Clow Valve Company; a division of McWane, Inc.
 - e. Crane Co.; Crane Valve Group; Crane Valves.
 - f. Crane Co.; Crane Valve Group; Jenkins Valves.
 - g. Crane Co.; Crane Valve Group; Stockham Division.
 - h. Fire-End & Croker Corporation.
 - i. Fire Protection Products, Inc.
 - j. Fivalco Inc.
 - k. Globe Fire Sprinkler Corporation.
 - l. Groeniger & Company.
 - m. Kennedy Valve; a division of McWane, Inc.
 - n. Matco-Norca.
 - o. Metraflex, Inc.
 - p. Milwaukee Valve Company.
 - q. Mueller Co.; Water Products Division.
 - r. NIBCO INC.
 - s. Potter Roemer.
 - t. Reliable Automatic Sprinkler Co., Inc.
 - u. Shurjoint Piping Products.
 - v. Tyco Fire & Building Products LP.
 - w. United Brass Works, Inc.
 - x. Venus Fire Protection Ltd.
 - y. Victaulic Company.
 - z. Viking Corporation.
 - aa. Watts Water Technologies, Inc.
2. Standard: UL 312.
3. Pressure Rating: 250 psig minimum.
4. Type: Swing check.
5. Body Material: Cast iron.
6. End Connections: Flanged or grooved.

C. Indicating-Type Butterfly Valves:

1. 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:

- a. Anvil International, Inc.
 - b. Fivalco Inc.
 - c. Global Safety Products, Inc.
 - d. Kennedy Valve; a division of McWane, Inc.
 - e. Milwaukee Valve Company.
 - f. NIBCO INC.
 - g. Shurjoint Piping Products.
 - h. Tyco Fire & Building Products LP.
 - i. Victaulic Company.
2. Standard: UL 1091.
3. Pressure Rating: 175 psig (1200 kPa) minimum or 250 psig where required
4. Valves NPS 2 (DN 50) and Smaller:
 - a. Valve Type: Ball or butterfly.
 - b. Body Material: Bronze.
 - c. End Connections: Threaded.
5. Valves NPS 2-1/2 (DN 65) and Larger:
 - a. Valve Type: Butterfly.
 - b. Body Material: Cast or ductile iron.
 - c. End Connections: Flanged, grooved, or wafer.
6. Valve Operation: Integral [electrical, 115-V ac, prewired, single-circuit, supervisory switch

2.5 HOSE CONNECTIONS

A. Nonadjustable-Valve Hose Connections:

1. 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:
 - a. AFAC Inc.
 - b. Elkhart Brass Mfg. Company, Inc.
 - c. Fire-End & Croker Corporation.
 - d. Fire Protection Products, Inc.
 - e. GMR International Equipment Corporation.
 - f. Guardian Fire Equipment, Inc.
 - g. Kennedy Valve; a division of McWane, Inc.
 - h. Mueller Co.; Water Products Division.
 - i. NIBCO INC.
 - j. Potter Roemer.
 - k. Tyco Fire & Building Products LP.
 - l. Wilson & Cousins Inc.
2. Standard: UL 668 hose valve for connecting fire hose.
3. Pressure Rating: 300 psig minimum.
4. Material: Brass or bronze.
5. Size: NPS 2-1/2 as indicated.
6. Inlet: Female pipe threads.

7. Outlet: Male hose threads with lugged cap, gasket, and chain. Include hose valve threads according to NFPA 1963 and matching local fire-department threads.
8. Pattern: Angle or gate.
9. Finish: Rough brass or bronze

2.6 ALARM DEVICES

A. Alarm-device types shall match piping and equipment connections.

B. Water-Flow Indicators:

1. 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:
 - a. ADT Security Services, Inc.
 - b. McDonnell & Miller; ITT Industries.
 - c. Potter Electric Signal Company.
 - d. System Sensor; a Honeywell company.
 - e. Viking Corporation.
 - f. Watts Industries (Canada) Inc.
2. Standard: UL 346.
3. Water-Flow Detector: Electrically supervised.
4. Components: Two single-pole, double-throw circuit switches for isolated alarm and auxiliary contacts, 7 A, 125-V ac and 0.25 A, 24-V dc; complete with factory-set, field-adjustable retard element to prevent false signals and tamperproof cover that sends signal if removed.
5. Type: Paddle operated.
6. Pressure Rating: 250 psig
7. Design Installation: Horizontal or vertical.

C. Valve Supervisory Switches:

1. 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:
 - a. Fire-Lite Alarms, Inc.; a Honeywell company.
 - b. Kennedy Valve; a division of McWane, Inc.
 - c. Potter Electric Signal Company.
 - d. System Sensor; a Honeywell company.
2. Standard: UL 346.
3. Type: Electrically supervised.
4. Components: Single-pole, double-throw switch with normally closed contacts.
5. Design: Signals that controlled valve is in other than fully open position.

2.7 PRESSURE GAGES

A. 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:

1. AMETEK; U.S. Gauge Division.
2. Ashcroft Inc.

3. Brecco Corporation.
4. WIKA Instrument Corporation.

- B. Standard: UL 393.
- C. Dial Size: 3-1/2- to 4-1/2-inch (90- to 115-mm) diameter.
- D. Pressure Gage Range: 0 to 250 psig (0 to 1725 kPa) minimum
- E. Water System Piping Gage: Include "WATER" or "AIR/WATER" label on dial face.
- F. Air System Piping Gage: Include retard feature and "AIR" or "AIR/WATER" label on dial face.

PART 3 - EXECUTION

3.1 WATER-SUPPLY CONNECTIONS

- A. Refer to specification 21 13 13

3.2 PIPING INSTALLATION

- A. Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated, as far as practical.
 1. Deviations from engineer of record approved working plans for piping require written approval from the EOR. Deviations to be requested prior to shop drawing submittal.
- B. Piping Standard: Comply with requirements in NFPA 14 for installation of fire-suppression standpipe piping.
- C. Install listed fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.
- D. Install drain valves on standpipes. Extend drain piping to outside of building or floor drain as applicable.
- E. Install alarm devices in piping systems.
- F. Install hangers and supports for standpipe system piping according to NFPA 14. Comply with requirements in NFPA 13 and FM data sheets for hanger materials.
- G. Install pressure gages on riser or feed main and at top of each standpipe. Include pressure gages with connection not less than NPS 1/4 (DN 8) and with soft-metal seated globe valve, arranged for draining pipe between gage and valve. Install gages to permit removal, and install where they will not be subject to freezing.
- H. Fill wet-type standpipe system piping with water.
- I. Install sleeves for piping penetrations of walls, ceilings, and floors.

- J. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 210517 "Sleeves and Sleeve Seals for Fire-Suppression Piping."
- K. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 21 13 13.
- L. All standpipe insulation in the parking garage to be primed and painted.
- M. All floor penetrations of the parking garage to be sleeved and approved by Walker Parking prior to the installation of sleeves. Sleeves to be steel.
- N. Where standpipe piping passes through areas not enclosed with walls, or exposed to outside temperatures below 40 degrees, the piping shall be primed, painted, provided with UL listed heat trace and provided with a weatherproof insulation. This shall include at a minimum all piping at the ground level of the Airside Building.

3.3 JOINT CONSTRUCTION

- A. Install couplings, flanges, flanged fittings, unions, nipples, and transition and special fittings that have finish and pressure ratings same as or higher than system's pressure rating for aboveground applications unless otherwise indicated.
- B. Install unions adjacent to each valve in pipes NPS 2 (DN 50) and smaller.
- C. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 (DN 65) and larger end connections.
- D. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- E. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.
- F. Flanged Joints: Select appropriate gasket material in size, type, and thickness suitable for water service. Join flanges with gasket and bolts according to ASME B31.9.
- G. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - 1. Apply appropriate tape or thread compound to external pipe threads.
 - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.
- H. Steel-Piping, Cut-Grooved Joints: Cut square-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe joints.
- I. Steel-Piping, Roll-Grooved Joints: Roll rounded-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe grooved joints.
- J. Welded Joints: Construct joints according to AWS D10.12M/D10.12, using qualified processes and welding operators according to "Quality Assurance" Article.

1. Shop weld pipe joints where welded piping is indicated. Do not use welded joints for galvanized-steel pipe.

- K. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.

3.4 VALVE AND SPECIALTIES INSTALLATION

- A. Install listed fire-protection valves, trim and drain valves, specialty valves and trim, controls, and specialties according to NFPA 14 and authorities having jurisdiction.
- B. Install listed fire-protection shutoff valves supervised-open, located to control sources of water supply except from fire-department connections. Install permanent identification signs indicating portion of system controlled by each valve.

3.5 HOSE-CONNECTION INSTALLATION

- A. Install hose connections on standpipes and fire hose piping at hose stations as indicated.
- B. Install freestanding hose connections for access and minimum passage restriction.
- C. Install NPS 2-1/2 (DN 65) hose connections with quick-disconnect NPS 2-1/2 by NPS 1-1/2 (DN 65 by DN 40) reducer adapter.
- D. Install wall-mounted-type hose connections in cabinets. Include pipe escutcheons, with finish matching valves, inside cabinet where water-supply piping penetrates cabinet. Install valves at angle required for connection of fire hose. Comply with requirements for Fire Extinguisher Cabinets. Fire Hose Valve cabinets to match fire extinguisher cabinets and be submitted to and approved by the Architect prior to procurement
- E. Fire Hose valve cabinets to be provided were indicated. Cabinets to be stainless steel, semi-recessed, and glass door.
- F. Standpipe to be extended to roof and roof manifold provided with two, 2 1/2" fire hose valves, cap and chain and pressure gauge.

3.6 FIRE-DEPARTMENT CONNECTION INSTALLATION

- A. Existing to remain

3.7 IDENTIFICATION

- A. Install labeling and pipe markers on equipment and piping according to requirements in NFPA 14.
- B. Identify system components, wiring, cabling, and terminals in accordance with NFPA 70 and NFPA 72.

3.8 FIELD QUALITY CONTROL

- A. Perform tests and inspections.

B. Tests and Inspections:

1. Leak Test: After installation, charge systems and test for leaks. Repair leaks and retest until no leaks exist.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
3. Flush, test, and inspect standpipe systems according to NFPA 14, "System Acceptance" Chapter.
4. Energize circuits to electrical equipment and devices.
5. Coordinate with fire-alarm tests. Operate as required.
6. Coordinate with fire-pump tests. Operate as required.
7. Verify that equipment hose threads are same as local fire-department equipment.

C. Fire-suppression standpipe system will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

3.9 PIPING SCHEDULE

A. Wet-type, fire-suppression standpipe piping, NPS 2 and smaller shall be the following:

1. Schedule 40, black-steel pipe with threaded ends; uncoated, gray-iron threaded fittings; and threaded joints.

B. Wet-type, fire-suppression standpipe piping, NPS 2 ½" and larger shall be the following:

1. Schedule 10, black-steel pipe with roll-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
2. Schedule 40 is permitted for threaded piping.

END OF SECTION 211200

SECTION 211313 - WET-PIPE SPRINKLER SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, Including Contractual Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Pipes, fittings, and specialties.
 - 2. Fire-protection valves.
 - 3. Fire-department connections.
 - 4. Sprinklers.
 - 5. Alarm devices.
 - 6. Pressure gages.
- B. Related Sections:
 - 1. Section 21 12 00 "Fire-Suppression Standpipes" for standpipe piping.
 - 2. Section 21 13 16 "Dry-Pipe Sprinkler Systems" for dry-pipe sprinkler piping.
 - 3. Section 21 05 17 "Sleeves and Sleeve Seals for Fire Suppression" for all piping.

1.3 SYSTEM DESCRIPTIONS

- A. Wet-Pipe Sprinkler System: Automatic sprinklers are attached to piping containing water and that is connected to the water supply. Water discharges immediately from sprinklers when they are opened. Sprinklers open when heat melts fusible link or destroys frangible device. Hose connections are included if indicated.

1.4 PERFORMANCE REQUIREMENTS

- A. Standard-Pressure Piping System Component: Listed for 175-psig (1200-kPa) minimum working pressure.
- B. Delegated Layout: Design sprinkler system(s) using performance requirements and design criteria indicated.
 - 1. Available fire-hydrant flow test records indicate the following conditions (at the time of the Parking Garage Permit Submittal, an on-site fire hydrant flow test was not available. Calculations for the Garage to be based upon the fire pump test report of the pump installed in Phase 1 of the Garage):
 - a. Date: 02-04-2020
 - b. Performed by: OUC

- c. Location of Residual Fire Hydrant R: Hydrant HSE33I01
 - d. Location of Flow Fire Hydrant F: Hydrant HSE 33J01
 - e. Static Pressure at Residual Fire Hydrant R: 68 psig
 - f. Measured Flow at Flow Fire Hydrant F: 1067 gpm
 - g. Residual Pressure at Residual Fire Hydrant R: 56 psig
- C. Sprinkler system design shall be approved by the engineer of record, FM Global, and authorities having jurisdiction prior to installation.
- 1. Margin of Safety for Available Water Flow and Pressure: 10 percent, including losses through water-service piping, valves, and backflow preventers. The 10 percent shall be at the fire pump discharge.
 - 2. Sprinkler Occupancy Hazard Classifications:
 - a. Building Service Areas: Ordinary Hazard, Group 2 / HC-2
 - b. Passenger Handling Areas: Ordinary Hazard 1
 - c. Electrical, IDF, MDF, Telco, LAN, and similar Rooms: Ordinary Hazard, Group 2 / HC-2
 - d. General Storage Areas: Ordinary Hazard, Group 2 / HC-2
 - e. Mechanical Equipment Rooms: Ordinary Hazard, Group 2 / HC-2
 - f. Retail: Ordinary Hazard Group 2, HC-2
 - g. Trash, Commissary, Tenant Storage, Loading Dock, : Ordinary Hazard, Group-2 / HC-2
 - h. Baggage Handling Areas: Ordinary Hazard Group 2 / HC-2
 - i. Baggage Sortation: Ordinary Hazard Group 2 / HC-2
 - j. Office, corridor, bathrooms, Locker, and similar: Light Hazard / HC-1
 - k. Shell Space: Ordinary Hazard Group 2 / HC-2
 - 3. Minimum Density for Automatic-Sprinkler Piping Design using standard spray sprinklers:
 - a. Light-Hazard Occupancy / HC-1: 0.10 gpm over 1500-sq. ft. area for wet-pipe with ceiling heights less than 30 ft.
 - 1) For ceiling heights 30-60 ft, a 0.20 gpm over 2500 sq.ft. is required. Dry-Pipe to have remote area increased to 3500 sq.ft.
 - b. Ordinary-Hazard, Group 1 Occupancy: 0.15 gpm over 2500-sq. ft. area.
 - 1) For ceiling heights 30-60 ft, a 0.20 gpm over 2500 sq.ft. is required. Dry-Pipe to have remote area increased to 3500 sq.ft.
 - c. Ordinary-Hazard, Group 2 Occupancy / HC-2: 0.20 gpm over 2500-sq. ft. area.
 - 1) For ceiling heights 30-60 ft, a 0.20 gpm over 2500 sq.ft. is required. Dry-Pipe to have remote area increased to 3500 sq.ft.
 - d. Special Occupancy Hazard: As determined by FM Global
 - e. Rack storage: In accordance with NFPA 13 and FM Global.
 - f. When two different occupancy hazards are adjacent to each other and are not separated by a wall or draft curtain, extend the design of the sprinkler system protecting the higher-hazard occupancy a minimum of 20ft (6.0m) in all directions beyond the perimeter of the higher-hazard occupancy area. (FM 2-0, 2.1.3.1.3)
 - 4. Maximum Protection Area per Sprinkler: Per UL listing and FM Global
 - 5. Minimum Sprinkler K-factor for standard spray sprinklers:
 - a. HC-1 up to 60 ft: 5.6k
 - b. HC-2 up to 60 ft: 5.6k (unless noted otherwise)
 - 6. Maximum Protection Area per standard spray sprinklers:
 - a. HC-1 (up to 30 ft): 225 sq.ft.
 - 1) Minimum spacing of 7 ft.
 - 2) Maximum spacing of 15 ft.
 - 3) Minimum area of 64 sq.ft.

- b. HC-1 (30-60 ft): 120 sq.ft.
 - 1) Minimum spacing of 8 ft.
 - 2) Maximum spacing of 12 ft.
 - 3) Minimum spacing of 80 sq.ft.
 - c. HC-2 (up to 30 ft): 130 sq.ft.
 - 1) Minimum spacing of 7 ft.
 - 2) Maximum spacing of 12 ft.
 - 3) Minimum area of 64 sq.ft.
 - 4) Baggage Handling / Sortation: 100 sq.ft. maximum
 - a) Minimum spacing of 8 ft
 - b) Maximum spacing of 10 ft.
 - c) Minimum area of 80 sq.ft.
 - d. HC-2 (30-60ft) 100 sq.ft.
 - 1) Minimum spacing of 8 ft
 - 2) Maximum spacing of 10 ft.
 - 3) Minimum area of 80 sq.ft.
 - e. Other Areas: According to FM Global recommendations unless otherwise indicated.
7. Total Combined Inside and Outside Hose-Stream Demand Requirement: According to FM Global unless otherwise indicated:
- a. Light-Hazard Occupancies / HC-1 with sprinklers up to 60ft: 250 gpm
 - b. Ordinary-Hazard Occupancies / HC-2 with sprinklers up to 60 ft: 250 gpm
8. Inside Hose Allowance: Minimum of 100 gpm at standpipes

1.5 SUBMITTALS

- A. Product Data:
 - 1. Provide for each type of product indicated.
 - 2. Submittals to include specific manufactures. Where multiple items are identified on each sheet, it shall be clearly indicated the items proposed to be installed.
 - 3. All equipment shall be FM Global approved.
 - 4. Product data to be submitted at the same time as shop drawings for review.
- B. Shop Drawings: For fire sprinkler systems. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Wiring Diagrams: For power, signal, and control wiring.
 - 2. Sprinkler layout Only. A submittal shall be provided to the architect indicating the sprinkler layout, its coordination with all other trades, and its type, color and finish. Drawing shall not include the sprinkler piping.
- C.
- D. Qualification Data: For qualified Installer
- E. Approved Sprinkler Piping Drawings: Working plans, prepared according to NFPA 13, that have been approved by authorities having jurisdiction (AHJ), including hydraulic calculations. Shop drawings shall be submitted to the engineer of record for review and approval prior to the AHJ.

It shall be the installing contractor's responsibility to submit shop drawings after coordination and with sufficient time to allow for a minimum of two reviews prior to fabrication and installation. The engineer of record is not responsible for delays in the project schedule due to insufficient scheduling by the contractor. Each review by the engineer of record to be a minimum of 10 working days. Shop drawings that do not include all required items will be returned Rejected. Resubmittals that do not include a response to each review comment will be returned Rejected.

- F. Welding certificates.
- G. Field Test Reports and Certificates: Indicate and interpret test results for compliance with performance requirements and as described in NFPA 13. Include "Contractor's Material and Test Certificate for Aboveground Piping."
- H. Field quality-control reports.
- I. Operation and maintenance data.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications:
 - 1. Installer's responsibilities include designing, providing layout, procurement, fabricating, and installing sprinkler systems. Base calculations on results of fire-hydrant flow test or annual fire pump test as applicable.
- B. Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.
- C. 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.
- D. FM Global Data Sheets. (DS 2-0 October 2021, DS 3-26 October 2021)
- E. NFPA Standards: Sprinkler system equipment, specialties, accessories, installation, and testing shall comply with the following:
 - 1. NFPA 13, "Installation of Sprinkler Systems." 2016
 - 2. NFPA 44, "Installation of Standpipe and Hose Systems." 2016

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

- A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, and fitting materials, and for joining methods for specific services, service locations, and pipe sizes.

2.2 STEEL PIPE AND FITTINGS

- A. Standard Weight, Black-Steel Pipe: ASTM A 53/A 53M, Type E. Pipe ends may be factory or field formed to match joining method.

- B. Schedule 10, Black-Steel Pipe: ASTM A 135 or ASTM A 795/A 795M. Pipe ends to be roll grooved.
- C. Black-Steel Pipe Nipples: ASTM A 733, made of ASTM A 53/A 53M, standard-weight, seamless steel pipe with threaded ends.
- D. Uncoated, Steel Couplings: ASTM A 865, threaded.
- E. Uncoated, Gray-Iron Threaded Fittings: ASME B16.4, Class 125, standard pattern.
- F. Malleable- or Ductile-Iron Unions: UL 860.
- G. Cast-Iron Flanges: ASME 16.1, Class 125.
- H. Steel Flanges and Flanged Fittings: ASME B16.5, Class 150.
- I. Steel Welding Fittings: ASTM A 234/A 234M and ASME B16.9.
- J. Grooved-Joint, Steel-Pipe Appurtenances:
 - 1. 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:
 - a. Anvil International, Inc.
 - b. Corcoran Piping System Co.
 - c. National Fittings, Inc.
 - d. Shurjoint Piping Products.
 - e. Tyco Fire & Building Products LP.
 - f. Victaulic Company.
 - 2. Pressure Rating: 250 psig minimum.
 - 3. Uncoated, Grooved-End Fittings for Steel Piping: ASTM A 47/A 47M, malleable-iron casting or ASTM A 536, ductile-iron casting; with dimensions matching steel pipe.
 - 4. Grooved-End-Pipe Couplings for Steel Piping: AWWA C606 and UL 213, rigid pattern, unless otherwise indicated, for steel-pipe dimensions. Include ferrous housing sections, EPDM-rubber gasket, and bolts and nuts.

2.3 PIPING JOINING MATERIALS

- A. Pipe-Flange Gasket Materials: AWWA C110, rubber, flat face, 1/8 inch (3.2 mm) thick or ASME B16.21, nonmetallic and asbestos free.
 - 1. Class 125, Cast-Iron Flat-Face Flanges: Full-face gaskets.
- B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.
- C. Welding Filler Metals: Comply with AWS D10.12M/D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

2.4 LISTED FIRE-PROTECTION VALVES

A. General Requirements:

1. All equipment shall be FM approved.
2. Minimum Pressure Rating: 175 psig (1200 kPa) or 250 psi where high pressure required.

B. Check Valves:

1. 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:
 - a. AFAC Inc.
 - b. American Cast Iron Pipe Company; Waterous Company Subsidiary.
 - c. Anvil International, Inc.
 - d. Clow Valve Company; a division of McWane, Inc.
 - e. Crane Co.; Crane Valve Group; Crane Valves.
 - f. Crane Co.; Crane Valve Group; Jenkins Valves.
 - g. Crane Co.; Crane Valve Group; Stockham Division.
 - h. Fire-End & Croker Corporation.
 - i. Fire Protection Products, Inc.
 - j. Fivalco Inc.
 - k. Globe Fire Sprinkler Corporation.
 - l. Groeniger & Company.
 - m. Kennedy Valve; a division of McWane, Inc.
 - n. Matco-Norca.
 - o. Metraflex, Inc.
 - p. Milwaukee Valve Company.
 - q. Mueller Co.; Water Products Division.
 - r. NIBCO INC.
 - s. Potter Roemer.
 - t. Reliable Automatic Sprinkler Co., Inc.
 - u. Shurjoint Piping Products.
 - v. Tyco Fire & Building Products LP.
 - w. United Brass Works, Inc.
 - x. Venus Fire Protection Ltd.
 - y. Victaulic Company.
 - z. Viking Corporation.
 - aa. Watts Water Technologies, Inc.
2. Standard: UL 312.
3. Pressure Rating: 250 psig (1725 kPa) minimum
4. Type: Swing check.
5. Body Material: Cast iron.
6. End Connections: Flanged or grooved.

C. Bronze OS&Y Gate Valves:

1. 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:
 - a. Crane Co.; Crane Valve Group; Crane Valves.

- b. Crane Co.; Crane Valve Group; Stockham Division.
 - c. Milwaukee Valve Company.
 - d. NIBCO INC.
 - e. United Brass Works, Inc.
 - f. <Insert manufacturer's name>.
- 2. Standard: UL 262.
 - 3. Pressure Rating: 175 psig (1200 kPa) or 250 psig where required
 - 4. Body Material: Bronze.
 - 5. End Connections: Threaded.

D. Iron OS&Y Gate Valves:

- 1. 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:
 - a. American Cast Iron Pipe Company; Waterous Company Subsidiary.
 - b. American Valve, Inc.
 - c. Clow Valve Company; a division of McWane, Inc.
 - d. Crane Co.; Crane Valve Group; Crane Valves.
 - e. Crane Co.; Crane Valve Group; Jenkins Valves.
 - f. Crane Co.; Crane Valve Group; Stockham Division.
 - g. Hammond Valve.
 - h. Milwaukee Valve Company.
 - i. Mueller Co.; Water Products Division.
 - j. NIBCO INC.
 - k. Shurjoint Piping Products.
 - l. Tyco Fire & Building Products LP.
 - m. United Brass Works, Inc.
 - n. Watts Water Technologies, Inc.
- 2. Standard: UL 262.
- 3. Pressure Rating: 250 psig (1725 kPa) minimum
- 4. Body Material: Cast or ductile iron.
- 5. End Connections: Flanged or grooved.

E. Indicating-Type Butterfly Valves:

- 1. 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:
 - a. Anvil International, Inc.
 - b. Fivalco Inc.
 - c. Global Safety Products, Inc.
 - d. Kennedy Valve; a division of McWane, Inc.
 - e. Milwaukee Valve Company.
 - f. NIBCO INC.
 - g. Shurjoint Piping Products.
 - h. Tyco Fire & Building Products LP.
 - i. Victaulic Company.

2. Standard: UL 1091.
3. Pressure Rating: 250 psig minimum.
4. Valves NPS 2 (DN 50) and Smaller:
 - a. Valve Type: Ball or butterfly.
 - b. Body Material: Bronze.
 - c. End Connections: Threaded.
5. Valves NPS 2-1/2 (DN 65) and Larger:
 - a. Valve Type: Butterfly.
 - b. Body Material: Cast or ductile iron.
 - c. End Connections: Flanged, grooved, or wafer.
6. Valve Operation: Integral electrical, 115-V ac, prewired, single-circuit, supervisory switch indicating device.

2.5 TRIM AND DRAIN VALVES

A. General Requirements:

1. Standard: "Approval Guide," published by FM Global, listing.
2. Minimum Pressure Rating: 175 psig (1200 kPa) or 250 psi where required

B. Ball Valves:

1. 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:
 - a. Affiliated Distributors.
 - b. Anvil International, Inc.
 - c. Barnett.
 - d. Conbraco Industries, Inc.; Apollo Valves.
 - e. Fire-End & Croker Corporation.
 - f. Fire Protection Products, Inc.
 - g. Flowserve.
 - h. FNW.
 - i. Jomar International, Ltd.
 - j. Kennedy Valve; a division of McWane, Inc.
 - k. Kitz Corporation.
 - l. Legend Valve.
 - m. Metso Automation USA Inc.
 - n. Milwaukee Valve Company.
 - o. NIBCO INC.
 - p. Potter Roemer.
 - q. Red-White Valve Corporation.
 - r. Southern Manufacturing Group.
 - s. Stewart, M. A. and Sons Ltd.
 - t. Tyco Fire & Building Products LP.
 - u. Victaulic Company.
 - v. Watts Water Technologies, Inc.

2.6 SPECIALTY VALVES

A. General Requirements:

1. Standard: "Approval Guide," published by FM Global, listing.
2. Minimum Pressure Rating: 175 psig (1200 kPa) or 250 psig where required
3. Body Material: Cast or ductile iron.
4. Size: Same as connected piping.
5. End Connections: Flanged or grooved.

B. Automatic (Ball Drip) Drain Valves:

1. 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:
 - a. AFAC Inc.
 - b. Reliable Automatic Sprinkler Co., Inc.
 - c. Tyco Fire & Building Products LP.
2. Standard: UL 1726.
3. Pressure Rating: 175 psig (1200 kPa) or 250 psig where required
4. Type: Automatic draining, ball check.
5. Size: NPS 3/4 (DN 20).
6. End Connections: Threaded.

2.7 FIRE-DEPARTMENT CONNECTIONS

A. Existing to Remain.

2.8 SPRINKLER SPECIALTY PIPE FITTINGS

A. Branch Outlet Fittings:

1. 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:
 - a. Anvil International, Inc.
 - b. National Fittings, Inc.
 - c. Shurjoint Piping Products.
 - d. Tyco Fire & Building Products LP.
 - e. Victaulic Company.
2. Standard: UL 213.
3. Pressure Rating: 175 psig (1200 kPa) minimum or 300 psig (2070 kPa) as required
4. Body Material: Ductile-iron housing with EPDM seals and bolts and nuts.
5. Type: Mechanical-T and -cross fittings.
6. Configurations: Snap-on and strapless, ductile-iron housing with branch outlets.
7. Size: Of dimension to fit onto sprinkler main and with outlet connections as required to match connected branch piping.

8. Branch Outlets: Grooved, plain-end pipe, or threaded.

B. Flow Detection and Test Assemblies:

1. 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:
 - a. AGF Manufacturing Inc.
 - b. Reliable Automatic Sprinkler Co., Inc.
 - c. Tyco Fire & Building Products LP.
 - d. Victaulic Company.
2. Standard: "Approval Guide," published by FM Global, listing.
3. Pressure Rating: 175 psig (1200 kPa) minimum or 300 psig (2070 kPa) as required.
4. Body Material: Cast- or ductile-iron housing with orifice, sight glass, and integral test valve.
5. Size: Same as connected piping.
6. Inlet and Outlet: Threaded.

C. Branch Line Testers:

1. 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:
 - a. Elkhart Brass Mfg. Company, Inc.
 - b. Fire-End & Croker Corporation.
 - c. Potter Roemer.
2. Standard: UL 199.
3. Pressure Rating: 175 psig (1200 kPa) minimum.
4. Body Material: Brass.
5. Size: Same as connected piping.
6. Inlet: Threaded.
7. Drain Outlet: Threaded and capped.
8. Branch Outlet: Threaded, for sprinkler.

D. Sprinkler Inspector's Test Fittings:

1. 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:
 - a. AGF Manufacturing Inc.
 - b. Triple R Specialty.
 - c. Tyco Fire & Building Products LP.
 - d. Victaulic Company.
 - e. Viking Corporation.
2. Standard: "Approval Guide," published by FM Global, listing.
3. Pressure Rating: 175 psig (1200 kPa) minimum or 300 psig (2070 kPa) as required.
4. Body Material: Cast- or ductile-iron housing with sight glass.
5. Size: Same as connected piping.
6. Inlet and Outlet: Threaded.

E. Flexible, Sprinkler Hose Fittings:

1. Manufacturers: Subject to compliance with requirements:
 - a. FlexHead Industries, Inc.
2. Standard: UL 1474.
3. Type: Flexible hose for connection to sprinkler, and with bracket for connection to ceiling grid.
4. Pressure Rating: 175 psig (1200 kPa) minimum or 300 psig (2070 kPa) as required.
5. Size: Same as connected piping, for sprinkler.

2.9 SPRINKLERS

A. 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:

1. AFAC Inc.
2. Globe Fire Sprinkler Corporation.
3. Reliable Automatic Sprinkler Co., Inc.
4. Tyco Fire & Building Products LP.
5. Venus Fire Protection Ltd.
6. Victaulic Company.
7. Viking Corporation.

B. General Requirements:

1. Standard: "Approval Guide," published by FM Global, listing.
2. Pressure Rating for Automatic Sprinklers: 175 psig (1200 kPa) minimum.
3. Pressure Rating for High-Pressure Automatic Sprinklers: 250 psig (1725 kPa) minimum or 300 psig (2070 kPa) as required

C. Automatic Sprinklers with Heat-Responsive Element:

1. Early-Suppression, Fast-Response Applications: UL 1767
2. Nonresidential Applications: UL 199
3. Characteristics: Nominal 1/2-inch (12.7-mm) orifice with Discharge Coefficient K of 5.6, and for "Ordinary" temperature classification rating unless otherwise indicated or required by application.

D. Sprinkler Finishes:

1. white
2. Bronze.
3. Painted.
4. Black
5. Special (as required by the Architect) Contractor to provide a line item cost for each special color.

E. Special Coatings:

1. ENT (Electroless Nickel PTFE)

F. Sprinkler Escutcheons: Materials, types, and finishes for the following sprinkler mounting applications. Escutcheons for recessed-type sprinklers are specified with sprinklers.

1. Ceiling Mounting: Plastic, white finish, one piece, flat.
2. Sidewall Mounting: Plastic, white finish, one piece, flat.

G. Sprinkler Guards:

1. 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:
 - a. Reliable Automatic Sprinkler Co., Inc.
 - b. Tyco Fire & Building Products LP.
 - c. Victaulic Company.
 - d. Viking Corporation.
2. Standard: UL 199.
3. Type: Wire cage with fastening device for attaching to sprinkler.

2.10 ALARM DEVICES

A. Alarm-device types shall match piping and equipment connections.

B. Water-Flow Indicators:

1. 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:
 - a. ADT Security Services, Inc.
 - b. McDonnell & Miller; ITT Industries.
 - c. Potter Electric Signal Company.
 - d. System Sensor; a Honeywell company.
 - e. Viking Corporation.
 - f. Watts Industries (Canada) Inc.
2. Standard: UL 346.
3. Water-Flow Detector: Electrically supervised.
4. Components: Two single-pole, double-throw circuit switches for isolated alarm and auxiliary contacts, 7 A, 125-V ac and 0.25 A, 24-V dc; complete with factory-set, field-adjustable retard element to prevent false signals and tamperproof cover that sends signal if removed.
5. Type: Paddle operated.
6. Pressure Rating: 250 psig (1725 kPa).
7. Design Installation: Horizontal or vertical.

C. Valve Supervisory Switches:

1. 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:
 - a. Fire-Lite Alarms, Inc.; a Honeywell company.
 - b. Kennedy Valve; a division of McWane, Inc.
 - c. Potter Electric Signal Company.
 - d. System Sensor; a Honeywell company.

2. Standard: UL 346.
3. Type: Electrically supervised.
4. Components: Single-pole, double-throw switch with normally closed contacts.
5. Design: Signals that controlled valve is in other than fully open position.

2.11 PRESSURE GAGES

- A. 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:
 1. AMETEK; U.S. Gauge Division.
 2. Ashcroft, Inc.
 3. Brecco Corporation.
 4. WIKA Instrument Corporation.
- B. Standard: UL 393.
- C. Dial Size: 3-1/2- to 4-1/2-inch (90- to 115-mm) diameter.
- D. Pressure Gage Range: 0 to 300 psig (0 to 2070 kPa)
- E. Water System Piping Gage: Include "WATER" or "AIR/WATER" label on dial face.
- F. Air System Piping Gage: Include "AIR" or "AIR/WATER" label on dial face.

PART 3 - EXECUTION

3.1 WATER-SUPPLY CONNECTIONS

- A.
- B. Install shutoff valve, check valve, pressure gage, and drain at connection to water supply.

3.2 PIPING INSTALLATION

- A. Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated, as far as practical.
 1. Deviations from approved working plans for piping require written approval from authorities having jurisdiction and Engineer of Record prior to installation and shall be incorporated into the first submission of shop drawings
- B. Piping Standard: Comply with requirements for installation of sprinkler piping in NFPA 13 and as noted on Contract Documents.
- C. Use listed fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.
- D. Install unions adjacent to each valve in pipes NPS 2 (DN 50) and smaller.

- E. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 (DN 65) and larger end connections.
- F. Install "Inspector's Test Connections" in sprinkler system piping, complete with shutoff valve, and sized and located according to NFPA 13.
- G. Install sprinkler piping with drains for complete system drainage. Drains, including piping, to be installed concealed in "public" spaces. Where necessary to install in public space, drain to be installed concealed and access panel with signage provided by the fire sprinkler contractor.
- H. Install sprinkler control valves, test assemblies, and drain risers adjacent to standpipes when sprinkler piping is connected to standpipes. Maintain all code required clearances. Sprinkler shop drawings shall include specific details to each item noted and clearly indicate dimensions for components.
- I. Install automatic (ball drip) drain valve at each check valve for fire-department connection, to drain piping between fire-department connection and check valve. Install drain piping to and spill over floor drain or to outside building.
- J. Install alarm devices in piping systems.
- K. Install hangers and supports for sprinkler system piping according to NFPA 13 and FM Global. Comply with requirements for hanger materials in NFPA 13 and FM Global.
- L. Install pressure gages on riser or feed main, at each sprinkler test connection, and at top of each standpipe. Include pressure gages with connection not less than NPS 1/4 (DN 8) and with soft metal seated globe valve, arranged for draining pipe between gage and valve. Install gages to permit removal, and install where they will not be subject to freezing.
- M. Fill sprinkler system piping with water.
- N. Install electric heating cables and pipe insulation on sprinkler piping in areas subject to freezing. Comply with manufacture requirements for UL listed Heat Tracing for Fire-Suppression Piping.
- O. Install sleeves for piping penetrations of walls, ceilings, and floors.
- P. Install ductile iron sleeve seals for piping penetrations of concrete walls and slabs.
- Q. Install escutcheons for piping penetrations of walls, ceilings, and floors in all locations where this is installed exposed and not above a drop ceiling in a public space. Not required for back of house such as mechanical, electrical or baggage handling spaces.
- R. Where sprinkler piping is installed beneath baggage handling systems, the sprinkler piping shall be supported from the building structure, and not the baggage handling system.

3.3 JOINT CONSTRUCTION

- A. Install couplings, flanges, flanged fittings, unions, nipples, and transition and special fittings that have finish and pressure ratings same as or higher than system's pressure rating for aboveground applications unless otherwise indicated.
- B. Install unions adjacent to each valve in pipes NPS 2 (DN 50) and smaller.

- C. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 (DN 65) and larger end connections.
- D. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- E. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.
- F. Flanged Joints: Select appropriate gasket material in size, type, and thickness suitable for water service. Join flanges with gasket and bolts according to ASME B31.9.
- G. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - 1. Apply appropriate tape or thread compound to external pipe threads.
 - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.
- H. Welded Joints: Construct joints according to AWS D10.12M/D10.12, using qualified processes and welding operators according to "Quality Assurance" Article.
 - 1. Shop weld pipe joints where welded piping is indicated. Do not use welded joints for galvanized-steel pipe.
- I. Steel-Piping, Cut-Grooved Joints: Cut square-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe joints.
- J. Steel-Piping, Roll-Grooved Joints: Roll rounded-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe grooved joints.
- K. Steel-Piping, Pressure-Sealed Joints: Join Schedule 5 steel pipe and steel pressure-seal fittings with tools recommended by fitting manufacturer.
- L. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.

3.4 VALVE AND SPECIALTIES INSTALLATION

- A. Install listed fire-protection valves, trim and drain valves, specialty valves and trim, controls, and specialties according to NFPA 13 and authorities having jurisdiction.
- B. Install listed fire-protection shutoff valves supervised open, located to control sources of water supply except from fire-department connections. Install permanent identification signs indicating portion of system controlled by each valve.
- C. Specialty Valves:
 - 1. General Requirements: Install in vertical position for proper direction of flow, in main supply to system.
 - 2. Alarm Valves: Include bypass check valve and retarding chamber drain-line connection.

3.5 SPRINKLER INSTALLATION

- A. Install sprinklers in suspended ceilings in center of acoustical ceiling panels.
- B. Install dry-type sprinklers with water supply from heated space. Do not install pendent or sidewall, wet-type sprinklers in areas subject to freezing.
- C. Install sprinklers into flexible, sprinkler hose fittings and install hose into bracket on ceiling grid.
- D. Institutional type sprinklers shall be installed in all Holding Cells, Search Rooms, Processing Interview Rooms, and associated Corridor serving such spaces, and the Sterile Corridor,
- E. Upright sprinklers installed in branchlines with minimum of 1 inch outlets and reducers. The 1 inch outlet along the branchlines is to permit future modifications. This applies throughout all spaces in both buildings.

3.6 FIRE-DEPARTMENT CONNECTION INSTALLATION

- A. Existing to Remain

.

3.7 IDENTIFICATION

- A. Install labeling and pipe markers on equipment and piping. Labels to identify the piping and indicate flow direction from the water source. All wet-pipe, dry-pipe, bulk supply, and standpipe piping to be provided with labels. Labels to be red with white lettering. Labels to be provided at a maximum of 19 ft. intervals along piping.
- B. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in NFPA 70 and 72.

3.8 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Tests and Inspections:
 - 1. Leak Test: After installation, charge systems and test for leaks. Repair leaks and retest until no leaks exist.
 - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - 3. Flush, test, and inspect sprinkler systems according to NFPA 13, "Systems Acceptance" Chapter.
 - 4. Energize circuits to electrical equipment and devices.
 - 5. Coordinate with fire-alarm tests. Operate as required.
 - 6. Coordinate with fire-pump tests. Operate as required.
 - 7. Verify that equipment hose threads are same as local fire-department equipment.
- C. Sprinkler piping system will be considered defective if it does not pass tests and inspections.

- D. Prepare test and inspection reports.

3.9 CLEANING

- A. Clean dirt and debris from sprinklers.
- B. Remove and replace sprinklers with paint or other debris other than factory finish.
- C. Refer to section 01 74 23 "Final Cleaning" for additional cleaning requirements.
- D. All piping to be primed and painted shall be prepared such as to remove any rust, grease, cutting oil, etc such that the piped can be properly primed.

3.10 PIPING SCHEDULE

- A. Piping between Fire-Department Connections and Check Valves: Galvanized, standard-weight steel pipe with threaded ends; cast-iron threaded fittings; and threaded joints or grooved ends; grooved-end fittings; grooved-end-pipe couplings; and grooved joints.
- B. Sprinkler specialty fittings may be used, downstream of control valves, instead of specified fittings.
- C. Wet-pipe sprinkler system, NPS 2 and smaller shall be the following:
 - 1. Schedule 40, black-steel pipe with threaded ends; uncoated, gray-iron threaded fittings; and threaded joints. Roll grooves are permitted for schedule 40.
- D. Standard-pressure, wet-pipe sprinkler system, NPS 2 1/2 to NPS 6 shall be the following:
 - 1. Schedule 10, black-steel pipe with roll-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
 - 2. Schedule 40 is an acceptable alternative to schedule 10.

3.11 SPRINKLER SCHEDULE

- A. Use sprinkler types in subparagraphs below for the following applications:
 - 1. Rooms without Ceilings: Upright sprinklers
 - 2. Rooms with Suspended Ceilings: Recessed sprinklers.
 - 3. Wall Mounting: Sidewall sprinklers.
 - 4. Spaces Subject to Freezing: Upright sprinklers, dry sprinklers.
 - 5. Special Applications: Extended-coverage sprinklers where indicated.
- B. Provide sprinkler types in subparagraphs below with finishes indicated.
 - 1. Recessed Sprinklers: white with white escutcheon. Black with black escutcheons where ceiling is painted black.
 - 2. Upright Sprinklers: Brass finish. Dry-Pipe upright sprinklers to have corrosion resistant manufacture applied finish. Sprinklers
 - 3. Institutional as indicated in specification.
 - 4. Specialty colors as indicated by the Architect. Fire Sprinkler contractor shall identify cost per sprinkler of specialty color in contract.

ORLANDO INTERNATIONAL AIRPORT
BP-S195: TERM C, PH1X-AIRSIDE
CONCOURSE
END OF SECTION 211313

WET-PIPE SPRINKLER SYSTEM

SECTION 21 13 13

SECTION 211316 - DRY-PIPE SPRINKLER SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Pipes, fittings, and specialties.
2. Fire-protection valves.
3. Fire-department connections.
4. Sprinkler specialty pipe fittings.
5. Sprinklers.
6. Alarm devices.
7. Pressure gages.

B. Related Sections:

1. Section 211200 "Fire-Suppression Standpipes" for standpipe piping.
2. Section 211313 "Wet-Pipe Sprinkler Systems" for wet-pipe sprinkler piping.

1.2 SYSTEM DESCRIPTIONS

- A. Dry-Pipe Sprinkler System: Automatic sprinklers are attached to piping containing compressed air. Opening of sprinklers releases compressed air and permits water pressure to open dry-pipe valve. Water then flows into piping and discharges from sprinklers that are open.

1.3 PERFORMANCE REQUIREMENTS

- A. Standard-Pressure Piping System Component: Listed for 175-psig (1200-kPa) minimum working pressure or 250 psig where required such as, but not limited to, Parking Garage.
- B. Delegated Layout: Design sprinkler system(s) using performance requirements and design criteria indicated.
- C. Sprinkler system design shall be approved by authorities having jurisdiction and engineer of record.
1. Margin of Safety for Available Water Flow and Pressure: 10 percent at the fire pump discharge, including losses through water-service piping, valves, and backflow preventers.
 2. Sprinkler Occupancy Hazard Classifications: Refer to specification 21 13 13
 3. Minimum Density for Automatic-Sprinkler Piping Design: Refer to specification 21 13 13
 4. Maximum Protection Area per Sprinkler: Per FM requirements:
 5. Maximum Protection Area per Sprinkler: Refer to specification 21 13 13

6. Total Combined Hose-Stream Demand Requirement: Refer to specification 21 13 13

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For dry-pipe sprinkler systems. Include plans, elevations, sections, details, and attachments to other work. All pipe elevations shall be included and the pitch of piping shall be included. Low points of system to be identified and required drain.
 1. Wiring Diagrams: For power, signal, and control wiring.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer
- B. Approved Sprinkler Piping Drawings: Working plans, prepared according to NFPA 13, that have been approved by authorities having jurisdiction, including hydraulic calculations if applicable.
- C. Field Test Reports and Certificates: Indicate and interpret test results for compliance with performance requirements and as described in NFPA 13. Include "Contractor's Material and Test Certificate for Aboveground Piping."
- D. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications:
 1. Installer's responsibilities include layout, fabricating, coordinating and installing sprinkler systems. Base calculations on results of fire-hydrant flow test or existing fire pump test report (Parking Garage)
- B. 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.
- C. NFPA Standards: Sprinkler system equipment, specialties, accessories, installation, and testing shall comply with the following:
 1. NFPA 13, "Installation of Sprinkler Systems."
- D. FM Global

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

- A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, and fitting materials, and joining methods for specific services, service locations, and pipe sizes.

2.2 STEEL PIPE AND FITTINGS

- A. Standard Weight, Schedule 40, Galvanized Black-Steel Pipe: ASTM A 53/A 53M, Type E. Pipe ends may be factory or field formed to match joining method. (Schedule 10 is not permitted).
- B. Steel Pipe Nipples: Galvanized ASTM A 733, made of ASTM A 53/A 53M, standard-weight, seamless steel pipe with threaded ends.
- C. Steel Couplings: Galvanized ASTM A 865, threaded.
- D. Gray-Iron Threaded Fittings: Galvanized, ASME B16.4, Class 125, standard pattern.
- E. Malleable- or Ductile-Iron Unions: UL 860.
- F. Cast-Iron Flanges: ASME B16.1, Class 125.
- G. Grooved-Joint, Steel-Pipe Appurtenances:
 - 1. 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:
 - a. Anvil International, Inc.
 - b. Corcoran Piping System Co.
 - c. National Fittings, Inc.
 - d. Shurjoint Piping Products.
 - e. Tyco Fire & Building Products LP.
 - f. Victaulic Company.
 - 2. Pressure Rating: 250 psig minimum.
 - 3. Galvanized, Grooved-End Fittings for Steel Piping: ASTM A 47/A 47M, malleable-iron casting or ASTM A 536, ductile-iron casting; with dimensions matching steel pipe.
 - 4. Grooved-End-Pipe Couplings for Steel Piping: AWWA C606 and UL 213, rigid pattern, unless otherwise indicated, for steel-pipe dimensions. Include ferrous housing sections, EPDM-rubber gasket, and bolts and nuts.

2.3 PIPING JOINING MATERIALS

- A. Pipe-Flange Gasket Materials: AWWA C110, rubber, flat face, 1/8 inch (3.2 mm) thick or ASME B16.21, nonmetallic and asbestos free.
 - 1. Class 125, Cast-Iron Flat-Face Flanges: Full-face gaskets.

- B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.

2.4 LISTED FIRE-PROTECTION VALVES

A. General Requirements:

1. All equipment shall be FM approved.
2. Minimum Pressure Rating: 175 psig (1200 kPa) or 250 psi as required

B. Check Valves:

1. 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:

- a. AFAC Inc.
- b. American Cast Iron Pipe Company; Waterous Company Subsidiary.
- c. Anvil International, Inc.
- d. Clow Valve Company; a division of McWane, Inc.
- e. Crane Co.; Crane Valve Group; Crane Valves.
- f. Crane Co.; Crane Valve Group; Jenkins Valves.
- g. Crane Co.; Crane Valve Group; Stockham Division.
- h. Fire-End & Croker Corporation.
- i. Fire Protection Products, Inc.
- j. Fivalco Inc.
- k. Globe Fire Sprinkler Corporation.
- l. Groeniger & Company.
- m. Kennedy Valve; a division of McWane, Inc.
- n. Matco-Norca.
- o. Metraflex, Inc.
- p. Milwaukee Valve Company.
- q. Mueller Co.; Water Products Division.
- r. NIBCO INC.
- s. Potter Roemer.
- t. Reliable Automatic Sprinkler Co., Inc.
- u. Shurjoint Piping Products.
- v. Tyco Fire & Building Products LP.
- w. United Brass Works, Inc.
- x. Venus Fire Protection Ltd.
- y. Victaulic Company.
- z. Viking Corporation.
- aa. Watts Water Technologies, Inc.

2. Standard: UL 312
3. Pressure Rating: 250 psig (1725 kPa) minimum.
4. Type: Swing check.
5. Body Material: Cast iron.
6. End Connections: Flanged or grooved.

C. Indicating-Type Butterfly Valves:

1. 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:
 - a. Anvil International, Inc.
 - b. Fivalco Inc.
 - c. Global Safety Products, Inc.
 - d. Kennedy Valve; a division of McWane, Inc.
 - e. Milwaukee Valve Company.
 - f. NIBCO INC.
 - g. Shurjoint Piping Products.
 - h. Tyco Fire & Building Products LP.
 - i. Victaulic Company.
2. Standard: UL 1091.
3. Pressure Rating: 175 psig (1200 kPa) minimum.
4. Valves NPS 2 (DN 50) and Smaller:
 - a. Valve Type: butterfly.
 - b. Body Material: Bronze.
 - c. End Connections: threaded or grooved
5. Valves NPS 2-1/2 (DN 65) and Larger:
 - a. Valve Type: Butterfly.
 - b. Body Material: Cast or ductile iron.
 - c. End Connections: Flanged, grooved, or wafer.
6. Valve Operation: Integral electrical, 115-V ac, prewired, single-circuit, supervisory switch indicating device.

2.5 TRIM AND DRAIN VALVES

A. General Requirements:

1. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
2. Minimum Pressure Rating: 175 psig (1200 kPa).

B. Ball Valves:

1. 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:
 - a. Affiliated Distributors.
 - b. Anvil International, Inc.
 - c. Barnett.
 - d. Conbraco Industries, Inc.; Apollo Valves.
 - e. Fire-End & Croker Corporation.
 - f. Fire Protection Products, Inc.
 - g. Flowserve.
 - h. FNW.

- i. Jomar International, Ltd.
- j. Kennedy Valve; a division of McWane, Inc.
- k. Kitz Corporation.
- l. Legend Valve.
- m. Metso Automation USA Inc.
- n. Milwaukee Valve Company.
- o. NIBCO INC.
- p. Potter Roemer.
- q. Red-White Valve Corporation.
- r. Southern Manufacturing Group.
- s. Stewart, M. A. and Sons Ltd.
- t. Tyco Fire & Building Products LP.
- u. Victaulic Company.
- v. Watts Water Technologies, Inc.

2.6 SPECIALTY VALVES

A. General Requirements:

- 1. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
- 2. Minimum Pressure Rating: 175 psig (1200 kPa) or 250 psig as necessary
- 3. Body Material: Cast or ductile iron.
- 4. Size: Same as connected piping.
- 5. End Connections: Flanged or grooved.

B. Dry-Pipe Valves:

- 1. 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:
 - a. AFAC Inc.
 - b. Globe Fire Sprinkler Corporation.
 - c. Reliable Automatic Sprinkler Co., Inc.
 - d. Tyco Fire & Building Products LP.
 - e. Venus Fire Protection Ltd.
 - f. Victaulic Company.
 - g. Viking Corporation.
- 2. Standard: UL 260
- 3. Design: Differential-pressure type.
- 4. Include UL 1486, quick-opening devices, trim sets for air supply, drain, priming level, alarm connections, ball drip valves, pressure gages, priming chamber attachment, and fill-line attachment.
- 5. Air Compressor:
 - a. 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
 - 1) Gast Manufacturing Inc.
 - 2) General Air Products, Inc.

3) Viking Corporation.

- b. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
- c. Motor Horsepower: Fractional.
- d. Power: 120-V ac, 60 Hz, single phase.

2.7 FIRE-DEPARTMENT CONNECTIONS

- A. See 21 13 13. (Existing to Remain)

2.8 SPRINKLER SPECIALTY PIPE FITTINGS

- A. General Requirements for Dry-Pipe-System Fittings: UL listed and FM Global approved for dry-pipe service.

- B. Flow Detection and Test Assemblies:

- 1. 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:

- a. AGF Manufacturing Inc.
- b. Reliable Automatic Sprinkler Co., Inc.
- c. Tyco Fire & Building Products LP.
- d. Victaulic Company.

- 2. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
- 3. Pressure Rating: 175 psig (1200 kPa) minimum or 250 psig as required
- 4. Body Material: Cast- or ductile-iron housing with orifice, sight glass, and integral test valve.
- 5. Size: Same as connected piping.
- 6. Inlet and Outlet: Threaded.

- C. Sprinkler Inspector's Test Fittings:

- 1. 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:

- a. AGF Manufacturing Inc.
- b. Triple R Specialty.
- c. Tyco Fire & Building Products LP.
- d. Victaulic Company.
- e. Viking Corporation.

- 2. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
- 3. Pressure Rating: 175 psig (1200 kPa) minimum or 250 psig as required
- 4. Body Material: Cast- or ductile-iron housing with sight glass.

5. Size: Same as connected piping.
6. Inlet and Outlet: Threaded.

2.9 SPRINKLERS

- A. 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:
1. AFAC Inc.
 2. Globe Fire Sprinkler Corporation.
 3. Reliable Automatic Sprinkler Co., Inc.
 4. Tyco Fire & Building Products LP.
 5. Venus Fire Protection Ltd.
 6. Victaulic Company.
 7. Viking Corporation.
- B. General Requirements:
1. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
 2. Pressure Rating for Automatic Sprinklers: 175 psig
- C. Automatic Sprinklers with Heat-Responsive Element:
1. Nonresidential Applications: UL 199
 2. Characteristics: Nominal 1/2-inch (12.7-mm) orifice with discharge coefficient K of 5.6, and for "Ordinary" temperature classification rating unless otherwise indicated or required by application. Refer to 21 13 13 for additional requirements on minimal K-Factor Size based upon FM Global requirements.
- D. Sprinkler Finishes:
1. White
 2. Black
 3. Bronze.
 4. Painted.
- E. Special Coatings:
1. Corrosion-resistant paint.
 2. Victaulic VC-250
 3. Polyester
- F. Sprinkler Escutcheons: Materials, types, and finishes for the following sprinkler mounting applications. Escutcheons for concealed, flush, and recessed-type sprinklers are specified with sprinklers.
1. Ceiling Mounting: Plastic, white finish, one piece, flat
 2. Sidewall Mounting: Plastic, white finish, one piece, flat.
 3. Special Color: Where indicated by the Architect

G. Sprinkler Guards:

1. 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:
 - a. Reliable Automatic Sprinkler Co., Inc.
 - b. Tyco Fire & Building Products LP.
 - c. Victaulic Company.
 - d. Viking Corporation.
2. Standard: UL 199.
3. Type: Wire cage with fastening device for attaching to sprinkler.

2.10 ALARM DEVICES

A. Alarm-device types shall match piping and equipment connections.

B. Water-Motor-Operated Alarm:

1. 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:
 - a. Globe Fire Sprinkler Corporation.
 - b. Tyco Fire & Building Products LP.
 - c. Victaulic Company.
 - d. Viking Corporation.
2. Standard: UL 753.
3. Type: Mechanically operated, with Pelton wheel.
4. Alarm Gong: Cast aluminum with red-enamel factory finish.
5. Size: 10-inch (250-mm) diameter.
6. Components: Shaft length, bearings, and sleeve to suit wall construction.
7. Inlet: NPS 3/4 (DN 20).
8. Outlet: NPS 1 (DN 25) drain connection.

C. Valve Supervisory Switches:

1. 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:
 - a. Fire-Lite Alarms; a Honeywell company.
 - b. Kennedy Valve; a division of McWane, Inc.
 - c. Potter Electric Signal Company.
 - d. System Sensor; a Honeywell company.
2. Standard: UL 346.
3. Type: Electrically supervised.
4. Components: Single-pole, double-throw switch with normally closed contacts.

5. Design: Signals that controlled valve is in other than fully open position.

2.11 PRESSURE GAGES

- A. 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:
 1. AMETEK, Inc.; U.S. Gauge Division.
 2. Ashcroft, Inc.
 3. Brecco Corporation.
 4. WIKA Instrument Corporation.
- B. Standard: UL 393.
- C. Dial Size: 3-1/2- to 4-1/2-inch (90- to 115-mm) diameter.
- D. Pressure Gage Range: 0 to 300 psig (0 to 2070 kPa).
- E. Water System Piping Gage: Include "WATER" or "AIR/WATER" label on dial face.
- F. Air System Piping Gage: Include retard feature and "AIR" or "AIR/WATER" label on dial face.

PART 3 - EXECUTION

3.1 WATER-SUPPLY CONNECTIONS

- A. Refer to 21 13 13.

3.2 PIPING INSTALLATION

- A. Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated, as far as practical.
 1. Deviations from approved working plans for piping require written approval from authorities having jurisdiction and Engineer of Record. File written approval with Architect before deviating from approved working plans.
- B. Piping Standard: Comply with requirements in NFPA 13 for installation of sprinkler piping.
- C. Use listed fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.
- D. Install unions adjacent to each valve in pipes NPS 2 (DN 50) and smaller.
- E. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 (DN 65) and larger end connections.
- F. Install "Inspector's Test Connections" in sprinkler system piping, complete with shutoff valve, and sized and located according to NFPA 13.

- G. Install sprinkler piping with drains for complete system drainage. These shall be identified on the shop drawings.
- H. Install sprinkler control valves, test assemblies, and drain risers adjacent to standpipes when sprinkler piping is connected to standpipes.
- I. Install automatic (ball drip) drain valves to drain piping between fire-department connections and check valves. Drain to floor drain or to outside building.
- J. Install alarm devices in piping systems.
- K. Install hangers and supports for sprinkler system piping according to NFPA 13. Comply with requirements in NFPA 13 for hanger materials.
- L. Install pressure gages on riser or feed main, at each sprinkler test connection, and at top of each standpipe. Include pressure gages with connection not less than NPS 1/4 (DN 8) and with soft metal seated globe valve, arranged for draining pipe between gage and valve. Install gages to permit removal, and install where they will not be subject to freezing.
- M. Drain dry-pipe sprinkler piping.
- N. Pressurize and check dry-pipe sprinkler system piping and air-pressure maintenance devices, air compressors.
- O. Install sleeves for piping penetrations of walls, ceilings, and floors.
- P. Install sleeve seals for piping penetrations of concrete walls and slabs.
- Q. Install escutcheons for piping penetrations of walls, ceilings, and floors.
- R. All piping to be pitched as required for drainage. Pipe to be pitched a minimum of 1/2" per 10'. Fire Sprinkler shop drawings shall indicate the direction of the pitch, including the maximum high points and low points of the sprinkler dry-pipe system.

3.3 JOINT CONSTRUCTION

- A. Install couplings, flanges, flanged fittings, unions, nipples, and transition and special fittings that have finish and pressure ratings same as or higher than system's pressure rating for aboveground applications unless otherwise indicated.
- B. Install unions adjacent to each valve in pipes NPS 2 (DN 50) and smaller.
- C. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 (DN 65) and larger end connections.
- D. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- E. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.
- F. Flanged Joints: Select appropriate gasket material in size, type, and thickness suitable for water service. Join flanges with gasket and bolts according to ASME B31.9.

- G. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - 1. Apply appropriate tape or thread compound to external pipe threads.
 - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.
- H. Steel-Piping, Cut-Grooved Joints: Cut square-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe joints.
- I. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.

3.4 VALVE AND SPECIALTIES INSTALLATION

- A. Install listed fire-protection valves, trim and drain valves, specialty valves and trim, controls, and specialties according to NFPA 13 and authorities having jurisdiction.
- B. Install listed fire-protection shutoff valves supervised open, located to control sources of water supply except from fire-department connections. Install permanent identification signs indicating portion of system controlled by each valve.
- C. Specialty Valves:
 - 1. General Requirements: Install in vertical position for proper direction of flow, in main supply to system.
 - 2. Dry-Pipe Valves: Install trim sets for air supply, drain, priming level, alarm connections, ball drip valves, pressure gages, priming chamber attachment, and fill-line attachment.
 - a. Install air compressor and compressed-air supply piping.

3.5 SPRINKLER INSTALLATION

- A. Install sprinklers in suspended ceilings in center of narrow dimension of acoustical ceiling panels.
- B. Install dry-type sprinklers with water supply from heated space. Do not install pendent or sidewall, wet-type sprinklers in areas subject to freezing.
- C. Install sprinklers into flexible, sprinkler hose fittings and install hose into bracket on ceiling grid.
- D. Dry-Pipe sprinkler systems located outside the building, including all at the Airside Concourse Building shall be provided with UL and FM approved corrosion resistant sprinklers. Sprinklers to be of Intermediate or High Temperature, match existing adjacent sprinklers.

3.6 FIRE-DEPARTMENT CONNECTION INSTALLATION

- A. Refer to 21 13 16.

3.7 IDENTIFICATION

- A. Install labeling and pipe markers on equipment and piping. Refer to 21 13 13.
- B. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.8 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Tests and Inspections:
 - 1. Leak Test: After installation, charge systems and test for leaks. Repair leaks and retest until no leaks exist.
 - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - 3. Flush, test, and inspect sprinkler systems according to NFPA 13, "Systems Acceptance" Chapter.
 - 4. Energize circuits to electrical equipment and devices.
 - 5. Start and run air compressors.
 - 6. Coordinate with fire-alarm tests. Operate as required.
 - 7. Coordinate with fire-pump tests. Operate as required.
 - 8. Verify that equipment hose threads are same as local fire-department equipment.
- C. Sprinkler piping system will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

3.9 CLEANING

- A. Clean dirt and debris from sprinklers.
- B. Remove and replace sprinklers with paint other than factory finish.

3.10 PIPING SCHEDULE

- A. Sprinkler specialty fittings may be used, downstream of control valves, instead of specified fittings.
- B. Dry-pipe sprinkler system, NPS 2 and smaller shall be the following:
 - 1. Schedule 40, black-steel pipe with cut-grooved ends; grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
- C. Dry-pipe sprinkler system, NPS 2-1/2 to NPS 6 shall be the following:
 - 1. Schedule 40, black-steel pipe with cut-grooved ends; grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.

3.11 SPRINKLER SCHEDULE

- A. Use sprinkler types in subparagraphs below for the following applications:
 - 1. Rooms without Ceilings: Upright sprinklers
 - 2. Rooms with Suspended Ceilings: Dry pendent sprinklers, Dry recessed sprinklers
 - 3. Wall Mounting: Dry sidewall sprinklers.
- B. Provide sprinkler types in subparagraphs below with finishes indicated.
 - 1. Recessed Sprinklers: white, with white escutcheon.
Upright Sprinklers: white with corrosion resistant covering where installed outside of building.

END OF SECTION 211316