

# ***EXHIBIT N - PROJECT MANUAL - VOLUME 1***

## **MADISON MUNICIPAL BUILDING RENOVATION**

215 Martin Luther King Jr. Blvd  
Madison, WI 53703

***BPW CONTRACT #7939 MUNIS 10129  
BID ISSUE***

**Date: 24 MARCH 2017**

ARCHITECT  
*MSR, Ltd.*

PRESERVATION ARCHITECT  
*Charles Quagliana, AIA*

LANDSCAPE ARCHITECT  
*KSD, Inc.*

CIVIL ENGINEER  
*Vierbicher, Inc.*

STRUCTURAL AND TECHNOLOGY ENGINEER  
*KJWW, Inc.*

BUILDING ENVELOPE CONSULTANT  
*Insite Consulting Architects*

MECHANICAL / ELECTRICAL / PLUMBING ENGINEER  
*MEP Associates*

LIGHTING DESIGN  
*Gallina Associates*

CODE AND LIFE SAFETY SYSTEMS  
*Summit Fire Consulting*

ACOUSTICAL CONSULTING  
*KRA, Inc.*

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<b>DIVISION 2</b>	<b>DEMOLITION</b>		
SEE SPEC SECTIONS BELOW FOR SPECIFIC DETAILS AND TAGS	XSTONE-1	Historic exterior limestone cladding	to be retained and protected for re-use.
	XSTONE-2	Historic exterior limestone cladding	to be removed.
	XBRICK-1	Historic exterior brick cladding	to be retained and protected for re-use.
	XBRICK-2	Historic exterior brick cladding	to be salvaged (on existing annex)
	XTRIM	Historic wood trim	to be demounted and set aside for re-use.
	XPANEL-1	Historic wood paneling	to be retained and protected for re-use.
	XPANEL-2	Historic wood paneling	to be demounted and set aside for re-use.
	XBASE-1	Historic wood wall base	to be retained and protected for re-use.
	XBASE-2	Historic wood wall base	to be demounted and set aside for re-use.
	XBASE-3	Historic marble base	to be retained and protected for re-use.
	XBASE-4	Historic marble base	to be demounted and set aside for re-use.
	XWIN	Historic windows and frames	to be retained and protected for re-use.
	XENTRY	Historic entry doors	to be retained and protected for re-use.
	XDOOR	Historic interior doors and frames	to be demounted and set aside for re-use.
	XTHOLD-1	Historic marble door thresholds	to be retained and protected for re-use.
	XTREAD	Existing exterior granite stair treads	to be demounted and set aside for re-use.
	XEIFS	Existing EIFS finish to elevator penthouse exterior walls	to be retained and trimmed and refinished to new base line for new roof flashing.
XTOIL	Existing marble toilet partition	to be retained and protected for re-use.	
<b>DIVISION 3</b>	<b>CONCRETE</b>		
033000	XCONC	EXISTING CONCRETE INCLUDING PATCHING	
031000	WSTOP-1	WATERSTOP	BASE OF RETAINING WALL JUNCTION WITH FOOTING
033000	CONC SLAB	NEW CONCRETE SLAB	
033000	SAF	SLIP-RESISTANT AGGREGATE FINISH	
035300	TPNG-1	CONCRETE TOPPING	AT LOCATIONS PER DRAWINGS TO BRING EXISTING FLOORS UP TO GENERAL FLOOR ELEVATIONS PRIOR TO FINAL FINISH.
033000	VB-1	UNDER-SLAB VAPOR RETARDER	
033543	CFF-1	POLISHED CONCRETE FINISHING	AT INTERIOR FLOOR SLABS - SEE FINISH PLANS
<b>DIVISION 4</b>	<b>MASONRY</b>		
040120.63	XBRICK-1	EXTERIOR BRICK CLADDING TO BE REPAIRED	
040120.63	XBRICK-2	EXTERIOR BRICK CLADDING TO BE SALVAGED	
040120.63	BRICK-1	NEW EXTERIOR BRICK CLADDING	IN SELECTED LOCATIONS - SEE
042200	CMU-1	CONCRETE MASONRY UNIT (6" NOM.)	
042200	CMU-2	CONCRETE MASONRY UNIT (8" NOM.)	Class C-3 CMU - FILL ALL CELLS WHERE INDICATED ON THE DRAWINGS
044550	XTILE-2B	HISTORIC MARBLE FLOOR TILE - REFURBISH	PERIMETER MARGINS AND HEXAGONAL MOZAIKS L-2 AND L-3

SECTION	TAG	DESCRIPTION	ADDITIONAL INFORMATION
044550	XTILE-2C	NEW WHITE CARRARA FLOOR TILE TO MATCH FEATURE DIAMOND TILE AND PERIMETER MARGINS.	LEVEL 1 PUBLIC AREA
044550	XTILE-2D	NEW "VERDE ANTIQUE" (GREEN) MARBLE FLOOR TILE TO MATCH FEATURE TRANGLE TILE.	LEVEL 1 PUBLIC AREA
044550	XTILE-3	HISTORIC MARBLE WALL PANEL - REFURBISH	EXISTING RESTROOMS AT LEVELS 2 AND 3
044550	XBASE-3	HISTORIC MARBLE BASE - RETAIN	to be retained and protected for re-use.
044550	XBASE-4	HISTORIC MARBLE BASE - REUSE ELSEWHERE	to be demounted and set aside for re-use.
<b>DIVISION 5</b>	<b>METALS</b>		
051223	STL FRAME	STEEL FRAMING COMPONENTS	
052100	STL JOIST	STEEL JOIST FRAMING	
053100	STL DECK	STEEL DECKING	
054000	CFSF	COLD FORMED METAL FRAMING	
054500	ESS-1	EQUIPMENT SUPPORT SYSTEM AT ACT-3 ZONES	PROVIDED FOR SERVICES SUPPORT IN OPEN CEILING AREAS.
055000	MTLFAB-1	METAL FABRICATIONS	
055000	GUARD-1	STEEL PIPE OR DOWNSPOUT GUARDS	
055113	STAIR-1	METAL PAN STAIRS	CIRCULATION STAIR BETWEEN LEVELS G AND 1
055116	STAIR-2	STEEL SERVICE STAIR	FROM ROOF HATCH TO LEVEL 3 ROOF, AND TO L-2 ROOF
055116	NOSING-1	SERVICE STAIR NOSINGS: SLIPNOT 3" x 1/8" thick stainless steel.	FOR EXTERIOR AND INTERIOR STEEL AND CONCRETE SERVICE STAIRS.
055213	RAIL-4	PIPE AND TUBE RAILINGS	FOR STAIR-2
057000	GR-1	LINEAR BAR GRILLE: Harrington & King: Large Sea Shell, Style 30067. Made from either 20ga. steel, factory painted PT- 2H, or 20ga. clear anodized alum. sheet.	NEW AT LEVEL 1 PUBLIC AREA: 65% OPEN AREA.
057000	GR-2	HYDRONIC RADIATOR COVER PANEL: EXTG AT ROOM 260	EXISTING AT ROOM 260, REPAINTED.
057000	GUARD-2	STAINLESS STEEL WALL CORNER GUARD: 2" x 2" x 48" high. 90 Degree, 16ga, Type 304, Satin #4 (Brushed) Finish.	
057300	RAIL-1	EXTERIOR METAL GUARD RAILS AT LIGHT WELLS AND STAIRS	SEE DRAWINGS FOR LOCATIONS AND DETAILS
057300	RAIL-2	BRACKETS FOR NEW HARDWOOD HANDRAILS: SEE WD-3 FOR HANDRAIL MATERIAL.	NEW HANDRAILS AT HISTORIC STAIRS AT EAST AND WEST, AND NEW INTERIOR STAIR.
057300	RAIL-3	METAL GUARD RAIL AT NEW INTERIOR STAIR - SEE DRAWINGS	
057500	MTL-1	ALUMINUM CLOSURE PANELS	
057500	MTL-2	POCKETS FOR WINDOW TREATMENT	IF NOT PART OF WINDOW TREATMENT PRODUCT RANGE
057500	MTL-3	WINDOW STOOLS	AT BASE OF NEW STORM WINDOWS
142100	SS-1	STAINLESS STEEL FINISH PANEL - SNAPCAB 5WL TEXTURED PANELS.	ELEVATOR CAR - NEW WALL PANELS - "INDUSTRIAL 1" STYLE. SEE ELEVATOR SPEC.
055000	GRATE-1	PEDESTRIAN GRATE: McNichols GW-125, Galv. steel.	AT LIGHT WELLS AT DOTY PLAZA
055000	GRATE-2	TRANSFORMER VAULT EQUIPMENT COVER: Hughes Bros C4270.13	CENTRAL SERVICE GRATE
055000	GRATE-3	TRANSFORMER VAULT MANHOLE COVER: Hughes Bros C4270.1	MAN HOLE DOORS

SECTION	TAG	DESCRIPTION	ADDITIONAL INFORMATION
<b>DIVISION 6</b>	<b>WOOD, PLASTICS AND COMPOSITES</b>		
060312	XTRIM	Historic wood trim repair/refinishing	to be demounted and set aside for re-use.
060312	XPANEL-1	Historic wood paneling repair/refinishing	to be retained and protected for re-use.
060312	XBASE-1	Historic wood wall base repair/refinishing	to be retained and protected for re-use.
061000	WD-FRMG	INTERIOR ROUGH CARPENTRY FRAMING	
061000	WD-BLKG	WOOD BLOCKING - LUMBER & PLYWOOD	
061000	CURB-2	WOOD CURB BASE	FOR ROOF EQUIPMENT SUPPORT
061516	WD-DECK	WOOD ROOF DECK BOARDS	
061600	SHTG-1	EXTERIOR WALL SHEATHING	
061600	SHTG-2	ROOF AND PARAPET SHEATHING	
064023	PLSHLF-1	PLASTIC LAMINATE SHELVING: White melamine	MELAMINE FACED WOOD SHELVING
064023	WDSHLF-1	STORAGE SHELVING	MAY NOT BE NEEDED
064116	PLAM-1	PLASTIC LAMINATE: Formica - Paloma Polar Finish - 6698-58	ARCHITECTURAL FACED CABINETS
064116	PLAM-2	PLASTIC LAMINATE: Not used	ARCHITECTURAL FACED CABINETS
064116	HRDW	CABINET HARDWARE	VARIES - SEE SPEC SECTION - Doug Mockett DP105A/2 26M Matte Chrome 4-3/16" 3/8" square profile
064116	MA-1	GROMMET-Not Used	IN COUNTER TOPS FOR CABLE ACCESS TO/FROM BELOW
064116	MA-3	GROMMET: Doug Mockett MAX11/B/M - Satin Aluminum	IN COUNTER TOPS FOR CABLE ACCESS TO/FROM BELOW
<b>DIVISION 7</b>	<b>THERMAL AND MOISTURE PROTECTION</b>		
070150.19	AB-1	AIR AND VAPOR BARRIER (ROOF SYSTEM)	
071416	WP-1	COLD FLUID APPLIED WATERPROOFING	BELOW GRADE WALLS AROUND EXTERIOR AREAWAYS AND LIGHT WELLS, AT WILSON ST STAIR BELOW FINISH, AND AT ROOF OF ELECTRICAL VAULT.
071613	WP-2	TROWEL APPLIED WATER PROOFING AND PROTECTION BOARD	BELOW GRADE WALLS AROUND NEW ADDITION SUBSTRUCTURE WALLS
071800	PTC-1	TRAFFIC COATING FOR CONCRETE FLOORS	MECHANICAL ROOM FLOORS
072100	INSUL-1	UNDERSLAB BOARD INSULATION	EXTRUDED POLYSTYRENE
072100	INSUL-2	POLYISOCYANURATE INSULATION BOARD	AT ROOFS (MANUF. LIMITED) AND EXTERIOR WALLS AROUND ADDITION.
072100	INSUL-3	MINERAL WOOL BLANKET INSULATION	VOID FILLING AT EXTERIOR DETAILS, INTERIOR SOUND-RATED PARTITIONS
072100	INSUL-4	MINERAL WOOL BOARD INSULATION	UNDERSIDE L-1 SLAB AT TRASH ROOM AND EQUIPMENT STORAGE ROOM.
072100	TAPE-1	ADHESIVE FOR BONDING INSULATION	
072100	INSUL-5	CLOSED CELL SPRAY FOAM OR GLASS FIBER INSULATION	MISCELLANEOUS SMALL VOIDS WHERE THERMAL LINE NEEDS CONT.
072129	SAI-1	SPRAY-APPLIED ACOUSTICAL INSULATION: K13 SonaSpray "fc", 1.5" THICK, WHITE.	AT UNDERSIDE FLOOR DECK ABOVE L-0 MECH ROOM
072715.13	AB-2	SELF-ADHERING SHEET AIR BARRIER	CAVITY WALLS BEHIND NEW RAINSCREEN SYSTEM (074213)
074213.13	MTLP-1	FORMED METAL WALL PANELS	EXTERIOR CLADDING TO NEW ADDITION - ZINC
074213.13	CLIP-1	THERMALLY BROKEN GIRT CLIPS	SMARTci 200 PULTRUDED FIBERGLASS CLIPS

SECTION	TAG	DESCRIPTION	ADDITIONAL INFORMATION
075213	ROOF-1 (OPTION A)	APP MODIFIED BITUMEN ROOFING - OPTION 1	ALL NEW AND REFURBISHED ROOFING
075216	ROOF-1 (OPTION B)	SBS MODIFIED BITUMEN ROOFING - OPTION 2	ALL NEW AND REFURBISHED ROOFING
075213 / 075216	SHTG-3	ROOF SUBSTRATE BOARD / THERMAL BARRIER	
076200	FLASH-3	TERNE-COATED STAINLESS STEEL BRAKE METAL FLASHING	
077100	SCUPPER-1	METAL PARAPET SCUPPER	
077100	REGLET-1	TERNE-COATED STAINLESS STEEL REGLET AND COUNTERFLASHING	
077100	COPING-1	ALUM. PARAPET CAP	
077129	ROOFJNT-1	ROOF EXPANSION JOINT	AT JUNCTION OF NEW ADDITION ROOF AND MMB NORTH WALL
077200	HATCH-1	ROOF HATCH	UPPER ROOF ACCESS TO ATTIC OVER ROOM 260
078110	SFRM-2	SPRAY-APPLIED FIRE RESISTANT MATERIAL	FOR 1HR FIRE PROTECTION OF NON-VISIBLE INTERIOR STEEL STRUCTURE
078413	FB-1	PENETRATION FIRE BARRIER FOR VERTICAL ASSEMBLIES	
078413	FB-2	PENETRATION FIRE BARRIER FOR HORIZONTAL ASSEMBLIES	
078443	JFS	JOINT FIRESTOPPING	
079200	JS-X	JOINT SEALANT (SEE SCHEDULE FOR TYPES 1 through 8)	
079200	JS-EXP	EXPANDING FOAM SEALANT: EMSEAL	
079219	AJS-1	ACOUSTICAL JOINT SEALANT	
079500	JNT-1	FLOOR MOVEMENT JOINT: EMSEAL FP-55, GREY	AT FLOOR JOINT BETWEEN EXISTING BUILDING NEW ADDITION.
079500	JNT-2	WALL MOVEMENT JOINT: JOINTMASTER 620 SERIES, GREY	AT WALL JOINT BETWEEN EXISTING BUILDING NEW ADDITION, BELOW GRADE.
<b>DIVISION 8</b>	<b>OPENINGS</b>		
082110	XDOOR	INTERIOR HISTORIC WOOD DOORS AND FRAMES	TO BE DEMOUNTED AND SET ASIDE FOR RE-USE.
083113	ACCESS-1	ACCESS PANEL 1	FLUSH ACCESS PANELS WITH EXPOSED FRAME
083113	ACCESS-2	FIRE RATED ACCESS PANEL 1	FIRE RATED ACCESS PANEL WITH EXPOSED FRAME
083326	COIL-1	OVERHEAD COILING GRILLES	AT GROUND LEVEL SERVICE COUNTERS
083323	COIL-2	OVERHEAD COILING DOOR	AT GROUND LEVEL TRASH STORAGE ROOM
084113	GLWS-1	ALUMINUM FRAMED INTERIOR STOREFRONT SYSTEM. B.O.D.: Kawneer Trifab 451 SSG, single glazed.	TYPICAL INTERIOR STOREFRONT SYSTEM
084113	GLWS-2	ALUMINUM FRAMED STOREFRONT SYSTEM (acoustical). B.O.D.: Kawneer Trifab 451 SSG, double glazed.	ACOUSTICAL INTERIOR STOREFRONT SYSTEM
084410	GLWS-3	FIRE RATED ALUMINUM CURTAIN WALL. B.O.D.: SaftiFirst GPX.	AT EGRESS STAIR SHAFTS ON ALL FLOORS (120 MIN FR)
084410	PT-11_	INTERIOR PAINT FOR GLWS-3 DOORS TO MATCH CLEAR ANODIZED ALUM.	FACTORY-APPLIED
084413	GLWS-4	GLAZED ALUMINUM CURTAIN WALL (exterior). B.O.D.: Kawneer 1600-series.	CURTAIN WALL SYSTEM AT NEW ADDITION

SECTION	TAG	DESCRIPTION	ADDITIONAL INFORMATION
085113	WIN-1	ALUMINUM WINDOWS (New, generally). B.O.D.: Wausau 4250 Invent Retro series.	NEW WINDOWS REPLACING EXISTING 1980s WINDOWS
085113	WIN-2	ALUMINUM WINDOWS (Ground and First in North bricked up openings): B.O.D.: St Cloud 2500.	NEW WINDOWS REPLACING BRICK-FILLED OPENINGS NORTH
085113.23	IAW-1	ALUMINUM INTERIOR ACCESSORY WINDOWS: B.O.D.: Wausau SEAL IAWs.	INTERIOR "STORM" WINDOWS AT LEVELS 2 AND 3
085113	AL-A	ALUMINUM COLOR PAINT FINISH: Benjamin Moore HC-131	PVF2 FACTORY FINISH ON ALUMINUM WINDOW EXTRUSIONS
085113	AL-B	CLEAR ANODIZED ALUM. FINISH	FINISH TO INTERIOR STOREFRONT SYSTEMS
086210	XENTRY	REHABILITATED EXISTING HISTORIC DOORS AND FRAMES	EXISTING, HISTORIC DOORS AND CAST IRON SUBFRAMES AND GRILLES ABOVE.
086210	PT-6A	EXTERIOR HISTORIC DOOR, FRAME AND SUBFRAME PAINT	EXISTING, HISTORIC DOORS AND CAST IRON SUBFRAMES AND GRILLES ABOVE.
086210	PT-12A	INTERIOR SATIN OIL-ALKYD PAINT ON WROUGHT IRON AND CAST IRON WINDOW FRAMES	INSIDE FACES OF 1929 HISTORIC WINDOW FRAMES AT LEVELS 2 AND 3.
086300	SKYLIGHT-1	MODULAR UNIT SKYLIGHTS, B.O.D. VELUX, WITH WASCO AS ACCEPTABLE ALTERNATE.	WITH INTEGRAL OSHA FALL PROTECTION LOAD CHARACTERISTICS
087100	HW	DOOR HARDWARE	REFER TO HW SCHEDULE AND SETS.
088000	GL-1	1/8" MONOLITHIC CLEAR GLASS	NEW GLASS IN EXISTING, REHABILITATED WINDOWS
088000	GL-2	MONOLITHIC CLEAR GLASS, THICKNESS BASED ON SIZE.	NEW GLASS IN INTERIOR PARTITIONS - NON ACOUSTIC RATED
088000	GL-3	1" THICK INSULATED LOW-E CLEAR GLASS	NEW GLASS IN NEW EXTERIOR DOORS AND WINDOWS
088000	GL-3A	INSULATED AND LAMINATED CLEAR GLASS	NEW GLASS IN NEW EXTERIOR WINDOWS AT U-SHAPED ROOF AREA: PER GL-3, BUT WITH INNER PANE LAMINATED. SEE WINDOW SCHEDULE FOR LOCATIONS.
088000	GL-4	1" THICK INSULATED LOW-E CLEAR GLASS	NEW GLASS IN INTERIOR ACCESSORY WINDOWS
088000	GL-5	1-1/6" INSULATED, LAMINATED CLEAR GLASS	NEW GLASS IN INTERIOR ACOUSTIC RATED PARTITIONS
088000	GL-7	INSULATED, LAMINATED INNER PANE (OSHA FALL RESISTANT)	FOR NEW UNIT SKYLIGHTS
088000	GL-8	BACK-PAINTED GLASS FOR INTERIOR USE: Paint color to match paint color PT_-K as closely as possible using manufacturer's standard color range.	FOR BASE PANELS OF SERVICE DESKS: SAFLEX VANCEVA RANGE
088113	WF-1	3M Fasara decorative film: Essen	DECORATIVE ARCHITECTURAL WINDOW FILM
088813	FRGL-1	FIRE RESISTANT RATED GLASS	INTERIOR PARTITIONS TO EGRESS STAIRS (120 MIN FR)
088853	SGL-1	FORCED ENTRY RESISTANCE SECURITY GLASS	AT H.O.D. RECEPTION COUNTER
089119	LOUVER-1	ALUMINUM FIXED LOUVERS	MECHANICAL LOUVERS
<b>DIVISION 9</b>	<b>FINISHES</b>		
090320	PLASTER-1	HISTORIC PLASTER REPAIR: CEILINGS	SEE DRAWINGS FOR LOCATIONS
090320	PLASTER-2	HISTORIC PLASTER REPAIR: MASONRY WALLS	SEE DRAWINGS FOR LOCATIONS
092116.23	GYP-1	GYP SUM BOARD AT FIRE RATED SHAFT WALL ASSEMBLIES	
092216.23	FURR-1	METAL FURRING	REFER TO DETAILS FOR TYPE: "Z", "HAT", CEILING, ETC.
092900	GYP-2	GYP SUM BOARD AT CEILINGS	
092900	GYP-3	GYP SUM BOARD AT ACOUSTIC SEPARATION CEILINGS	

SECTION	TAG	DESCRIPTION	ADDITIONAL INFORMATION
092900	GYP-4	GYPSUM BOARD AT INTERIOR WALLS	
092900	TRIM-1	"J" EDGE BEAD	
092900	TRIM-2	CORNER BEAD	
092900	TRIM-3	SHADOW GAP TRIM	
092900	TRIM-4	SHADOW GAP TRIM AT EDGE	
093013	CT-1A	GLAZED MOSAIC WALL TILE: 'Tile X Design - Market Collection - Ashbury - 4x7 Rhomboid - Pale Powder	
093013	CT-2A	GLAZED MOSAIC WALL TILE COLOR A: 'Rubble Tile - Rewind 8x8 hexagon Vanilla [light grey/ white] - 88HEXRW90	
093013	CT-2B	GLAZED MOSAIC WALL TILE COLOR B: 'Rubble Tile - Rewind 8x8 hexagon Polvere [light grey] - 88HEXRW91	
093013	CT-2C	GLAZED MOSAIC WALL TILE COLOR C: 'Rubble Tile - Rewind 8x8 hexagon Tabacco [dark brown] - 88HEXRW93	
093013	CT-3	PORCELAIN FLOOR TILE: 'Rubble Tile - Royal Mosa - Global collection - 12x12 Agate Grey - 12575050	
093013	CTACC-1	GLAZED TILE COVE BASE: 'Rubble Tile - Royal Mosa - Global collection - 4x6 Cove base - Agate Grey 75050P	
093013	CT1ACC-2	GLAZED TILE INTERNAL CORNER STRIP	
093013	CT1ACC-3	GLAZED TILE EXTERNAL CORNER STRIP	
093013	CT1ACC-4	GLAZED TILE EDGE STRIP	
093013	CT2ACC-2	GLAZED TILE INTERNAL CORNER STRIP	
093013	CT2ACC-3	GLAZED TILE EXTERNAL CORNER STRIP	
093013	CT2ACC-4	GLAZED TILE EDGE STRIP	
093013	THOLD-1	NEW STONE THRESHOLDS	WHITE CARRERA MARBLE, POLISHED
093013	CTTRIM-1	TILE TRIM: Schluter - DECO-DE - Stainless steel	AT OUTSIDE CORNERS OF WALL TILE AREAS
093013	CTTRIM-2	TILE TRIM: Schluter - SCHIENE AE-100	For floor transition from WD-2 to CT-3
093016	XTILE-1	CLAY FLOOR TILE TO BE REHABILITATED	LEVEL 1 PUBLIC AREA
093016	XTILE-2A	NEW CLAY FLOOR TILE TO MATCH XTILE-1	LEVEL 1 PUBLIC AREA
093016	XTILE-2E	NEW CLAY FLOOR TILE TO MATCH XTILE-1 BUT 6" SQUARE.	LEVEL 1 PUBLIC AREA
093016	QT-1	EXTERIOR QUARRY TILE: 'Daltille 6" x 6" quarry tile (field tile). Grout bed: St. Astier, NHL 3.5.	AT EXTERIOR LANDING OUTSIDE WILSON ST STAIR EXIT/ENTRY DOORS.
093016	QT1ACC-1	DRAINAGE PLANE BELOW QT-1: Schluter DITRA Drain.	AT EXTERIOR LANDING OUTSIDE WILSON ST STAIR EXIT/ENTRY DOORS.
095113	ACT-1	ACOUSTIC CEILING TILE 1: Armstrong Optima Tegular	AT FULL HEIGHT WALLS TO DECK, WITH AXIOM TRIM AT ACT "CLOUDS" AT SELECT LOCATIONS PER THE DRAWINGS.
095113	ACT-2	ACOUSTIC CEILING TILE 2: Armstrong Ultima Vector	AT OFFICES/CONF ROOMS WITH PARTIAL HEIGHT WALLS
095123	ACT-3	ACOUSTIC CEILING TILE 3: Armstrong Optima Capz	AT UNDERSIDE EXISTING FLOOR SLABS

SECTION	TAG	DESCRIPTION	ADDITIONAL INFORMATION
092900	ACA-1	ACOUSTIC CEILING ASSEMBLY	BENEATH MECHANICAL ROOMS AT 3, AND IN CHILLER ROOM AT GF
096429	XFLOOR	EXISTING WOOD FLOOR RESTORATION	2ND FLOOR OFFICES AT NORTH AND WEST WINGS, AND ROOM 260
096429	WD-1	SOLID WOOD FLOOR AT FLOOR BOXES (ROOM 260)	WOOD FLOOR TO MATCH ROOM 260 WOOD FLOOR
096429	WD-2	SOLID WOOD FLOOR OVER EXISTING FLOOR TOPPING	LEVEL 2 OFFICE AREAS SOUTH OF HISTORIC CORRIDOR
060312	WD-3	NEW HARDWOOD HANDRAILS, PANELS AND TRIM TO MATCH XTG WAINSCOT: WHITE OAK STAINED TO MATCH EXISTING.	LEVEL 2 HISTORIC CORRIDOR, ROOM 260 PANELING, AND NEW HANDRAILS AT HISTORIC STAIRS AT EAST AND WEST, AND NEW STAIR.
096429	MAT-2	RESILIENT ACOUSTICAL MAT: SONUS 1/8" MAT	BELOW WD-2 AT L-2 SOUTH OF CORRIDOR.
096513	RB-1	RESILIENT BASE (GREY): Johnsonite 63 Burnt Umber	GENERAL (NON-HISTORIC) AREAS THROUGHOUT
142100	RF-1	RUBBER SHEET FLOORING (GREY): Noraplan Sentica, Color 6521 Sunday Paper.	EXISTING ELEVATOR CAB FLOOR FINISH - SEE ELEVATOR SPEC.
096613	TZ-1	PORTLAND CEMENT TERRAZZO FLOORING: Color based on Tectura TZ-03: Foggy Day. Use inset non-slip strips per the drawings.	AT TREADS AND LANDINGS OF NEW STAIR BTWN LEVELS G AND 1.
096723	EPOXY-1	EPOXY FLOOR FINISH	AT FINAL PREP KITCHEN
096813	CPT-1	CARPET TILE: Tandus Centiva Avant 04840 Galvanized Pewter 11709	SELECTED OFFICE AREAS, PER FINISHES PLAN
096813	CPTTRIM-1	CARPET TRIM: TRAFFIC MASTER – ¼" height, Silver hammered carpet tack bar	EDGES OF CARPET AT TRANSITIONS, PER FINISHES PLAN
096813	MAT-1	ENTRY FLOOR MAT 1, Interface - Style 1290102500 - Entry Level Color 7187 - Black	
097516	BASE-1	NEW GREEN STONE WALL BASE TO MATCH HISTORIC	SPECIES: TINOS OASIS GREEN MARBLE, POLISHED
097516	BASE-2	NEW WHITE STONE WALL BASE TO MATCH XTG PROFILE	SPECIES: WHITE CARRARA MARBLE, POLISHED
098433	AWP-1A	ACOUSTICAL WALL PANEL: ROOM 260 WALLS	1" THICK: ROOM 260 WALLS
098433	AWP-1B	ACOUSTICAL WALL PANEL: ROOM 260 CEILING	2" THICK: ROOM 260 CEILING
098433	AWP-2	ACOUSTICAL WALL PANEL - CONF. ROOMS GENERALLY	2" THICK: MEETING / CONFERENCE ROOMS
098433	FABRIC-A	ACOUSTICAL WALL PANEL FABRIC COVER 1: Luum, Linen Weave Sesame, 1018-07.	FABRIC COVER TYPE 1, ROOM 260 WALLS, GRILLES, & CEILING
098433	FABRIC-B	ACOUSTICAL WALL PANEL FABRIC COVER 2: DesignTex, Gammut 3468-808	FABRIC COVER TYPE 2, CONFERENCE ROOM WALLS GENERALLY
	PT-6A	REFER TO 086210 ABOVE	EXISTING, HISTORIC DOOR AND FRAME PAINT
099113	PT-7_	EXTERIOR ALKYD, GLOSS LEVEL 3, PAINT	EXISTING AND NEW, HISTORIC AND NEW METAL DOORS AND RAILINGS
099113	PT-8_	EXTERIOR LATEX, GLOSS LEVEL 1 (FLAT), PAINT	CONCRETE STAIR STRINGERS ETC. AT WILSON ST
099113	PT-9_	EXTERIOR WATER-BASED INDUSTRIAL, GLOSS LEVEL 3, PAINT	DUNNAGE AND OTHER EXTERIOR SUPPORT GALVANIZED STEEL
099113 / 099123	PT-10_	PAINT APPLIED OVER EXISTING ANODIZED ALUM. WINDOW FRAMES AT LEVELS 0 AND 1, IF ALTERNATE-1 IS NOT TAKEN.	TO MATCH PT-_A IN COLOR.

SECTION	TAG	DESCRIPTION	ADDITIONAL INFORMATION
099123	PT-1_	INTERIOR SATIN LATEX PAINT	INTERIOR PAINTING AND FINISHING
099123	PT-2_	INTERIOR EGGSHELL LATEX PAINT	INTERIOR PAINTING AND FINISHING
099123	PT-3_	INTERIOR SEMI-GLOSS LATEX PAINT	INTERIOR PAINTING AND FINISHING
099123	PT-4_	INTERIOR FLAT DRYFALL CEILING AND BDG SERVICES PAINT	INTERIOR PAINTING AND FINISHING
099123	PT-5_	INTERIOR ABRASION-RESISTANT PAINT	INTERIOR PAINTING AND FINISHING
	PT-11_	REFER TO 084410 ABOVE	FACTORY-APPLIED FINISH TO GLWS-3 DOORS
	PT-12A	REFER TO 086210 ABOVE	INSIDE FACES OF 1929 HISTORIC WINDOW FRAMES AT LEVELS 2 AND 3.
099123	PT-_A	Benjamin Moore Lehigh Green HC-131.	HISTORIC GREEN
099123	PT-_B	Benjamin Moore Chantilly Lace 2121-70	NEW SPACES
099123	PT-_C	[NOT USED]	
099123	PT-_D	[NOT USED]	
099123	PT-_E	[NOT USED]	
099123	PT-_F	Benjamin Moore Woodland Snow 2161-70	Room 260 upper walls, level 1 historic public zone, level 2 corridor, Historic Bathrooms and historic stair walls
099123	PT-_G	Benjamin Moore 2121-10 (Gray)	steel balustrades externally, metal exterior signage letters.
099123	PT-_H	Benjamin Moore Metallic Silver 2132-60 [similar to AL-B: Clear anodized aluminum]	new metal balustrades internally and other interior exposed metal components as noted on the drawings.
099123	PT-_J	Benjamin Moore 1099 Byzantine Gold: Apply tinted Umber glaze finish coat to match half-circle plaster medallion above Judge's bench.	Plaster "supports" at ends of fake beams on north and south walls of Room 260 ceiling.
099123	PT-_K	Scuffmaster: Scrubtough Max, Ref GOH 11459544, Color XC 019 STM	Feature walls at levels G and 1, per the drawings.
099123	PT-_L	PPG Light Silver, ref: AD3Y1346N	steel doors at GLWS-3, to match clear anodized alum.
099300	CCT-1	STAIN TO MATCH HISTORIC TRIM, DOORS, PANELS.	
099300	CCT-2	CLEAR COAT FINISH TO HISTORIC TRIM, DOORS, PANELS.	
099646	SFRM-1	INTUMESCENT PAINT	FOR 1HR FIRE PROTECTION OF VISIBLE INTERIOR STEEL STRUCTURE



SECTION	TAG	DESCRIPTION	ADDITIONAL INFORMATION
DIVISION 10	SPECIALTIES		
101100	MKBD-1	MARKER BOARD: Clarus Glassboards, Pure White C100	IN ALL CONFERENCE ROOMS EXCEPT ROOM 111 - SEE DRAWINGS FOR LOCATION AND SIZE.
101100	TACK-1	TACKABLE BOARD: Forbo, Bulletin Board, Koroseal - Aluminum J-Cap Frame, See drawings for size, Color: per manuf. std range at time of procurement.	At staff areas where noted on the drawings
101200	DISPLAY-1	GLASS DISPLAY CASE: CRL Architectural Products, Self-healing cork, satin anodized frame. Size 48" high x 48" wide.	AT ENTRY VESTIBULES AND OTHER SELECT LOCATIONS - SEE FLOOR PLANS.
102113.15	TOIL-1	STAINLESS STEEL TOILET ROOM PARTITION	AT NEW RESTROOMS, AND AT SELECTED LOCATIONS ON LEVELS 2 AND 3. NOTE THAT THE NEW TOILET PARTITIONS IN THE EXISTING, HISTORIC RESTROOMS AT LEVEL 2 AND 3 WOMEN'S ROOMS ARE FLOOR MOUNTED NOT HUNG FROM THE DECK ABOVE.
102113	TOIL-2	TOILET ROOM URINAL SCREEN	AT ALL MEN'S ROOMS.
102116.19	SHOWER-1	SHOWER COMPARTMENT WALL PANEL	AT SHOWER COMPARTMENTS, LEVEL 1.
102116.19	SHOWER-2	TERRAZZO SHOWER TRAY: Acorn Engineering Company: Terrazzo ADA Shower Base, Model SBADA-36-3F.	TERRAZZO - RECESS INTO SLAB FOR ADA COMPLIANCE
102800	TA-04	TOILET PAPER DISPENSER - Wausau Paper, Model 80300, Double-roll dispenser, Surface mounted. Color: Black.	
102800	TA-05	PAPER TOWEL DISPENSER: Bobrick B-2860, surface mounted, SS finish.	FOR KITCHENETTES AND COMFORT ROOMS.
102800	TA-07	WASTE RECEPTACLE: ULINE, Model H3622. free standing.	
102800	TA-11	LIQUID SOAP DISPENSER: Gojo 2789-12	
102800	TA-12	GRAB BARS: Bobrick, satin finish	
102800	TA-13	SANITARY NAPKIN VENDOR: Bobrick B-2706C Classic Series, surface mounted, satin stainless.	TO BE INSTALLED IN ALL NEW PUBLICLY ACCESSIBLE RESTROOMS
102800	TA-14	SANITARY NAPKIN DISPOSAL: Bobrick B-270, Partition mounted, Stainless steel	
102800	TA-18	TOWEL HOLDER	
102800	TA-17	WALL MOUNT MIRRORS	FRAMED MIRRORS
102800	TA-19	COAT / ROBE HOOK: Bobrick, B-542, Single prong	
102800	TA-21	FOLDING SHOWER SEAT: Bobrick B-5181, single phenolic, fold-up.	
102800	TA-23	WARM AIR DRYER: XCELRATOReco	AT RESTROOMS ONLY
102800	TA-24	DIAPER CHANGING STATION: Koala Kare KB200.	LEVEL 0 AND 1 PUBLIC RESTROOMS, AND L-2 NEW UNISEX RESTROOMS ONLY.
102800	TA-25	UNDER-LAVATORY GUARDS: Truebro LAV Shield, Model 2018.	

SECTION	TAG	DESCRIPTION	ADDITIONAL INFORMATION
102800	TA-30	MOP HOLDER: American Specialties, Inc.: 0795	
102800	TA-31	UTILITY SHELF: American Specialties, Inc.: 1308-3	
102800	AED-1	RECESSED AED CABINET: ALLIED MEDICAL PRODUCTS, STANDARD, SEMI-RECESSED, 14-1/8" SQUARE X 7" DEEP, COLOR: WHITE.	SEE FLOOR PLANS FOR LOCATIONS. OWNER TO CONFIRM IF AED UNITS THEMSELVES TO BE INCLUDED IN THE CABINETS FOR BID (THIS IS NORMALLY AN O.F.O.I. ITEM).
102800	KNOX BOX	KNOX SERIES 3200 SURFACE MOUNTED KNOX BOX WITH HINGED DOOR, IN BLACK.	MOUNT TO BOLLARD ADJACENT MLK BLVD ENTRY DOOR, PER THE DRAWINGS.
104416	FEX-1	FIRE EXTINGUISHER TYPE 1: UL Rated 2A-20B	
105113	LOCKER-1	SOLID PHENOLIC LOCKERS - Hollman: Corporate Locker, Z-style with integrated bench. Finish - Solid Surface White Quartz	STAFF SHOWER ROOM
105113	LOCKER-2	P-LAM LOCKERS - Color: Grey	FACILITIES STAFF ROOM
105113	BENCH	LOCKER ROOM BENCH: AJW, HPDE	
<b>DIVISION 11</b>	<b>EQUIPMENT</b>		
113100	MICRO-1	MICROWAVE, General Electric, JEM3072SHSS, counter top unit - <b>OWNER FURNISHED OWNER INSTALLED (OFOI)</b>	IN STAFF KITCHENETTES (OFOI)
113100	REF-1	FULL SIZE FRIDGE, General Electric GDE25ESKSS - <b>OFOI</b> .	IN STAFF KITCHENETTES (OFOI)
113100	REF-2	UNDER-COUNTER FRIDGE, General Electric GCE06GSHSB - <b>OFOI</b> .	IN COMFORT ROOMS BELOW COUNTER (OFOI)
113100	REF-3	COMMERCIAL KITCHEN FRIDGE: Central Restaurant Products: True T-23 Reach-In Refrigerator - One Door. Product ref 675-001. - <b>OFOI</b> .	IN FINAL PREP KICHEN AT LEVEL 2 (OFOI)
113100	WASHER-1	CLOTHES WASHER, Bosch, WAT28401UC - <b>OFOI</b> .	IN FACILITIES LAUNDRY ROOM (OFOI)
113100	DRYER-1	CLOTHES DRYER, Bosch WTG86401UC - <b>OFOI</b> .	IN FACILITIES LAUNDRY ROOM (OFOI)
113100	KEG-1	KEGERATOR - UBC KegMaster Double Tap Model KM15CT2 - <b>OFOI</b> .	IN FINAL PREP KICHEN AT LEVEL 2 (OFOI)
	ICE-1	ICE MAKER - Ice-O-Matic ICE0320 - <b>OFOI</b> .	IN FINAL PREP KICHEN AT LEVEL 2 (OFOI)
<b>DIVISION 12</b>	<b>FURNISHINGS</b>		
122413	SHADE-1	MANUAL ROLLER SHADE - MECHOSHADE, Thermoveil Shadow Grey, 3% openness.	
123661	SSF-1	SOLID SURFACE 1: Formica Classics - Luna Concrete 781	
123661	SSF-2	SOLID SURFACE 2: Sileston - Niebla	
123661	SSF-3	SOLID SURFACE 3: Formica Classics - Luna Sand 757	

SECTION	TAG	DESCRIPTION	ADDITIONAL INFORMATION
124813	MAT-3	RECESSED MODULAR MATTING, JL Industries: Activar JL-600 series roll-up grating, 3/4" deep, clear anodized alum. frame JL-AA. Color - Grey	AT ENTRY ZONES AT GROUND LEVEL AND LEVEL 1 - SEE PLANS.
129313	RACK-1	BICYCLE HANGING RACKS: PARK-A-BIKE SS10.	AT NEW ADDITION, LEVEL 1
<b>DIVISION 14</b>	<b>CONVEYING EQUIPMENT</b>		
142100	ELEV-1	EXISTING ELEVATOR TO BE REFURBISHED	REFER TO DRAWINGS FOR SCOPE AND FINISHES
<b>DIVISION 22</b>	<b>PLUMBING</b>		
224713	DF-X	DRINKING FOUNTAIN AND BOTTLE FILLER	REFER TO PLUMBING DRAWINGS AND SPECS FOR LOCATIONS AND TYPES
221316 / 221423	CO	CLEANOUT	
221423	DS-X	DOWN SPOUT	
221316	FCO	FLOOR CLEANOUT	
221316	FD	FLOOR DRAIN	
221119	FWH-X	FREEZELESS WALL HYDRANT	
224216.16	MS-X	JANITOR'S MOP SINK	
224216.13	L-X	LAVATORY	
224216.16	S-1	COUNTERTOP SINK AT KITCHENETTES	
224216.16	S-2	HANDWASH SINK AT FINAL PREP KITCHEN	
224216.16	S-3	FOOD PREP SINK AT FINAL PREP KITCHEN	
224216.16	S-4	FOUR-BOWL WASHUP SINK AT FINAL PREP KITCHEN	
224223	SH-1	SHOWER HEAD	
224213.16	UR-X	WALL-HUNG URINAL	
221316	VTR	VENT THROUGH ROOF	
224213.13	WC-X	WATER CLOSET	
221119	GGB	OUTLET BOX	
<b>DIVISION 23</b>	<b>MECHANICAL</b>		
237313	AHU-X	MECHANICAL AIR HANDLING UNIT	SEE MECHANICAL DRAWINGS FOR LOCATIONS
233600	AV-X	MECHANICAL AIR VALVE	
238219	FCU-X	FAN COIL UNIT	
233300	FDAMPER	FIRE DAMPER	
233713	LPH-X	MECHANICAL AIR INTAKE/EXHAUST	
233713	MGRILLE	MECHANICAL RETURN/TRANSFER GRILLE	
233713	MVENT	MECHANICAL VENT	
238229	PR-X	MECHANICAL HYDRONIC UNIT / RADIATOR	

SECTION	TAG	DESCRIPTION	ADDITIONAL INFORMATION
DIVISION 26	ELECTRICAL		
260533	FBOX	RECESSED FLOOR BOX FOR POWER/DATA/AV	
260923	OS	OCCUPANCY SENSOR	
260923	PC	PHOTOCELL	
262726	REC	RECEPTACLE	
DIVISION 27	TECHNOLOGY		
	AV-MON	AV FLAT PANEL MONITOR (OFCI)	SEE TECHNOLOGY DRAWINGS FOR LOCATIONS AND SIZES
	AV-MNT	AV FLAT PANEL MONITOR MOUNT	
	CAM	CLOSED CIRCUIT CAMERA	
	CM-X	AV SYSTEM PTZ CAMERA (OFCI)	
	CR-X	CARD READER	
	DR	SECURITY DURESS/PANIC BUTTON	
	SP-X	AV SYSTEM SPEAKER (OFCI)	
	SM-X	SOUND MASKING SPEAKER	
	TP-X	TABLE TOP AV CONNECTIVITY BOX AND PLATE	
	WAP	WIRELESS ACCESS POINT	
	WP-1	WALL AV CONNECTIVITY BOX AND PLATE	
DIVISION 28	FIRE ALARM AND SECURITY		
283111	ANNC	ANNUNCIATOR	SEE ELECTRICAL DRAWINGS FOR LOCATIONS AND SIZES
283111	FAAP	FIRE ALARM ANNUNCIATOR PANEL	
283111	FACP	FIRE ALARM CONTROL PANEL	
283111	S	SMOKE DETECTOR	

1.1 DESIGN PROFESSIONALS OF RECORD

A. Architect:

1. Jack Poling, AIA.
2. Wisconsin License Number: A-8984.
3. Responsible for Architectural Design: spec divisions 1 through 14 except for City-issued Div 1 sections, 024150, 040120, 040140, 044550, 051250, 060312, 070190, 071350, 075213, 075216, 076250, 082110, 086210, 090320, 093016, 096429, 099300, Divisions 27 and 28, and other sections mentioned below.



*Daniel Poling*

B. Civil Engineer:

1. James Joehnk, PE.
2. Wisconsin License Number: E-28032.
3. Responsible for Civil Engineering: spec section 129300 and divisions 31, 32 and 33, except for 312300.



*James R. Joehnk*  
9/16/16

C. Structural Engineer:

1. Abby Pertzborn, PE.
2. Wisconsin License Number: E-38745-6.
3. Responsible for Structural Engineering: spec divisions 03 and 05, and 312300, except for 033300, 033543, 035300, 054500, 055000, 054500, 055000, 055113, 055116, 055213.



*Abby Pertzborn*  
10/3/16  
STRUCTURAL

D. Fire-Protection Engineer:

1. Michael Nakhla, FPE.
2. Wisconsin License Number: E42619-6
3. Responsible for Fire Protection Engineering: spec section 211000.



*Michael Nakhla*  
Oct 19 2016

E. Mechanical and Plumbing Engineer:

1. Larry Nemer, PE.
2. Wisconsin License Number: E-30240.
3. Responsible for Mechanical and Plumbing Engineering: spec divisions 22 and 23.



*Larry J. Nemer*  
10.03.2016

F. Electrical Engineer:

1. Randall Jacobs.
2. Wisconsin License Number: 35771.
3. Responsible for Electrical Engineering and Fire Alarm system design: spec division 26 and section 283111



*Randall Jacobs*  
10.03.2016

END OF DOCUMENT 000107

**SECTION 00 31 46  
PERMITS**

1  
2  
3  
4 PART 1 – GENERAL ..... 1  
5 1.1. SUMMARY ..... 1  
6 1.2. REFERENCES ..... 1  
7 1.3. GENERAL CONTRACTORS REQUIREMENTS ..... 1  
8 PART 2 – PRODUCTS – THIS SECTION NOT USED ..... 1  
9 PART 3 – EXECUTION – THIS SECTION NOT USED ..... 1

10  
11 **PART 1 – GENERAL**

12  
13 **1.1. SUMMARY**

- 14 A. Each project has varying requirements for permits, inspections, and fees based on the scope, size, and location of  
15 the project.  
16 B. The City of Madison (Owner) is subject to all permits, inspections and associated fees for construction,  
17 demolition, utility connection, storm water management, and other similar requirements that may be required  
18 to complete the scope of work associated with these contract documents.  
19 C. The General Contractor (GC) shall be responsible for obtaining all permits, inspections and paying for all  
20 associated fees unless specifically identified within this specification.  
21

22 **1.2. REFERENCES**

- 23 A. The following references are not intended to be all inclusive. It shall be the GC’s responsibility to determine all  
24 requirements based on the scope of work in the contract documents.  
25 B. City of Madison Ordinances: Review all ordinances that may require a permit or fee that may be connected with  
26 a required permit. Contact the following City Agencies to determine the exact requirements during bidding  
27 1. Building Inspection  
28 2. Zoning  
29 3. Engineering  
30 4. Water Utility  
31 5. Traffic Engineering  
32 6. Others as may be specified by the contract documents.  
33 B. State Statutes  
34 C. Other Regulatory Regulations  
35 D. Other Agencies or companies that may have related requirements  
36 1. Madison Metropolitan Sewerage District  
37 2. Local gas and electric utility companies  
38 3. Other utility companies  
39

40 **1.3. GENERAL CONTRACTORS REQUIREMENTS**

- 41 A. The GC shall be responsible for all of the following:  
42 1. Execute application for all required permits as may be required by the scope of work described within the  
43 contract documents.  
44 2. Paying all fees associated with the application of any required permits.  
45 3. Scheduling all required inspections that may be conditions of any required permits.  
46 B. The GC shall provide high quality scanned images of all required permits and inspections and upload them to the  
47 Contract Documents-Regulatory Documents Library on the Project Management Web Site.  
48

49 **PART 2 – PRODUCTS – THIS SECTION NOT USED**

50  
51 **PART 3 – EXECUTION – THIS SECTION NOT USED**

52  
53  
54  
55 **END OF SECTION**

1 SECTION 01 23 00

2 ALTERNATES

3 PART 1 – GENERAL

4 1.1 [RELATED DOCUMENTS](#)

5 1.2 [SUMMARY](#)

6 1.3 [DEFINITIONS](#)

7 1.4 [PROCEDURES](#)

8 PART 2 – PRODUCTS

9 NOT USED

10 PART 3 – EXECUTION

11 3.1 [SCHEDULE OF ALTERNATES](#)

12 PART 1 - GENERAL

13 1.1 RELATED DOCUMENTS

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

16 1.2 SUMMARY

- 17 A. Section includes administrative and procedural requirements for alternates.

18 1.3 DEFINITIONS

- 19 A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the  
20 bidding requirements that may be added to or deducted from the base bid amount if the Owner decides to  
21 accept a corresponding change either in the amount of construction to be completed or in the products,  
22 materials, equipment, systems, or installation methods described in the Contract Documents.

- 23 1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.  
24 2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to  
25 incorporate alternates into the Work. No other adjustments are made to the Contract Sum.

26 1.4 PROCEDURES

- 27 A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the  
28 alternate into Project.

- 29 1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items  
30 incidental to or required for a complete installation whether or not indicated as part of alternate.

- 31 B. Execute accepted alternates under the same conditions as other work of the Contract.

- 32 C. Schedule: A schedule of alternates is included at the end of this Section. Specification Sections referenced  
33 in schedule contain requirements for materials necessary to achieve the work described under each  
34 alternate.

35 PART 2 - PRODUCTS (Not Used)

36 PART 3 - EXECUTION

37 3.1 SCHEDULE OF ALTERNATES

- 38  
39 A. Alternate No.1: Window Installation.

- 40 1. Alternate: Provide all work to install window types W1, W5, W5a, W6, W7 AS indicated on sheets  
41 A201, A202, A620, A622, A653; and as specified in exhibit "N" specification section 085113 -  
42 ALUMINUM WINDOWS.

- 43  
44 B. Alternate No.2: Vegetated Roof Module (Tray) System.

- 45 1. Alternate: Provide all work to install an extensive vegetated roof module (tray) system to roof areas  
46 as indicated on sheet C110 and related details; and as specified in exhibit "N" specification  
47 sections 075213 - APP Modified Asphalt Bituminous Roofing or 075216 - SBS Modified Asphalt  
48 Bituminous Roofing..

49 END OF SECTION

**SECTION 01 25 13**  
**PRODUCT SUBSTITUTION PROCEDURES**

1  
2  
3  
4 PART 1 – GENERAL ..... 1  
5 1.1. SUMMARY ..... 1  
6 1.2. RELATED SPECIFICATIONS ..... 1  
7 PART 2 – PRODUCTS..... 1  
8 2.1. SUBSTITUTION REQUEST FORM..... 1  
9 PART 3 - EXECUTION ..... 1  
10 3.1. REQUESTING A SUBSTITUTION DURING BIDDING..... 1  
11 3.2. REQUESTING A SUBSTITUTION AFTER AWARD OF CONTRACT ..... 2  
12 3.3. UNAUTHORIZED SUBSTITUTIONS..... 2  
13

**PART 1 – GENERAL**

**1.1. SUMMARY**

- 17 A. The City of Madison uses a specific list of preferred products for various specification items to establish  
18 standards of quality, utility, and appearance required.  
19 B. The City of Madison will not allow substitutions for specified Products except as follows:  
20 1. The Product is no longer produced or the product manufacturer is no longer in business.  
21 2. The manufacturer has significantly changed performance data, product dimensions, or other such design  
22 criteria for the specified Product(s).  
23 3. Products specified by naming one or more Products or manufacturer’s and “or approved equal” or  
24 “approved equivalent.”  
25 C. The City of Madison will not allow substitutions for specified Products as follows:  
26 1. For Products specified by naming only one Product and manufacturer, no substitute product will be  
27 considered.  
28 2. For Products specified by naming several Products or manufacturers select any one of the products or  
29 manufacturers named, which complies with the specifications. No substitute product will be considered.  
30 D. Request for substitutions from any party other than the General Contractor (GC) will not be accepted.  
31

**1.2. RELATED SPECIFICATIONS**

- 32 A. Section 01 26 13 Request for Information (RFI)  
33 B. Section 01 31 23 Project Management Web Site  
34 C. Section 01 33 23 Submittals  
35  
36

**PART 2 – PRODUCTS**

**2.1. SUBSTITUTION REQUEST FORM**

- 37  
38  
39 A. During bidding all contractors (General and Sub-contractors) and suppliers of materials or products shall provide  
40 the Substitution Request form and all required attachments directly to the Project Architect and City Project  
41 Manager. Submission shall use the form located at the end of this specification.  
42 1. Contractors and suppliers shall use the screen shot of the form located at the end of this specification to  
43 print a hard copy for all pre-bid substitution requests.  
44 B. After bidding only the GC shall submit a request and shall use the form located on the Project Management Web  
45 Site.  
46  
47

**PART 3 - EXECUTION**

**3.1. REQUESTING A SUBSTITUTION DURING BIDDING**

- 48  
49  
50 A. In the event that a substitution is requested during the bidding phase the Contractor or Supplier shall meet the  
51 substitution request deadline listed in the bidding documents. No substitution request will be considered during  
52 the bidding period after the stated substitution request deadline. In general this procedure shall be as follows:  
53 1. Submit the Substitution Request Form including all required supporting documentation to the City  
54 Project Manager and Project Architect by the substitution request deadline specified in Section A of the  
55 Contract Documents. Utilize the Substitution Request Form found at the end of this Section.  
56 2. Submit a Substitution Request Form for each product, supported with complete data, drawings and  
57 samples as appropriate, including:  
58



- 1 i. Comparison of qualities of the proposed substitutions with that specified.
- 2 ii. Changes required in other elements of the Work because of the substitution.
- 3 iii. Effect on the construction schedule.
- 4 iv. Cost data comparing the proposed substitution with the Product specified.
- 5 v. Any required license fees or royalties.
- 6 vi. Availability of maintenance service and source of replacement materials.
- 7 3. The Owner and Architect will review the Substitution Request Form and if approved the City of Madison
- 8 will publish a bidding addendum authorizing the replacement. The Owner and Architect may reject any
- 9 substitution request without providing specific reasons.
- 10 B. Substitutions submitted and approved during the bidding phase shall be announced by the City of Madison by
- 11 addenda prior to the bid due date.
- 12

13 **3.2. REQUESTING A SUBSTITUTION AFTER AWARD OF CONTRACT**

- 14 A. A substitution request will only be considered after award of contract if it meets the qualifying provisions as
- 15 described in 1.1.B.1 and .2 above.
- 16 B. The GC shall submit a substitution request using the digital form on the Project Management Web Site located in
- 17 the Construction Administration-Substitution Request library.
- 18 1. Click on *Add document* to open a new digital form, fill out form, provide required attachments, then click
- 19 the Submit button.
- 20 2. Consulting Staff, Owner and Owners Representatives will review the request and provide the appropriate
- 21 approvals and feed back to the GC.
- 22

23 **3.3. UNAUTHORIZED SUBSTITUTIONS**

- 24 A. Any Contractor who substitutes products without proper authorization by the Owner and Architect will be
- 25 required to immediately remove and replace the product and all costs required to conform to the Contract
- 26 Documents shall be borne by the General Prime Contractor.
- 27
- 28
- 29

30 **END OF SECTION**

31



# Substitution Request

Today's Date:

Project Title:

Project Number:

Contract Number:

Description	Spec Section	Page	Paragraph
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

The undersigned requests consideration of the following:

Proposed Substitution:

### Attachments

[Click here to attach a file](#)

Insert item

- Attached data includes product description, specifications, drawings, photographs, performance and test data adequate for evaluation of the request; applicable portions of the data are clearly identified.
- Attached data also includes a description of changes to the Contract Documents that the proposed substitution will require for its proper installation.

The undersigned General Contractor representative certifies that the following paragraphs are correct.

1. *The function, appearance, and quality of the proposed substitution are equal or superior to the specified item.*
2. *The proposed substitution does not affect dimensions shown on drawings.*
3. *The undersigned will pay for changes to the building design, including engineering design, detailing, and construction costs caused by the request.*
4. *The proposed substitution will have no adverse affect on other trades, the construction schedule, or specified warranty requirements.*
5. *Maintenance and service parts will be locally available for the proposed substitution. Provide supporting documentation.*

Submitted By:

**\*\*By typing my name and entering the date I hereby give my electronic signature\*\***

Name:  Title:  Date:

Firm:  Address:

Phone:

1  
2  
3  
4  
5

**SECTION 01 26 13  
REQUEST FOR INFORMATION (RFI)**

1  
2  
3  
4 PART 1 – GENERAL ..... 1  
5 1.1. SUMMARY ..... 1  
6 1.2. RELATED SPECIFICATIONS ..... 1  
7 1.3. PERFORMANCE REQUIREMENTS..... 1  
8 1.4. QUALITY ASSURANCE ..... 1  
9 PART 2 – PRODUCTS..... 1  
10 2.1. REQUEST FOR INFORMATION FORM ..... 1  
11 PART 3 - EXECUTION ..... 1  
12 3.1. CONTRACTOR INITIATED RFI ..... 2  
13 3.3. RFI RESPONSES ..... 2  
14 3.4. COMMENCEMENT OF WORK RELATED TO AN RFI ..... 2  
15

**PART 1 – GENERAL**

**1.1. SUMMARY**

- 19 A. Contractors shall use the RFI form/process to request additional information or clarification regarding the  
20 construction documents.  
21 B. All RFI documentation will be processed through the through the Construction Administration-Request for  
22 Information Library on the Project Management Web Site (PMWS).  
23

**1.2. RELATED SPECIFICATIONS**

- 24 A. Section 01 26 46 Construction Bulletin (CB)  
25 B. Section 01 26 57 Change Order Request (COR)  
26 C. Section 01 26 63 Change Order (CO)  
27 D. Section 01 31 23 Project Management Web Site (PMWS)  
28  
29

**1.3. PERFORMANCE REQUIREMENTS**

- 30 A. RFI issues initiated by any contractor shall be done through the General Contractor (GC).  
31 1. RFIs submitted by any Sub-contractor under the GCs control shall be returned with no response.  
32 B. Submit a new RFI for each issue. Only multiple questions that are of a similar nature may be combined into one  
33 RFI shall be allowed and responded to.  
34  
35

**1.4. QUALITY ASSURANCE**

- 36 A. The GC shall be responsible for all of the following:  
37 1. Ensure that any request for additional information is valid and the information being requested is not  
38 addressed in the construction documents.  
39 2. Ensure that all requests are clearly stated and the RFI form is completely filled out.  
40 3. Ensure that all Work associated an RFI response is carried out as intended.  
41 B. The PA shall be responsible for the following:  
42 1. Ensure that all responses to contractor initiated RFIs are properly responded to in a timely fashion.  
43 a. The CPM, Owner, consulting staff, and other City staff shall be responsible for the initial review of  
44 the RFI. The PA shall be responsible for codifying all consultant and Owner/City staff comments  
45 into a unified RFI response.  
46  
47

**PART 2 – PRODUCTS**

**2.1. REQUEST FOR INFORMATION FORM**

- 48  
49  
50 A. The RFI form is located on the Project Management Web Site. The GC, PA, or CPM as appropriate shall click the  
51 link in the left margin of the project web site opening a new form. Project information is pre-loaded, provide  
52 additional information as indicated below in the execution to complete the form.  
53  
54

**PART 3 - EXECUTION**

1 **3.1. CONTRACTOR INITIATED RFI**

- 2 A. Immediately on discovery of the need for additional information or interpretation of the Contract Documents  
3 any contractor may initiate an RFI for additional information or clarification through the GC.  
4 B. The GC shall select the "Submit an RFI" link on the Project Management Web Site and completely fill out the  
5 form as follows:  
6 1. Contract related information will be automatically populated on the form.  
7 2. Thoroughly explain the issue at hand, provide backup information (photographs, sketches, drawings,  
8 data, etc) as necessary, and clearly state the question or problem that requires a resolution. Combine  
9 like or related issues but do not include multiple issues on one form.  
10 a. Example. If a duct interferes with other critical piping and electrical work include all issues into  
11 one RFI.  
12 b. Example. If you have a question regarding the chiller and another regarding toilet partitions  
13 create separate RFIs.  
14 3. Check all relevant boxes for trades affected. This will assist the design team in determining who should  
15 be reviewing the RFI.  
16 C. Upon completing the RFI click the "Submit" button. The PMWS software will automatically route the RFI to the  
17 appropriate reviewers.  
18

19 **3.3. RFI RESPONSES**

- 20 A. Responses to simple RFI issues shall use the response section of the RFI form and shall be completed within five  
21 (5) working days of the RFI form being submitted.  
22 B. Responses to more complex issues may require additional time or may require a Construction Bulletin to be  
23 published. The initial RFI shall be responded to within five (5) working days stating that the RFI is being  
24 reviewed and provide an estimated date for the response.  
25 C. The following GC generated RFIs will be returned without action:  
26 1. Requests for approval of submittals  
27 2. Requests for approval of substitutions  
28 3. Requests for approval of Contractor's means and methods.  
29 4. Requests for coordination information already indicated in the Contract Documents.  
30 5. Requests for adjustments in the Contract Time or the Contract Sum.  
31 6. Requests for interpretation of A/E's actions on submittals.  
32 7. Incomplete RFI or inaccurately prepared RFI.  
33

34 **3.4. COMMENCEMENT OF WORK RELATED TO AN RFI**

- 35 A. The GC shall only proceed with the Work of an RFI when additional information is not required.  
36 B. The GC shall not proceed with any Work associated with an RFI while it is under review.  
37 C. The GC shall not proceed with any Work associated with an RFI that clearly states a CB will be issued in response  
38 to the RFI.  
39 D. The GC will be required to immediately remove and replace unauthorized Work and all costs required to  
40 conform to the Contract Documents shall be borne by the GC.  
41  
42  
43

44 **END OF SECTION**  
45

**SECTION 01 26 46  
CONSTRUCTION BULLETIN (CB)**

1  
2  
3  
4 PART 1 – GENERAL ..... 1  
5 1.1. SUMMARY ..... 1  
6 1.2. RELATED SPECIFICATIONS ..... 1  
7 1.3. PERFORMANCE REQUIREMENTS..... 1  
8 1.4. QUALITY ASSURANCE ..... 1  
9 PART 2 – PRODUCTS..... 2  
10 2.1. CONSTRUCTION BULLETIN FORM ..... 2  
11 PART 3 - EXECUTION ..... 2  
12 3.1. WRITING THE CONSTRUCTION BULLETIN ..... 2  
13 3.2. EXECUTING THE CONSTRUCTION BULLETIN..... 2  
14

**PART 1 – GENERAL**

**1.1. SUMMARY**

- 18 A. Construction Bulletins (CB) are formal published construction documents that modify the original contract bid  
19 documents after construction has commenced. CBs may be published for many reasons, including but not  
20 limited to the following:  
21 1. Clarification of existing construction documents including specifications, plans, and details  
22 2. Change in product or equipment  
23 3. A response to a Request for Information  
24 4. Change in scope of the contract as either an add or a deduct of work  
25 B. CBs provide a higher degree of detail in response to a Request for Information (RFI) through directives, revised  
26 plans/details, and specifications as necessary.  
27 C. The CB may change the original contract documents through additions or deletions to the Work.  
28 D. Where the directives of a CB are significant enough to warrant a Change Order Request (COR) the GC shall use all  
29 information provided in the CB to assemble all required back-up documentation for additions and deletions of  
30 materials, labor and other related contract costs for the COR.  
31 E. All CB documentation will be processed through the Construction Administration-Construction Bulletin Library  
32 on the Project Management Web Site (PMWS).  
33

**1.2. RELATED SPECIFICATIONS**

- 34 A. Section 01 26 13 Request for Information (RFI)  
35 B. Section 01 26 57 Change Order Request (COR)  
36 C. Section 01 26 63 Change Order (CO)  
37 D. Section 01 31 23 Project Management Web Site  
38  
39

**1.3. PERFORMANCE REQUIREMENTS**

- 40 A. Project Architect (PA): The PA shall be the only person authorized to publish a CB as needed for any reason  
41 indicated in section 1.1.A above. The PA shall consult as necessary with any of the following while drafting the  
42 CB and shall confirm final direction with the CPM prior to issuing a CB:  
43 1. City Project manager (CPM)  
44 2. Owner  
45 3. Members of the consulting staff  
46 4. Members of city staff  
47 5. The General Contractor  
48 6. Sub-contractors  
49 B. General Contractor: The GC shall be responsible for the following as needed:  
50 1. Executing the directives of the CB when he/she believes that no changes in labor, materials, equipment,  
51 or contract duration will be required for additions or deletions.  
52 2. Submit a COR when he/she believes that a change in labor, materials, equipment or contract duration  
53 will be required for additions or deletions.  
54  
55

**1.4. QUALITY ASSURANCE**

- 56 A. The PA shall be responsible for ensuring the final CB sufficiently provides direction, details, specifications and  
57 other information as necessary for the GC to perform the intended Work.  
58

- 1           B.     The PA shall be responsible for ensuring the final CB is published as expeditiously as practical based on the  
2                     complexity of the CB being written. CBs that may affect the GC critical path shall be given priority.  
3

4     **PART 2 – PRODUCTS**

5  
6     **2.1. CONSTRUCTION BULLETIN FORM**

- 7           A.     The CB form is located on the Project Management Web Site. The PA shall click the link in the left margin of the  
8                     project web site opening a new form. Project information is pre-loaded, the PA only needs to enter information  
9                     and make attachments as needed to complete the form.  
10

11     **PART 3 - EXECUTION**

12  
13     **3.1. WRITING THE CONSTRUCTION BULLETIN**

- 14           A.     The PA shall draft a CB as needed using the Construction Bulletin form on the Project Management Web Site.  
15                     1.     The PA and/or consulting staff as necessary shall provide specifications, model numbers and performance  
16                     data, details and other such information necessary to clearly state the intentions of the CB.  
17                     2.     The consulting staff, CPM, Owner, and other City Staff shall review the draft and recommend changes as  
18                     needed.  
19                     3.     The PA shall amend the draft as necessary into a final CB for review  
20           B.     Once the final CB has been approved the PA shall “Submit” the CB through the Project Management Web Site to  
21                     the GC.  
22

23     **3.2. EXECUTING THE CONSTRUCTION BULLETIN**

- 24           A.     The GC shall acknowledge receipt of the CB on the Project Management Web Site as instructed in the Tutorial  
25                     Manual provided to the awarded contractor.  
26           B.     The GC shall notify all Sub-contractors of the CB and publish the CB to all field sets of drawings and specifications  
27                     as appropriate.  
28           C.     The GC shall execute the directives of the CB or submit COR documentation as necessary during the execution  
29                     and implementation of the CB.  
30                     1.     See Specification 01 26 57 Change Order Request (COR)  
31  
32  
33  
34

**END OF SECTION**

**SECTION 01 26 57  
CHANGE ORDER REQUESTS (COR)**

1  
2  
3  
4 PART 1 – GENERAL ..... 1  
5 1.1. SUMMARY ..... 1  
6 1.2. RELATED SPECIFICATION SECTIONS ..... 2  
7 1.3. DEFINITIONS AND STANDARDS ..... 2  
8 1.4. CONTRACT EXTENSION ..... 3  
9 1.5. OVERHEAD AND PROFIT MARKUP ..... 3  
10 1.6. PERFORMANCE REQUIREMENTS ..... 3  
11 1.7. QUALITY ASSURANCE ..... 4  
12 PART 2 – PRODUCTS ..... 4  
13 2.1. CHANGE ORDER REQUEST FORM ..... 4  
14 PART 3 - EXECUTION ..... 4  
15 3.1. ESTABLISHING A CHANGE ORDER REQUEST ..... 4  
16 3.2. SUBMIT A CHANGE ORDER REQUEST FORM ..... 4  
17 3.3. CHANGE ORDER REQUEST REVIEW, APPROVAL, AND PROCESSING ..... 5  
18 3.4. EMERGENCY CHANGE ORDER REQUEST ..... 5

19  
20 **PART 1 – GENERAL**

21  
22 **1.1. SUMMARY**

- 23 A. Except in cases of emergency, no changes in the Work required by the Contract Documents may be made  
24 by the General Contractor (GC) without having prior approval of the City Engineer or his representative.  
25 B. The City may at any time, without invalidating the Contract and without Notice to Sureties, order changes in  
26 the Work by written Change Order (CO). Such changes may include additions and/or deletions.  
27 C. Where the City desires to make changes in the Work through use of written Change Order Request (COR), the  
28 following procedures apply:  
29 1. If requested by the City, the GC shall prepare and submit a detailed proposal, including all cost and time  
30 adjustments to which the GC believes it will be entitled if the change proposed is incorporated into the  
31 Contract. The City shall be under no legal obligation to issue a Change Order for such proposal.  
32 2. The parties shall attempt in good faith to reach agreement on the adjustments needed to the Contract to  
33 properly incorporate the proposed change(s) into the Work. In the event that the parties agree on such  
34 adjustments, the City may issue a Change Order and incorporate such changes and agreed to  
35 adjustments, if any.  
36 3. In some instances, it may be necessary for the City to authorize Work or direct changes in Work for which  
37 no final and binding agreement has been reached and for which unit prices are not applicable. In such  
38 cases the following shall apply.  
39 a. Upon written request by the City, the GC shall perform proposed Work  
40 b. The cost of such change may be determined in accordance with this specification.  
41 c. In the event agreement cannot be accomplished as contemplated herein, the City may authorize  
42 the Work to be performed by City forces or to hire others to complete the Work. Such action on  
43 the part of the City shall not be the basis of a claim by the GC for failure to allow it to perform the  
44 changed Work.  
45 D. Where changes in the Work are made by the City through use of a force account basis, the GC shall as soon as  
46 practicable, and in no case later than ten (10) working days from the receipt of such order, unless another time  
47 period has been agreed to by both parties, give the City written Notice, stating:  
48 1. The date, circumstances and source of the extra work; and,  
49 2. The cost of performing extra work described by such Order, if any; and,  
50 3. Effect of the order on the required completion date of the Project, if any.  
51 E. The giving of each Notice by the GC as prescribed by this specification, shall be a requirement to liability of the  
52 City for payment of any additional costs incurred by the GC in implementing changes in the Work. Under this  
53 specification, no order or statement of the City shall be treated as a Change Order, or shall entitle the GC to an  
54 equitable adjustment of the terms of this Contract or damages for costs incurred by the GC on any activity for  
55 which the Notice was not given.  
56 F. In the event Work is required due to an emergency as described in this specification the GC must request an  
57 equitable adjustment as soon as practicable, and in no case later than ten (10) working days of the  
58 commencement of such emergency.

- 1 G. All GC requests for equitable adjustment shall be submitted to the CPM per the specifications below. Such  
2 requests shall set forth with specificity the amount of and reason(s) for the proposed adjustment and shall be  
3 accompanied by supporting information and documents.  
4 H. No adjustment of any kind shall be made to this Contract, if asserted by the GC for the first time, after the date  
5 of final payment.  
6 I. This specification shall be used by the GC when preparing documentation for any COR to ensure each has been  
7 properly and completely filled out as required by the City of Madison.  
8 J. All COR documentation will be processed through the Construction Administration-Change Order Request  
9 Library on the Project Management Web Site (PMWS).

10  
11 **1.2. RELATED SPECIFICATION SECTIONS**

- 12 A. Section 01 26 13 Request for Information (RFI)  
13 B. Section 01 26 46 Construction Bulletins (CB)  
14 C. Section 01 26 63 Change Order (CO)  
15 D. Section 01 31 23 Project Management Web Site  
16 E. Parts of this specification will reference articles within "The City of Madison Standard Specifications for Public  
17 Works Construction".  
18 1. Use the following link to access the Standard Specifications web page:  
19 <http://www.cityofmadison.com/business/pw/specs.cfm>  
20 a. Click on the "Part" chapter identified in the specification text. For example if the specification  
21 says "Refer to City of Madison Standard Specification 210.2" click the link for Part II, the Part II  
22 PDF will open.  
23 b. Scroll through the index of Part II for specification 210.2 and click the text link which will take you  
24 to the referenced text.  
25

26 **1.3. DEFINITIONS AND STANDARDS**

- 27 A. LABOR: The amount of time and cost associated with the performance of human effort for a defined scope of  
28 Work. Labor is further defined as follows:  
29 1. Labor rate is the total hourly rate which includes the basic rate of pay, fringe benefits plus each  
30 company's cost of required insurance, also referred to as a reimbursable labor rate.  
31 2. Unit labor is the labor hours anticipated to install the corresponding unit of material.  
32 3. Labor cost is the labor hours multiplied by the hourly labor rates.  
33 B. MATERIAL: Actual material cost is the amount paid, or to be paid, by the GC for materials, supplies and  
34 equipment entering permanently into the Work, including cost of transportation and applicable taxes. The cost  
35 shall not exceed the usual and customary cost for such items available in the geographical area of the project  
36 C. LARGE TOOLS AND MAJOR EQUIPMENT: Large tools and major equipment are those with an initial cost greater  
37 than \$1,500, whether from the GC or other sources.  
38 1. Tool and equipment use and time allowed is only for extra work associated with change orders.  
39 a. Rental Rate is the machine cost associated with operating a piece of equipment for a defined  
40 length of time (hour, day, week, or month) and shall not exceed the usual and customary amount  
41 for such items available in the geographical area of the project.  
42 b. Rental cost is the rental rate multiplied by the anticipated duration the equipment shall be  
43 required.  
44 2. The GC shall provide a breakdown of all rental rates to indicate what items and costs are associated with  
45 the rate. Examples of items to include in the breakdown would be fuel consumption, lubrication,  
46 maintenance and other similar expenses but not including profit and overhead.  
47 3. When large tools and equipment needed for Change Order work are not already at the job site, the  
48 actual cost to get the item there is also reimbursable.  
49 D. BOND COST: The cost shall be calculated at 1% of the total proposed change order.  
50 E. SUB-CONTRACTOR COSTS: Sub-contractor costs are for those labor, material, and equipment costs required by  
51 subcontracted specialties to complete the Change Order work including allowable markups as outlined within  
52 this specification.  
53 F. OVERHEAD AND PROFIT Markup: The allowable markup percentage to a COR by the GC and Sub-contractors for  
54 overhead and profit. All of the following are expenses associated with overhead and profit and shall not be  
55 reimbursable as individual items on any COR:  
56 1. CHANGE ORDER PREPARATION: All costs associated with the preparing and processing of the change  
57 order.



- 1                    2.    DESIGN, ESTIMATING, AND SUPERVISION: All such efforts, unless specifically requested by Owner as
- 2                    additional Work to be documented as a COR or portion thereof.
- 3                    3.    INSTALLATION LAYOUT: The layout required for the installation of material and equipment, and the
- 4                    installation design, is the responsibility of the GC.
- 5                    4.    SMALL TOOLS AND SUPPLIES: The cost of small hand tools with an initial cost of \$1,500 or less, along
- 6                    with consumable supplies and expendable items such as drill bits, saw blades, gasoline, lubricating or
- 7                    cutting oil, and similar items.
- 8                    5.    GENERAL EXPENSE: The general expense, which is those items that are a specific job cost not associated
- 9                    with direct labor and material such as job trailers, foreman truck, and similar items.
- 10                  6.    RECORD DRAWINGS: The preparation of record or as-built drawings.
- 11                  7.    OTHER COSTS: Any miscellaneous cost not directly assessable to the execution of the Change Order
- 12                  including but not limited to the following:
- 13                  a.    All association dues, assessments, and similar items.
- 14                  b.    All education, training, and similar items.
- 15                  c.    All drafting and/or engineering, unless specifically requested by Owner as additional Work to be
- 16                  documented as a Change Order proposal or portion thereof.
- 17                  d.    All other items including but not limited to review, coordination, estimating and expediting, field
- 18                  and office supervision, administrative work, etc.
- 19                  G.    Contract Extension: The necessary amount of time to be added to the contract deadlines for the completion of a
- 20                  change order.

21  
22    **1.4. CONTRACT EXTENSION**

- 23    A.    The GC shall not assume that every COR will require a Contract Extension. If the GC feels a contract extension is
- 24    warranted he/she shall provide sufficient scheduling information that shows how the COR being requested
- 25    impacts the critical path of the project.
- 26    B.    The City of Madison strongly encourages the GC to explore alternative methods and practices prior to submitting
- 27    a COR with a request for contract extension.

28  
29    **1.5. OVERHEAD AND PROFIT MARKUP**

- 30    A.    Pursuant to the City of Madison Standard Specifications for Public Works Construction, Section 104.7, Extra
- 31    Work, the following maximum allowable markups shall be strictly enforced on all change orders associated with
- 32    the execution of this contract.
- 33        1.    The total maximum overhead and profit shall not exceed fifteen percent (15%) of the total costs.
- 34        2.    The total maximum overhead and profit shall be distributed as follows:
- 35            a.    For work performed and materials provided solely by the General Contractor, fifteen percent
- 36            (15%) of the total costs.
- 37            b.    For work performed and materials provided solely by Sub-contractors and supervised by the
- 38            General Contractor:
- 39                i.    Supervision of the GC, five percent (5%) of the total Sub-contractor cost.
- 40                ii.   Sub-contractors work and materials ten percent (10%) of the total Sub-contractor cost.

41  
42    **1.6. PERFORMANCE REQUIREMENTS**

- 43    A.    The GC shall become thoroughly familiar with this specification as it will identify procedures and expenses that
- 44    are or are not allowed under the Change Order and Change Order Request process.
- 45    B.    The GC shall be responsible for all of the following:
- 46        1.    Carefully reviewing the CB that is associated with the COR.
- 47        2.    Collecting required supporting documentation from all contractors that quantify the need for a COR.
- 48            a.    Labor hours and wage rates
- 49            b.    Material costs
- 50            c.    Equipment costs
- 51    C.    The following shall apply to establishing prices for labor, materials, and equipment costs:
- 52        1.    Where Work to be completed has previously been established by individual bid items in the contract bid
- 53        proposal the GC shall use the unit bid prices previously established.
- 54        2.    Where Work to be completed was bid as a Lump Sum without individual bid items the GC shall provide a
- 55        breakdown of all labor, materials, equipment including unit rates and quantities required.
- 56    D.    The completion date is determined by Owner. The schedule, however, is the responsibility of the GC. Time
- 57    extensions for extra Work will be considered when a schedule analysis of the critical path shows that the Change
- 58    Order Request places the Work beyond the completion date stated in the Contract.

1  
2 **1.7. QUALITY ASSURANCE**

- 3 A. The GC shall be responsible for ensuring that all COR supporting documentation meets the following  
4 requirements prior to completing the COR form on the Project Management Web Site:  
5 1. Sufficiently indicates labor, material, and other expenses related to completing the intent of the CB.  
6 2. No costs exceed the usual and customary amount for such items available in the geographical area of the  
7 project, and no costs exceed those established under the contract.  
8 B. The Project Architect (PA), City Project Manager (CPM), other members of the consulting staff, and city staff shall  
9 review all COR requests to ensure that the intent of the CB will be met under the proposal of the COR or request  
10 additional information as necessary.  
11

12 **PART 2 – PRODUCTS**

13  
14 **2.1. CHANGE ORDER REQUEST FORM**

- 15 A. The COR form is located on the Project Management Web Site. The GC shall click the link in the left margin of  
16 the project web site opening a new form. Follow additional instructions below in the execution section for filling  
17 out the form.  
18

19 **PART 3 - EXECUTION**

20  
21 **3.1. ESTABLISHING A CHANGE ORDER REQUEST**

- 22 A. Upon receipt of a Construction Bulletin (CB) where the GC believes a significant change in contract scope  
23 warrants the submittal of a COR the GC shall do all of the following within ten (10) working days after receipt of  
24 the CB:  
25 1. Review the CB with all necessary trades and sub-contractors required by the change in scope.  
26 a. Additions or deletions to the contract scope shall be as directed within the CB.  
27 b. Additions or deletions of labor and materials shall be determined by the GC based on the  
28 directives of the CB.  
29 2. Assemble all required back-up documentation for additions and deletions of materials, labor and other  
30 related contract costs as previously outlined in this specification.  
31 3. Submit a COR request form on the Project Management Web Site.  
32 B. Submitting a COR does not obligate the GC to complete the work associated with the COR nor does it obligate  
33 the Owner to approve the COR as a change to the contract.  
34

35 **3.2. SUBMIT A CHANGE ORDER REQUEST FORM**

- 36 A. This specification shall provide a subject overview only. In depth instructions shall be provided to the awarded  
37 Contractor in a PDF Instructional Manual.  
38 B. The GC shall select the "Submit a COR" link on the Project Management Web Site.  
39 C. The software will open a new COR form and the GC shall provide all of the following information:  
40 1. DO NOT perform any calculations on this worksheet, only provide the raw data as requested below. All  
41 calculations, totals, and markups shall be computed as described within this specification.  
42 2. Provide a summary description of the COR request, and justification for any requested time extension to  
43 the contract, indicate the number of calendar days being requested for the extension and add any  
44 attachments to the form as needed.  
45 3. Provide all GC self performance data including all of the following:  
46 a. Materials description, quantities, and unit costs.  
47 b. Labor hours and rates for all Foremen, Journeymen, and Apprentices by trade.  
48 c. Equipment descriptions, quantities, unit costs and rates.  
49 4. Provide all Sub-contractor data including all of the following:  
50 a. Materials description, quantities, and unit costs.  
51 b. Labor hours and rates for all Foremen, Journeymen, and Apprentices by trade.  
52 c. Equipment descriptions, quantities, unit costs and rates.  
53 5. Ensure all calculations performed by the form have been completed correctly. Contact the CPM directly  
54 if you suspect an error before hitting the save button.  
55 C. At any time after creating a COR you must at a minimum click "Save as Draft" to save your work.  
56 D. When all data has been entered and verified click on the "Submit COR" button. This will kick off the COR Review  
57 and Approval process.  
58

1 **3.3. CHANGE ORDER REQUEST REVIEW, APPROVAL, AND PROCESSING**

- 2 A. The PA and CPM shall review all CORs submitted by the GC.  
3 1. Additional consulting staff and city staff having knowledge of the components of the COR shall review  
4 and advise the PA and CPM as to the accuracy of the items, quantities, and associated costs of the COR as  
5 directed by the CB.  
6 2. The CPM shall review the COR with the Owner.  
7 B. If required the PA and CPM, shall in good faith, further negotiate the COR with the GC as necessary. All  
8 amendments to any COR shall be documented within the Project Management Web Site software.  
9 C. After final review of the COR the CPM and Owner may accept the COR.  
10 D. The CPM shall prepare the COR in the form of an official Board of Public Works Change Order for final review and  
11 approval as outlined in Section 01 26 63 Change Order (CO).  
12 E. The GC shall not act upon any accepted COR until it has received final approval through the Public Works process  
13 as an official CO to the Work unless instructed to do so by the CPM. Proceeding without the final approval of a  
14 fully authorized Change Order is at the GC's own risk.  
15

16 **3.4. EMERGENCY CHANGE ORDER REQUEST**

- 17 A. In the event Work is required due to an emergency as described in the Contract Documents, the GC must  
18 request an equitable adjustment as soon as practicable, and in no case later than ten (10) working days of the  
19 commencement of such emergency.  
20 B. The GC shall provide full documentation of all labor, materials and equipment used during the period of  
21 emergency as part of the COR submittal.  
22  
23  
24  
25

**END OF SECTION**

**SECTION 01 26 63  
CHANGE ORDER (CO)**

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6 1.2. RELATED SPECIFICATION SECTIONS ..... 1  
7 1.3. BOARD OF PUBLIC WORKS PROCEDURE ..... 1  
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9 2.1. CHANGE ORDER FORM..... 2  
10 PART 3 - EXECUTION ..... 2  
11 3.1. PREPARATION OF THE CHANGE ORDER ..... 2  
12 3.2. EXECUTION OF THE CHANGE ORDER ..... 2  
13

**PART 1 – GENERAL**

**1.1. SUMMARY**

- 17 A. Except in cases of emergency, no changes in the Work required by the Contract Documents may be made  
18 by the General Contractor (GC) without having prior approval of the City Project Manager (CPM).  
19 B. The City may at any time, without invalidating the Contract and without Notice to Sureties, order changes in  
20 the Work by written Change Order. Such changes may include additions and/or deletions.  
21 C. The Change Order (CO) is a Board of Public Works (BPW) form that is reviewed and approved by a specific  
22 process.  
23 D. The CO form is typically made up of multiple Change Order Requests (CORs) and/or Bid Items as appropriate  
24 depending on the type of project and how the contract was bid.  
25 E. All CO documentation shall be processed through the Construction Administration-Change Order Library and  
26 digital workflow on the Project Management Web Site (PMWS).  
27

**1.2. RELATED SPECIFICATION SECTIONS**

- 28  
29 A. Section 01 26 13 Request for Information (RFI)  
30 B. Section 01 26 46 Construction Bulletin (CB)  
31 C. Section 01 26 63 Change Order Request (COR)  
32 D. Section 01 31 23 Project Management Web Site  
33

**1.3. BOARD OF PUBLIC WORKS PROCEDURE**

- 34  
35 A. The Board of Public Works has a very explicit procedure for the review and approval of all change orders  
36 associated with any Public Works Contract as follows:  
37 1. The Supervisory Chain of the CPM shall review and approve any CO under \$10,000 provided it does not  
38 include either of the following:  
39 a. The CO does not request a time extension to the contract.  
40 b. The CO does not cause the contract contingency sum to be exceeded.  
41 2. The Board of Public Works shall review and approve any CO that requires any of the following:  
42 a. Any CO over \$10,000.  
43 b. Any CO requesting a time extension to the contract regardless of the monetary value of the CO.  
44 c. Any CO that that causes the contract contingency sum to be exceeded.  
45 B. The Board of Public Works generally meets every other week and only once in August and December. The GC is  
46 cautioned that, under normal scheduling, a CO requiring a BPW review will take a minimum of two (2) weeks to  
47 achieve final approval.  
48 1. The City shall not be responsible for additional delays to the Work caused by the scheduling constraints  
49 of the Board of Public Works.  
50 C. **SPECIAL NOTE:** The GC is cautioned to never proceed unless told to do so by the CPM. Only in rare instances  
51 may the CPM give a written notice to proceed on a COR without an approved CO. Proceeding without the  
52 written notice of the CPM or an approved CO is at the GC's own risk.  
53

1 **PART 2 – PRODUCTS**  
2

3 **2.1. CHANGE ORDER FORM**

- 4 A. The CO form is located on the Project Management Web Site. The CPM shall click the link in the left margin of  
5 the project web site opening a new form. Project information is pre-loaded, the CPM only needs to enter  
6 information and make attachments as needed to complete the form.  
7

8 **PART 3 - EXECUTION**  
9

10 **3.1. PREPARATION OF THE CHANGE ORDER**

- 11 A. The CPM shall prepare the required CO forms in the Construction Administration-Change Order Library on the  
12 Project Management Web Site as follows:  
13 1. Provide information for all contract information.  
14 2. Provide a general description of the items described within the change order.  
15 3. Provide detailed information for each Item on the CO form. At the option of the CPM he/she may include  
16 multiple Change Order Requests each as their own item.  
17 4. Provide required pricing and accounting information as needed for the item.  
18 5. Insert attachments of contractor/architect provided information that clarifies and quantifies the CO.  
19 Attachments may include but not be limited to material lists, estimated labor, revised details or  
20 specifications, and other documents that may be related to the requested change.  
21 6. Save the final version of the completed CO.  
22

23 **3.2. EXECUTION OF THE CHANGE ORDER**

- 24 A. Upon saving the CO as described in section 3.1 above the software associated with the Project Management  
25 Web Site shall notify the GC that the CO has been drafted and is ready for review. The GC shall do the following:  
26 1. Open the appropriate CO form in the Construction Administration-Change Order Library and review all  
27 items on the form.  
28 2. The GC shall notify the CPM immediately of any errors or discrepancies on the form and shall not sign or  
29 save it.  
30 a. The CPM shall make any corrections as needed, re-save the form, and notify the GC.  
31 3. If/when the GC concurs with the CO form as drafted the GC shall digitally sign the form and click SAVE.  
32 B. After the GC digitally signs/saves the CO it shall be routed through the Project Management Web Site for  
33 additional review and/or approvals. The CPM shall do the following:  
34 1. Monitor the review process to ensure the software is working properly at each review step.  
35 2. Ensure that proper BPW procedures are executed as needed by the CO approval process.  
36 a. Schedule the CO on the next available BPW agenda if required.  
37 i. Attend the BPW meeting to speak on the CO to board members and answer questions.  
38 ii. The GC and/or PA may be required to attend the BPW meeting to address specific  
39 information as it relates to the Work and/or materials associated with the CO.  
40 3. Monitor final approval and distribution of the CO.  
41 4. Notify the GC that the CO has been completed.  
42 5. Ensure that the CO is posted to the next Public Works payment schedule.  
43 6. Verify that the GC's next Progress Payment-Schedule of Values show the CO as part of the contract sum.  
44 C. Upon final approval of the CO the GC may proceed with executing the Work associated with the CO.  
45  
46  
47  
48

**END OF SECTION**

**SECTION 01 29 73  
SCHEDULE OF VALUES**

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7 1.3. RELATED DOCUMENTS ..... 1  
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9 PART 2 – PRODUCTS – THIS SECTION NOT USED ..... 2  
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12 3.2. AIA DOCUMENT G703 – CONTINUATION SHEET ..... 2  
13 3.3. INITIAL SCHEDULE OF VALUES SUBMITTAL ..... 3  
14 3.4. SOV FOR PROGRESS PAYMENT REQUESTS ..... 3  
15

16 **PART 1 – GENERAL**

17  
18 **1.1. SUMMARY**

- 19 A. The Schedule of Values (SOV) is a Contractor provided statement that allocates portions of the total contract  
20 sum to various portions of the contracted work and shall be the basis for reviewing the Contractors Progress  
21 Payment Requests.  
22 B. AIA Document G702 – Application and Certificate for Payment and AIA Document G703 Continuation Sheet shall  
23 be filled out in sufficient detail to be used as a guideline in determining work completed and materials stored on  
24 site when verifying Progress Payment Requests.  
25 C. The General Contractor shall be responsible for filling out, updating, and providing these work sheets with each  
26 Progress Payment Request.  
27

28 **1.2. RELATED SPECIFICATIONS**

- 29 A. Section 01 26 63 Change Order (CO)  
30 B. Section 01 29 76 Progress Payment Procedures  
31 C. Section 01 31 23 Project Management Web Site  
32 D. Section 01 32 26 Construction Progress Reporting  
33 E. Section 01 33 23 Submittals  
34 F. Parts of this specification will reference articles within “The City of Madison Standard Specifications for Public  
35 Works Construction”.  
36 1. Use the following link to access the Standard Specifications web page:  
37 <http://www.cityofmadison.com/business/pw/specs.cfm>  
38 a. Click on the “Part” chapter identified in the specification text. For example if the specification  
39 says “Refer to City of Madison Standard Specification 210.2” click the link for Part II, the Part II  
40 PDF will open.  
41 b. Scroll through the index of Part II for specification 210.2 and click the text link which will take you  
42 to the referenced text.  
43

44 **1.3. RELATED DOCUMENTS**

- 45 A. The following documents shall be used as the basis for initiating and maintaining the SOV worksheets throughout  
46 the execution of this contract.  
47 1. Drawing documents and specifications (including general provisions) as provided with the bid set  
48 documents and any published addendums.  
49 2. Documents associated with revisions or clarifications to number 1 above after awarding of the contract,  
50 including but not limited to:  
51 a. Construction Bulletins  
52 b. Request for Information  
53 c. Approved Change Orders  
54 3. The latest daily/weekly Construction Progress Report  
55 4. Other specifications as identified in Section 1.2 above

1  
2 **1.4. BASIS OF VALUES**

- 3 A. The Contractor shall provide a breakdown of the Contract Sum in sufficient detail to assist the Architect and City  
4 Project Manager in evaluating Progress Payment Requests. The breakdown detail may require a labor and  
5 material breakdown for each division of work or trade or as directed by the CPM.  
6 B. The total sum of all items shall equal the Contract Sum.  
7

8 **PART 2 – PRODUCTS – THIS SECTION NOT USED**

9  
10 **PART 3 - EXECUTION**

11  
12 **3.1. AIA DOCUMENT G702 – APPLICATION AND CERTIFICATE FOR PAYMENT**

- 13 A. The Contractor shall use AIA Document G-702 Application and Certificate for Payment with each Progress  
14 Payment Request.  
15 B. Completely fill out the Project Information section as follows:  
16 1. TO OWNER; provide all owner related information as provided in the contract documents.  
17 2. PROJECT; provide all contract information including contract number, title and address.  
18 3. FROM CONTRACTOR; provide all contractor related information.  
19 4. VIA ARCHITECT; provide all the architect's related information including the architect's project reference  
20 number if different from the owners.  
21 5. Indicate the current APPLICATION NO., PERIOD TO date, and CONTRACT DATE.  
22 C. Completely fill out the Contractors Application for Payment section.  
23 1. Fill out lines 1 through 9 to reflect the current status of the contract through the payment date being  
24 requested.  
25 2. The City of Madison calculates retainage on Public Works Contracts as follows:  
26 a. In general, across the duration of the contract, 2.5% of the total contract sum, including change  
27 orders, is withheld for retainage as referenced from the City of Madison Standard Specification  
28 110.2:  
29 i. Beginning with Progress Payment 1, 5% retainage will be withheld until such time that 50%  
30 of the total contract sum has been paid out.  
31 ii. No additional retainage will be withheld after 50% of the total contract sum has been paid,  
32 unless additional change orders have been approved after the 50% milestone has been  
33 reached. Per City of Madison Standard Specification 110.2, additional retainage up to 10%,  
34 may be held in the event there are holds placed by Affirmative Action or liquidated  
35 damages by BPW.  
36 iii. Retainage for additional change orders after the 50% milestone will be withheld at the rate  
37 of 2.5% of the total cost of the change order.  
38 iv. Retainage is based on the change orders posted to the City's contract worksheet at the  
39 time the progress payment is processed.  
40 D. Completely fill out the Change Order Summary section. Only change orders that have been finalized and posted  
41 to the City of Madison's Application for Partial Payment worksheet may be itemized into the SOV documents.  
42 E. The Contractor shall sign and date the application and it shall be properly notarized.  
43 F. The Contractor shall not fill in any information in the Architects Certificate for Payment section.  
44

45 **3.2. AIA DOCUMENT G703 – CONTINUATION SHEET**

- 46 A. The Contractor shall use AIA Document G-703 Continuation Sheet to itemize his/her SOV for this contract.  
47 Provide additional sheets as necessary.  
48 B. Provide information in Column A (Item No.), Column B (Description of Work), and Column C (Scheduled Value) by  
49 any method that allocates portions of the total contract sum to various portions of the contracted work.  
50 Possible methods include combinations of the following:  
51 1. By division of work  
52 2. By contractor, sub-contractor, sub sub-contractor  
53 3. By specialty item or group  
54 4. Other methods of breakdown as may be requested by the City Project Manager or City Construction  
55 Manager at the pre-construction meeting.  
56 C. Provide total cost of the item/description of work including proportionate shares of profit and overhead related  
57 to the item.  
58

1 **3.3. INITIAL SCHEDULE OF VALUES SUBMITTAL**

- 2 A. The Contractor shall upload his/her initial SOV to the Project Management Web Site, Submittals Library, no later  
3 than five (5) working days after the Pre-construction Meeting.  
4 1. The initial SOV shall provide information in Column A (Item No.), Column B (Description of Work), and  
5 Column C (Scheduled Value) only.  
6 2. The level of detail shall be as described in section 3.2 above.  
7 B. The Project Architect (PA) and the City Project Manager (CPM) shall review the SOV as any other submittal and  
8 may require modifications to reflect additional detail as necessary.  
9 C. The Contractor shall resubmit the SOV as necessary until such time as the PPA and CPM have sufficient detail for  
10 assessing and approving future Progress Payment Applications.  
11 D. Progress Payment Application 1 will not be processed until such time as the Contractor has met this requirement  
12 regardless of the amount of work completed per the application.  
13

14 **3.4. SOV FOR PROGRESS PAYMENT REQUESTS**

- 15 A. The Contractor shall update the initial SOV with each Progress Payment Application as follows:  
16 1. Initial items and values as part of Section 3.3 above will not be adjusted once the original Schedule of  
17 Values submittal has been approved.  
18 2. Change orders shall be added as additional items and values at the bottom of the SOV as they become  
19 approved and posted to the City's contract worksheet. The value for each change order shall be the  
20 value indicated on the SOV and shall stand alone. Values shall not be split out or combined with other  
21 existing items with similar work descriptions on the original SOV.  
22 3. Fill out Columns D, E, F and G to properly reflect the work completed and materials received since the last  
23 Progress Payment Application.  
24 4. Only materials delivered and stored on the project site may be reflected on SOV progress updates.  
25 B. Provide updated G702 and G703 sheets with each Progress Payment application.  
26 C. See Specification 01 29 76 Progress Payment Procedures for additional information on submitting Progress  
27 Payment Applications.  
28  
29  
30  
31

**END OF SECTION**



**SECTION 01 29 76**  
**PROGRESS PAYMENT PROCEDURES**

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13 3.2. PROJECT ARCHITECT PROCEDURE ..... 5  
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15

**PART 1 – GENERAL**

**1.1. SUMMARY**

- 19 A. The General Contractor (GC) shall review this and all related specifications prior to submitting progress payment  
20 requests.  
21 B. Progress payment requests (Partial Payment-PP) for this contract shall be uploaded digitally by the GC to the  
22 Project Management Web Site  
23 C. The Project Architect (PA) and City Project Manager (CPM) shall review and amend or approve the PP on the  
24 Project Management Web Site.  
25 D. After approval of the PP by the CPM, he/she shall forward the PP to the appropriate agencies for BPW  
26 contractual review and payment processing.  
27

**1.2. RELATED SPECIFICATIONS**

- 29 A. Section 01 26 63 Change Order (CO)  
30 B. Section 01 29 73 Schedule of Values  
31 C. Section 01 31 19 Progress Meetings  
32 D. Section 01 31 23 Project Management Web Site  
33 E. Section 01 32 16 Construction Progress Schedules  
34 F. Section 01 32 26 Construction Progress Reporting  
35 G. Section 01 33 23 Submittals  
36 H. Section 01 45 16 Field Quality Control Procedures  
37 I. Section 01 77 00 Closeout Procedures  
38 J. Section 01 78 13 Completion and Correction List  
39 K. Section 01 78 23 Operation and Maintenance Data  
40 L. Section 01 78 36 Warranties  
41 M. Section 01 78 39 As-Built Drawings  
42 N. Section 01 78 43 Spare Parts and Extra Materials  
43 O. Section 01 79 00 Demonstration and Training  
44

**1.3. RELATED DOCUMENTS**

- 46 A. The following documents shall be used when evaluating PP requests.  
47 1. Daily and weekly construction progress reports filed since the last payment request.  
48 2. Contractors Schedule of Values as updated from the last payment request. See Specification 01 29 73.  
49 3. Any document that may be required to be submitted for review and approval, as noted by the  
50 specifications listed in Section 1.2 above, or the Progress Payment Milestone Schedule in Section 1.4  
51 below, to achieve a required bench mark of contract progression or contract requirement.  
52

**1.4. PROGRESS PAYMENT MILESTONES**

- 54 A. City Engineering-Facility Management has developed the Project Payment Milestone Schedule (Section 1.4  
55 below) to assist the GC in providing required construction specific documentation and general contractual  
56 documentation in a timely manner.  
57 B. The Progress Payment Milestone Schedule is not an all inclusive list. Multiple agencies review progress payment  
58 requests and contract closeout requests. Missing, incomplete, or incorrect documentation for any agency may

- 1 be a cause for not processing progress payments. It shall be the sole responsibility of the Contractor for  
 2 providing documentation as required or requested to the appropriate agencies.  
 3 C. The milestone schedule is based on the contract total sum and shall be valid for most contracts. Milestone  
 4 submittals will be required with whatever progress payment hits the percentage of contract total indicated in  
 5 the schedule.  
 6 D. The CPM shall review the milestone schedule with each progress payment request and at his/her option may  
 7 elect to hold processing the progress payment until such time as the contractor has met the requirements for  
 8 providing construction specific documentation.  
 9 E. It shall be the General Contractors responsibility to comply with all BPW Contract Administration requirements  
 10 and related deadlines as outlined in the Award Letter, Award Checklist, and Start Work Letter.  
 11

<b>Progress Payment (PP) Milestone Schedule</b>		
<b>Milestone Description</b>	<b>Due Before</b>	<b>Remarks</b>
BPW Contract Administration Documentation <ul style="list-style-type: none"> <li>• Workforce profiles</li> <li>• Best Value Contracting Documentation</li> <li>• Sub-contractors prequalification approval &amp; Affirmative Action plans</li> <li>• Other as may be required</li> </ul>	PP-1, or start work as applicable	<ul style="list-style-type: none"> <li>• For GC and Sub-contractors before PP-1 regardless of scheduling</li> <li>• Sub-contractors (if applicable), due 10 days before they may start work</li> <li>• Sub-contractors (if applicable), due 10 days before they may start work</li> </ul>
Required Construction Submittals/Administrative Documents <ul style="list-style-type: none"> <li>• Contractors Project Directory</li> <li>• Schedule of Values</li> <li>• Submittals Schedule</li> <li>• Waste Management Plan</li> <li>• Closeout Requirement Checklist</li> <li>• Warranty Checklist</li> </ul>	PP-1	References <ul style="list-style-type: none"> <li>• Specification 01 31 23</li> <li>• Specification 01 29 73</li> <li>• Specification 01 32 19</li> <li>• Specification 01 74 19</li> <li>• Specification 01 77 00</li> <li>• Specification 01 78 36</li> </ul>
Construction Progress Milestones <ul style="list-style-type: none"> <li>• Early submittals, per submittal schedule</li> <li>• Detailed Contract Schedules</li> </ul>	PP-1	See specifications for specific requirements <ul style="list-style-type: none"> <li>• Specification 01 32 19, Examples: concrete mix, structural steel, products with long lead times</li> <li>• See Specification 01 32 16</li> </ul>
General Construction Progress Requirements are all up to date <ul style="list-style-type: none"> <li>• Progress Schedules</li> <li>• Submittals/Re-submittals (ongoing)</li> <li>• Schedule of Values</li> <li>• Progress Reporting</li> <li>• LEED Documentation</li> <li>• Waste Management documentation</li> <li>• QMOs are being addressed and closed</li> <li>• Progress Cleaning</li> <li>• As-Built Drawings</li> </ul>	Each future PP	Verified with each Progress Payment Request <ul style="list-style-type: none"> <li>• Specification 01 32 16</li> <li>• Specification 01 33 23</li> <li>• Specification 01 29 73</li> <li>• Specification 01 32 26</li> <li>• All specifications with LEED documentation requirements</li> <li>• Specification 01 74 19</li> <li>• Specification 01 45 16</li> <li>• Specification 01 74 13</li> <li>• Specification 01 78 39</li> </ul>
<b>* All of the above are being updated on the Project Management Web Site as required</b>		
BPW Contract Administration Documentation <ul style="list-style-type: none"> <li>• Weekly payroll reports</li> <li>• Best Value Contracting Reports</li> </ul>	25% CT or PP 2	See 1.4.E above. <i>This progress payment will be with held by BPW for any missing contractual documentation.</i>

<b>Progress Payment (PP) Milestone Schedule</b>		
<b>Milestone Description</b>	<b>Due Before</b>	<b>Remarks</b>
<ul style="list-style-type: none"> <li>SBE Reports</li> </ul>		
Construction Progress Milestones <ul style="list-style-type: none"> <li>Construction/Contract Closeout Meeting #1</li> <li>Submittals/Re-submittals complete</li> </ul>	50% CT	<ul style="list-style-type: none"> <li>Specification 01 31 19</li> <li>Specification 01 33 23</li> </ul>
Operation and Maintenance (O & M) drafts	60% CT	<ul style="list-style-type: none"> <li>Specification 01 78 23</li> </ul>
Construction/Contract Closeout Meeting #2 <ul style="list-style-type: none"> <li>Construction closeout checklist</li> </ul>	70% CT	<ul style="list-style-type: none"> <li>Specification 01 31 19</li> <li>Specification 01 77 00</li> </ul>
BPW Contract Administration Documentation <ul style="list-style-type: none"> <li>Request Finalization Review from BPW</li> </ul>	80% CT	This is a recommendation to the GC and is not a requirement of this PP. <ul style="list-style-type: none"> <li>Specification 01 77 00</li> </ul>
Construction Progress Milestones <ul style="list-style-type: none"> <li>Operation and Maintenance (O &amp; M) finals, accepted</li> <li>All major QMO issues resolved</li> <li>As-Built Drawings, Division Trades ready for GC review</li> </ul>	80% CT	<ul style="list-style-type: none"> <li>Specification 01 78 23</li> <li>Specification 01 45 16; Items that could prevent occupancy</li> <li>Specification 01 78 39</li> </ul>
All of the following shall be completed for this PP: <ul style="list-style-type: none"> <li>Regulatory Inspections completed</li> <li>All QMO reports closed</li> <li>Demonstration and Training completed</li> <li>Attic Stock completed</li> <li>Final Cleaning</li> </ul>	90% CT	Contractor to determine the proper order of completion: <ul style="list-style-type: none"> <li>Governing ordinances and statutes</li> <li>Specification 01 45 16</li> <li>Specification 01 79 00</li> <li>Specification 01 78 43</li> <li>Specification 01 74 13</li> </ul>
Construction Closeout Procedures: <ul style="list-style-type: none"> <li>Letter of Substantial Compliance sent to BI and DHS as needed</li> <li>Certificate of Occupancy issued</li> <li>As-Built Drawings, finals, accepted</li> <li>City Letter of Substantial Completion</li> <li>Warranty letters dated and issued</li> </ul>	100% CT	<ul style="list-style-type: none"> <li>Specification 01 77 00</li> <li>Generated/Signed by the Architect</li> <li>Building Inspection</li> <li>Specification 01 78 39</li> <li>Signed by the City Engineer</li> <li>Specification 01 78 36</li> </ul>
<b>* Completion of this begins the one year warranty.</b>		
BPW Contract Administration Documentation Contract Closeout Procedures <ul style="list-style-type: none"> <li>Construction Closeout has been completed</li> <li>Contractor requests final payment of retainage upon receiving City Letter of Substantial Completion</li> <li>All BPW contractual requirements are verified</li> </ul>	Final	<ul style="list-style-type: none"> <li>Specification 01 77 00</li> <li>Contractor must provide any missing BPW Contractual Documentation</li> </ul>
<b>* Completion of this closes the contract but not the warranty period/bond.</b>		

<b>Progress Payment (PP) Milestone Schedule</b>		
<b>Milestone Description</b>	<b>Due Before</b>	<b>Remarks</b>
<b>NOTE: CT = Contract Total less held retainage</b>		

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**1.5. PROGRESS PAYMENT SUBMITTAL**

- A. Each progress payment submittal shall be:
  - 1. Digital in PDF format
  - 2. PDF shall be in color
  - 3. Uploaded to the appropriate Project Management library and properly named per the tutorial instructions provided to the awarded contractor.
- B. Submit all required construction progress documentation to the appropriate Project Management Web Site library.
- C. In general the following shall apply to all PP requests:
  - 1. Materials or products:
    - a. On order, being shipped, etc. may not be invoiced.
    - b. Received and stored on the project site may be invoiced.
    - c. Being manufactured off site at any location may not be invoiced (example: cabinetry, ductwork, etc.)
    - d. Completed products stored off site locally waiting for delivery to the project site may be invoiced with prior approval by the CPM. All of the following conditions must be met to be allowed:
      - i. Items must be visually inspected by CPM to verify product is complete.
      - ii. Item must be stored inside a compatible structure and the structure and contents must be insured.
      - iii. Contractor is responsible for condition until installation is completed.
  - 2. All labor and equipment, including rental time for the current progress period may be invoiced.
  - 3. Only completed installations may be invoiced to 100% based on the Schedule of Values.
- D. DO NOT submit BPW Contract Administration Documentation for review with Progress Payment Requests, submit them directly to the correct agency and in the correct format as instructed from information in your BPW Contract Award Packet instructions.

**PART 2 - PRODUCTS - THIS SECTION NOT USED**

**PART 3 - EXECUTION**

**3.1. GENERAL CONTRACTOR PROCEDURE**

- A. The GC shall provide an updated version of his/her schedule of values (AIA documents G702 & G 703) with each PP request.
  - 1. The AIA - Application and Certificate for Payment (G702) shall be properly filled out and prepared for the Architects review. See specification 01 29 73, Schedule of Values for more information.
  - 2. The AIA - Continuation sheets (G703) shall be properly filled out and indicate the dollar value of the completed work to date for each item on the form. See specification 01 29 73, Schedule of Values for more information.
    - a. The GC shall subtotal the work completed to date for all of the original Schedule of Value items.
    - b. Divide the sub total of work completed by the Original Contract Total to obtain a percentage complete of the original Lump Sum Bid. This percentage may be taken out to five (5) decimal places (round fifth place up or down as needed).
      - i. Example: \$5,192.55 of completed work divided by \$10,000 original Contract Total = 0.519255, round this to 0.51926
    - c. Write the percentage in Column 10 on the City Tabular Sheet for the original lump sum bid item in RED ink.
  - 3. Ensure that any newly posted change orders from the City of Madison provided tabulation sheet have been entered on the G703 continuation sheets. Repeat steps a thru c above for each change order on the schedule of values and the City Tabular Sheet.
- B. The GC shall fill out the City of Madison Application and Certificate of Payment cover sheet as follows:
  - 1. The GC shall not change any pre-printed information and shall not write in the box that indicates previous progress payments.
  - 2. The GC shall sign and date the form where indicated.
  - 3. The GC shall provide the dates from and to for the PP being requested.



**SECTION 01 31 13  
PROJECT COORDINATION**

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2  
3  
4 PART 1 – GENERAL ..... 1  
5 1.1. SUMMARY ..... 1  
6 1.2. RELATED SPECIFICATIONS ..... 1  
7 1.3. GENERAL REQUIREMENTS ..... 1  
8 1.4. GENERAL CONTRACTOR PERFORMANCE REQUIREMENTS ..... 2  
9 1.5. SUB-CONTRACTOR PERFORMANCE REQUIREMENTS ..... 2  
10 PART 2 – PRODUCTS – THIS SECTION NOT USED ..... 3  
11 PART 3 – EXECUTION – THIS SECTION NOT USED ..... 3  
12

**PART 1 – GENERAL**

**1.1. SUMMARY**

- 16 A. Project Coordination covers many areas within the execution of the Contract Documents and the requirements  
17 of proper coordination are the applicable to all contractors executing the Work of this contract.  
18 B. This specification provides general information regarding project coordination for the General Contractor and all  
19 Sub-contractors. All contractors shall be familiar with project coordination requirements and responsibilities  
20 that may be defined in other specification within these Contract Documents.  
21 C. The General Contractor shall at all times be responsible for the project, project site, and execution of the  
22 Contract Documents.  
23

**1.2. RELATED SPECIFICATIONS**

- 24 A. Section 01 29 76 Progress Payment Procedures  
25 B. Section 01 31 19 Progress Meetings  
26 C. Section 01 31 23 Project Management Web Site  
27 D. Section 01 32 16 Construction Progress Schedules  
28 E. Section 01 32 19 Submittals Schedule  
29 F. Section 01 33 23 Submittals  
30 G. Section 01 43 39 Mockups  
31 H. Section 01 45 16 Field Quality Control Procedures  
32 I. Section 01 60 00 Product Requirements  
33 J. Section 01 77 00 Closeout Procedures, including all specifications referenced therein  
34  
35

**1.3. GENERAL REQUIREMENTS**

- 36 A. The following general requirements shall applicable to all contractors:  
37 1. Cooperate with the Owner, all authorized Owner Representatives, Project Architect and all consultants of  
38 the Owner.  
39 2. Materials, products, and equipment shall be new, as specified and to industry standards except where  
40 otherwise noted.  
41 3. Labor and workmanship shall be of a high quality and to industry standards.  
42 B. Existing conditions:  
43 1. Verify all existing conditions noted in the contract documents with actual filed locations. Verify  
44 dimensions, sizes and locations, of structural, equipment, mechanical and utility components.  
45 2. Report any inconsistencies, errors, omissions, or code violations in writing to the General Contractor (GC)  
46 immediately.  
47 3. Annotate any inconsistencies, errors, omissions on the GC As-Built record drawings immediately for  
48 future reference.  
49 C. Contract Documents:  
50 1. The Contract Documents are intended to include everything necessary to perform the work. Every item  
51 required may not be specifically mentioned, shown, or detailed.  
52 a. Except where specifically stated all systems and equipment shall be complete, installed, and fully  
53 operable.  
54 b. If a conflict exists within the contract documents the contractor shall furnish the item, system, or  
55 workmanship of the highest quality, largest, largest quantity, or most closely fits the intent of the  
56 contract documents.  
57







**SECTION SECTION 01 31 19**  
**PROJECT MEETINGS**

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4 PART 1 – GENERAL ..... 1  
5 1.1. SUMMARY ..... 1  
6 1.2. RELATED SPECIFICATIONS ..... 1  
7 1.3. PROJECT MEETING TYPES ..... 1  
8 1.4. GENERAL REQUIREMENTS ..... 1  
9 PART 2 – PRODUCTS – NOT USED IN THIS SECTION ..... 1  
10 PART 3 - EXECUTION ..... 1  
11 3.1. PRECONSTRUCTION MEETING ..... 1  
12 3.2. PROJECT MANAGEMENT WEB SITE – TUTORIAL MEETING ..... 2  
13 3.3. CONSTRUCTION PROGRESS MEETINGS ..... 2  
14 3.4. PRE-INSTALLATION MEETINGS ..... 2  
15 3.6 PRE-CONTRACT CLOSEOUT MEETINGS ..... 3  
16 3.7 OTHER SPECIAL MEETINGS ..... 3  
17

**PART 1 – GENERAL**

**1.1. SUMMARY**

- 21 A. The purpose of this specification is to identify various project related meetings and the responsible parties for  
22 scheduling, agendas, minutes, and required attendance.  
23 B. This specification is not intended to be inclusive of all meeting types or a complete list of required meetings.  
24 C. This specification is not intended to cover planning and execution meetings between the General Contractor  
25 (GC) and his/her sub-contractors.

**1.2. RELATED SPECIFICATIONS**

- 28 A. 01 31 23 Project Management Web Site  
29 B. 01 32 16 Construction Progress Schedules  
30 C. 01 43 39 Mockups

**1.3. PROJECT MEETING TYPES**

- 33 A. The following project meeting types may be used but not limited to the following  
34 1. Preconstruction Meeting  
35 2. Project Management Web Site – Tutorial Meeting  
36 3. Construction Progress Meetings  
37 4. Pre-installation Meetings (including mock-up review meetings)  
38 5. Weekly Trade Meetings  
39 6. Special Meetings

**1.4. GENERAL REQUIREMENTS**

- 42 A. Representatives of Contractors, Subcontractors, and suppliers attending meetings shall be qualified and  
43 authorized to act on behalf of the entity each represents.  
44

**PART 2 – PRODUCTS – NOT USED IN THIS SECTION**

**PART 3 - EXECUTION**

**3.1. PRECONSTRUCTION MEETING**

- 50 A. After execution of the Contract the City Project Manager (CPM) shall schedule and conduct the Preconstruction  
51 Meeting at the Owner’s facilities. The CPM shall coordinate the meeting agenda with the Project Architect and  
52 the GC Project Manager.  
53 B. The CPM shall be responsible for the final agenda.  
54 C. The CPM and Project Architect shall take notes on the meeting and post completed meeting minutes.  
55 D. Attendance shall be required by all of the following:  
56 1. Owner Representative(s)  
57 2. Architect and applicable sub consultant(s)  
58 3. General Contractor and applicable subcontractors and suppliers

- 1
- 2
- 3 E. Topics of the Preconstruction Meeting shall include but not be limited to the following:
- 4 1. Staff and contractor introductions
- 5 2. Completion Date
- 6 3. BPW Administrative requirements and due outs
- 7 a. Small Business Enterprise (SBE) (if applicable)
- 8 b. Certified payroll forms
- 9 c. Workforce profiles
- 10 d. Best Value Contracting (BVC)
- 11 4. General Facility Management Division 1 Specifications, including:
- 12 a. Section 01 29 76 Progress Payment Procedures
- 13 b. Section 01 31 23 Project Management Web Site (overview)
- 14 c. Section 01 45 16 Field Quality Control Procedures
- 15 d. Section 01 77 00 Closeout Procedures
- 16 5. Project Meeting scheduling
- 17 a. Section 01 31 19 Project Meetings
- 18 6. Construction Schedule
- 19

20 **3.2. PROJECT MANAGEMENT WEB SITE – TUTORIAL MEETING**

- 21 A. The CPM shall schedule and conduct a tutorial presentation of the PMWS prior to the beginning of construction.
- 22 B. The CPM shall be responsible for the final agenda, there will be no minutes.
- 23 C. The required attendance list in 3.1.D. above shall apply except for City Staff in items 1 and 4 who are already
- 24 familiar with the PMWS system.
- 25 D. It is recommended that all contractors bring their lap top, tablet or other internet capable device with them
- 26 including a fully charged battery and internet connection devices as necessary.
- 27

28 **3.3. CONSTRUCTION PROGRESS MEETINGS**

- 29 A. In general all of the following shall apply:
- 30 1. Representatives of Contractors, Subcontractors, and suppliers attending meetings shall be qualified and
- 31 authorized to act on behalf of the entity each represents.
- 32 2. The attendance shall be from the required attendance list in 3.1.D. above.
- 33 B. The General Contractor Project Manager (GCPM) shall:
- 34 1. Schedule and conduct all construction progress meetings biweekly or more frequently as required.
- 35 2. Prepare agenda for meetings including, but not limited to the following:
- 36 a. Safety
- 37 b. Current Schedule, including review of the critical path and 6-week look ahead schedule
- 38 c. Status of project related documentation (Submittals, RFIs, CBs, etc.)
- 39 d. Quality Observation Log and status of correction of deficient items
- 40 e. Project questions and issues from meeting attendees
- 41 f. BPW Administration Check
- 42 g. Other as needed
- 43 h. Status of CORs and COs to be reviewed outside the standard progress meeting time.
- 44 3. Make physical arrangements for meetings.
- 45 4. GCPM to post meeting agendas to the appropriate libraries on the Project Management Web Site
- 46 (PMWS) no less than two (2) working days prior to the scheduled meeting. Notify all required attendees,
- 47 applicable parties to the contract, and others affected of the posted meeting agenda.
- 48 5. Preside at meetings.
- 49 6. Route a meeting attendance roster for attendees to sign-in on.
- 50 7. GCPM to record the minutes of the meeting; include significant proceedings and decisions. Post meeting
- 51 minutes to the PMWS no more than two (2) working days after the completed meeting. Meeting
- 52 minutes shall include a scanned copy of the attendance sign-in sheet. Notify all required meeting
- 53 attendees, applicable parties to the contract, and others affected by decisions made at the meetings.
- 54 8. The above requirements do not apply to GC/sub-contractor meetings.
- 55

56 **3.4. PRE-INSTALLATION MEETINGS**

- 57 A. The GCPM shall schedule and conduct all pre-installation meetings, including mockup reviews, before each
- 58 construction activity that requires coordination with other trades.

- 1 B. The GCPM shall be responsible for the final agenda and meeting minutes.
- 2 C. The GCPM will work with all concerned parties to resolve issues as needed and submit RFI's if necessary.
- 3 D. Required attendance shall be from the list in 3.1.D. above and shall be personnel having a stake in the outcome
- 4 of the installation or knowledge of the system being installed.
- 5 E. In the event the Contractor installs equipment or materials without a pre-installation meeting the Contractor
- 6 shall be solely responsible for removing, replacing, repositioning materials and equipment as instructed by the
- 7 Project Architect or City Project Manager at no additional cost to the City.
- 8

9 **3.6 PRE-CONTRACT CLOSEOUT MEETINGS**

- 10 A. Two (2) Pre-contract Closeout Meetings shall be held to review the closeout procedures, requirements, and
- 11 contract deliverables.
  - 12 1. Pre-contract Closeout Meeting #1 shall be scheduled prior to the 50% Progress Payment Request is being
  - 13 requested. This meeting shall discuss items such as closing out QMO reports, providing O&M drafts and
  - 14 finals, payroll and Affirmative Action documentation, and other contract deliverables.
  - 15 2. Pre-contract Closeout Meeting #2 shall be scheduled prior to the 80% Progress Payment Request is being
  - 16 requested. This meeting shall discuss, but not be limited to, the status of scheduling final regulatory
  - 17 inspections, cleaning up outstanding QMO's, demonstration and training, attic stock; and finalization
  - 18 review of payroll and other related documents.
- 19 B. The GCPM shall schedule, coordinate, and make physical arrangements for both meetings.
- 20 C. All of the following shall be required to attend both meetings:
  - 21 1. The GCPM and the GC Field superintendent
  - 22 2. All Subcontractor Project Managers regardless of the current status of their work.
    - 23 a. The GCPM may excuse a Subcontractor PM if he is confident that all contractual requirements for
    - 24 closeout by the subcontractor have been completed and/or delivered to the GCPM. The list of
    - 25 attendees shall be reviewed and agreed upon with CPM ahead of the meeting.
    - 26 b. At the option of these project managers the field supervisors may also attend.
  - 27 3. The Project Architect and at least one design consultant from each discipline represented by the plans
  - 28 and specifications to address open QMOs, final tests, reports, etc.
  - 29 4. The Owner
  - 30 5. The CPM
  - 31 6. Quality Management staff as needed to address open QMOs, final tests, reports, etc.
  - 32 7. The Commissioning Agent
- 33 D. The CPM shall publish an agenda and chair the meeting.
- 34

35 **3.7 OTHER SPECIAL MEETINGS**

- 36 A. The Contractor shall schedule special meetings per the requirements of the LEED Specification, the Project
- 37 Quality Management Plan, the Commissioning Plan and as indicated by other specifications.
- 38 B. Special meetings include but are not limited to the following:
  - 39 1. Waste Management Conference
  - 40 2. Equipment start up meetings
  - 41 3. Testing and balancing meetings
  - 42 4. Commissioning meetings
  - 43 5. Other meetings as necessitated by the contract documents
  - 44
  - 45

**END OF SECTION**

**SECTION 01 31 23  
 PROJECT MANAGEMENT WEB SITE**

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 4 PART 1 – GENERAL ..... 1  
 5 1.1. GENERAL DESCRIPTION ..... 1  
 6 1.2. SHAREPOINT PROCEDURE OVERVIEW ..... 1  
 7 1.3. RELATED SPECIFICATIONS ..... 2  
 8 PART 2 - PRODUCTS ..... 2  
 9 2.1. SHAREPOINT SYSTEM RELATED PRODUCTS ..... 2  
 10 PART 3 - EXECUTION ..... 2  
 11 3.1. POST BID-OPENING ..... 2  
 12 3.2. POST PRE-CONSTRUCTION MEETING ..... 3  
 13

**PART 1 – GENERAL**

**1.1. GENERAL DESCRIPTION**

- 17 A. The City of Madison (CoM) has established a web based Project Management Tool (PMT) using a Microsoft  
 18 product called SharePoint (SP).  
 19 B. The software is used throughout the design, construction and warranty process of major remodels and new  
 20 construction projects executed as a City of Madison, Board of Public Works project.  
 21 C. Initially deployed in mid 2013, the PMT software has been successfully deployed on several projects, and we  
 22 continue to modify/update/enhance the PMT on a regular basis.

**1.2. SHAREPOINT PROCEDURE OVERVIEW**

- 25 A. The CoM PMT is a system of consolidated Document & Form Libraries and Data Lists that assist in performing  
 26 day to day functions of design/construction management while reducing the use of surface mail, email and email  
 27 attachments.  
 28 1. Document libraries store a wide variety of documents in many different formats including but not limited  
 29 to Word, Excel, PDF, photographs (all popular formats), etc.  
 30 2. Data Lists contain consolidated data information that can be generated and stored for further use. Punch  
 31 Lists and Warranty issues will be examples of Data Lists.  
 32 3. Form libraries contain snapshot information associated with a particular Data Entry form. An example of  
 33 this is the Quality Management Observation form.  
 34 B. The following libraries and sub-libraries on the PMWS are provided for specific workflows and contract  
 35 documentation. Related specification numbers are in "( )" if applicable.  
 36

<b>Contract Documents</b>	<b>Construction Administration</b>	<b>Construction Progress</b>	<b>LEED Documentation</b>	<b>Quality Control</b>	<b>Construction Closeout</b>
<i>Signed Contract</i>	<i>Change Order Requests (COR Form) (01 26 57)</i>	<i>Schedules (01 32 16)</i>	<i>LEED Documents</i>	<i>Regulatory Inspections</i>	<i>Misc Closeout Documents</i>
<i>GC Partial Pay Apps (01 29 76)</i>	<i>Change Orders (CO Form) (01 26 63)</i>	<i>Progress Meetings (01 31 19)</i>	<i>Waste Management (01 74 19)</i>	<i>Commissioning Checklists</i>	<i>O &amp; M Manuals (01 78 23)</i>
<i>Construction Documents</i>	<i>Construction Bulletins (CB Form) (01 26 46)</i>	<i>Daily Journal (DJ Form) (01 32 26)</i>		<i>System Performance Tests</i>	<i>Product Warranties /Guarantees (01 78 36)</i>
<i>Regulatory Documents</i>	<i>Request for Information (RFI Form) (01 26 13)</i>			<i>Quality Management Observation (QMO Form) (01 45 16)</i>	<i>As-Builts (01 78 39)</i>
<i>Testing Contract</i>	<i>Submittals (SUB Form) (01 33 23)</i>			<i>Safety and Incident Reports</i>	<i>Attic Stock (01 78 23)</i>
				<i>Material Testing &amp; Field Reports</i>	<i>Demonstration and Training (01 79 00)</i>
					<i>Warranty Issues (WI Form) (01 78 23)</i>

- 1  
2 C. A tutorial document on the web based PMT will be provided to the General Contractor (GC) who is awarded the  
3 contract. Additional training will be provided as needed for the GC and Sub-Contractors (SC) by the CoM.  
4 D. The PMT has predefined work flows that channel automated alerts as documents are uploaded, reviewed, and  
5 completed. These workflows are designed for inbound information from the contractor as well as outbound  
6 information from the Architectural/Engineer consultant and the Owner.  
7 E. The GC will be required to receive email notifications, access the internet to review related documentation and  
8 be able to upload/download documentation to the various project libraries.  
9 F. The SC's will be required (at a minimum) to receive email notifications and access the internet to review related  
10 documentation. Prior to setting up the final PMT the GC and CPM shall meet to review all SP workflows, the GC  
11 will determine to what level over the minimum requirements the SC's will be involved.  
12

### 13 1.3. RELATED SPECIFICATIONS

- 14 A. The following specification sections are directly related to the CoM PMT system.  
15 1. 01 26 13 Request for Information (RFI)  
16 2. 01 26 46 Construction Bulletins (CB)  
17 3. 01 26 57 Change Order Request (COR)  
18 4. 01 26 63 Change Order (CO)  
19 5. 01 29 76 Progress Payment Procedures  
20 6. 01 31 19 Project Meetings  
21 7. 01 32 16 Construction Progress Schedules  
22 8. 01 32 26 Construction Progress Reporting  
23 9. 01 32 33 Photographic Documentation  
24 10. 01 33 23 Submittals  
25 11. 01 45 16 Field Quality Control Procedures (Owner)  
26

## 27 PART 2 - PRODUCTS

### 28 2.1. SHAREPOINT SYSTEM RELATED PRODUCTS

- 29 A. SharePoint is a Microsoft Windows based software that requires no additional software installation, hardware or  
30 other special requirements/applications for the users. There are no costs associated with the use of this system.  
31 B. Currently the CoM is using SharePoint 2010.  
32 1. SharePoint works best if the user's computer is running Windows versions 7 through 8.1.  
33 2. SharePoint works best when used with Internet Explorer versions 7, 8 and 9 (32 bit).  
34 a. At this time SharePoint is not fully supported by Internet Explorer versions 10 and 11.  
35 b. At this time SharePoint is not entirely compatible with other internet browsers such as Fire Fox,  
36 Google Chrome, and Safari.  
37  
38

## 39 PART 3 - EXECUTION

### 40 3.1. POST BID-OPENING

- 41 A. After bids have been opened, a successful bidder has been determined, and bid acceptance procedures have  
42 been initiated the City Project Manager (CPM) will contact the GC to provide the following information.  
43 1. Project Management Software Tutorial. This tutorial is in a PDF printable format with screen shots and  
44 associated instructions on how to access and use the PMT.  
45 a. Tutorial instructions will include but not be limited to the following:  
46 i. Descriptions of various libraries, documents, and forms that will be used throughout the  
47 construction project.  
48 ii. Uploading procedures for various types of documents including standardized naming  
49 conventions.  
50 2. A blank Project Directory in an Excel spread sheet format. The contractor shall provide the following  
51 information for GC and SC staffs as indicated on the spreadsheet. This will generally be the Project  
52 Manager for the GC as well as the Sub-contractors and the GC Site Supervisor.  
53 a. Last Name, First Name  
54 b. Company Name  
55 c. Email address (valid, work related)  
56 d. Work Phone Number (required, include area code)  
57 e. Cell Phone Number (not required, include area code)  
58



**SECTION 01 32 16  
CONSTRUCTION PROGRESS SCHEDULES**

1  
2  
3  
4 PART 1 – GENERAL ..... 1  
5 1.1. SCOPE ..... 1  
6 1.2. RELATED SPECIFICATIONS ..... 1  
7 PART 2 – PRODUCTS – THIS SECTION NOT USED ..... 1  
8 PART 3 - EXECUTION ..... 1  
9 3.1. OVERALL PROJECT SCHEDULE (OPS) ..... 1  
10 3.2. 6 WEEK LOOK-OUT SCHEDULES (LOS) ..... 1  
11 3.3. PROJECT MANAGEMENT WEB SITE (PMWS) ..... 2  
12

**PART 1 – GENERAL**

**1.1. SCOPE**

- 16 A. This specification is to identify various project related schedules associated with indicating construction progress  
17 and outlook. The following schedules are the responsibility of the General Contractor (GC).  
18 1. Overall Project Schedule  
19 2. 6 Week Look-out Schedule  
20 B. This specification is not intended to include internal schedules generated by the contractors during their  
21 planning and execution of the contract.  
22

**1.2. RELATED SPECIFICATIONS**

- 23 A. Section 01 29 76 Progress Payment Procedures  
24 B. Section 01 31 23 Project Management Web Site  
25 C. Section 01 31 19 Progress Meetings  
26 D. Section 01 74 13 Progress Cleaning  
27 E. Section 01 77 00 Closeout Procedures  
28 F. Section 01 78 23 Operation and Maintenance Data  
29 G. Section 01 78 36 Warranties  
30 H. Section 01 78 39 As-Built Drawings  
31 I. Section 01 78 43 Spare Parts and Extra Materials  
32 J. Section 01 79 00 Demonstration and Training  
33 K. Other specification within the construction documents that may indicate the need for scheduling any event with  
34 Owner, Project Architect, Owner Representatives, including any owner provided equipment.  
35  
36

**PART 2 – PRODUCTS – THIS SECTION NOT USED**

**PART 3 - EXECUTION**

**3.1. OVERALL PROJECT SCHEDULE (OPS)**

- 41 A. The GC shall prepare an OPS that covers the duration of the contract from the pre-construction meeting through  
42 the end of construction to final contract closeout.  
43 1. The GC shall review Specification 01 77 00 Closeout Procedures to become familiar with definitions,  
44 differences, and requirements for closing out the construction and contract including the association with  
45 progress payments.  
46 B. The GC shall provide copies and lead a discussion on the OPS during the pre-construction meeting.  
47 C. The OPS shall indicate start and end dates of each task associated with the project.  
48 D. The OPS shall clearly indicate the critical path of the project.  
49 E. The GC shall update the OPS as often as necessary during the duration of the project. Updates will be briefed as  
50 needed during bi-weekly progress meetings.  
51  
52

**3.2. 6 WEEK LOOK-OUT SCHEDULES (LOS)**

- 53 A. The GC shall prepare the initial LOS to include detail of daily tasks for the first six (6) weeks of construction in  
54 depth for the Pre-construction meeting. The LOS shall be compatible and complimentary to the OPS.  
55 B. The GC shall provide copies and lead a discussion on the LOS during the pre-construction meeting.  
56 C. The LOS shall indicate start and end dates of each major task, associated related sub-tasks, and required parallel  
57 or pre-requisite tasks required to complete the major task on time.  
58

- 1 D. The LOS shall also include identifying and scheduling such events as:
- 2 1. Pre-installation meetings and mock-up review meetings.
- 3 2. Quality management reviews of installations before they are covered.
- 4 3. Owner provided equipment as designated by the contract documents.
- 5 4. Work by others as designated by the contract documents.
- 6 5. Critical submittal dates.
- 7 E. The GC shall update the LOS prior to each bi-weekly progress meeting to indicate the next 6 weeks of scheduled
- 8 work. Updates will be briefed during each bi-weekly progress meeting.
- 9

10 **3.3. PROJECT MANAGEMENT WEB SITE (PMWS)**

- 11 A. The GC shall upload all project schedules and updates to the PMWS in an original PDF version of the scheduling
- 12 document. Scans will not be permitted.
- 13
- 14
- 15

**END OF SECTION**



**SECTION 01 32 19  
SUBMITTALS SCHEDULE**

1  
2  
3  
4 PART 1 – GENERAL ..... 1  
5 1.1. SUMMARY ..... 1  
6 1.2. RELATED SPECIFICATIONS ..... 1  
7 1.3. RELATED DOCUMENTS ..... 1  
8 1.4. SUBMITTAL DEFINITIONS ..... 1  
9 1.5. SUBMITTAL REQUIREMENTS ..... 1  
10 1.6. ADMINISTRATIVE SUBMITTALS ..... 2  
11 PART 2 – PRODUCTS – THIS SECTION NOT USED ..... 2  
12 PART 3 - EXECUTION ..... 2  
13 3.1. OVERALL RESPONSIBILITIES OF ALL CONTRACTORS ..... 2  
14 3.2. GENERAL CONTRACTORS RESPONSIBILITIES ..... 2  
15 3.3. STAFF REVIEW RESPONSIBILITIES ..... 3  
16

**PART 1 – GENERAL**

**1.1. SUMMARY**

- 20 A. The General Contractor shall submit a complete and comprehensive list of all submittals anticipated during the  
21 execution of this contract.  
22 B. The GC shall include the Administrative submittals identified in item 1.5 below and shall be required to up load  
23 them to the Project Management Web Site.  
24 C. The initial Submittals Schedule shall be based on the original contract documents used at the time of bidding and  
25 any posted addenda through awarding of the contract.  
26 D. The Submittal Schedule may be appended during the execution of the contract based on amendments to the  
27 contract in the form of Change Orders, Construction Bulletins, and other related documents that add, or change  
28 the scope of the work.  
29

**1.2. RELATED SPECIFICATIONS**

- 30 A. Section 01 29 76 Progress Payment Procedures  
31 B. Section 01 31 23 Project Management Web Site  
32 C. Section 01 33 23 Submittals  
33  
34

**1.3. RELATED DOCUMENTS**

- 35 A. The following documents shall be used as the basis for initiating the original Submittals Schedule.  
36 1. Drawing documents and specifications (including general provisions) as provided with the bid set  
37 documents and any published addenda.  
38 B. The following documents shall be used to amend the submittals schedule as needed during the execution of this  
39 contract.  
40 1. Documents associated with revisions or clarifications to number A.1 above after awarding of the  
41 contract, including but not limited to:  
42 a. Construction Bulletins  
43 b. Approved Change Orders  
44  
45

**1.4. SUBMITTAL DEFINITIONS**

- 46 A. Administrative Submittal: Any submittal that may be required by a Division 1 Specification and as noted in  
47 Section 1.5 below.  
48 B. Critical Path Submittal: Any early submittal that needs a priority review due to early construction use or long  
49 lead times where a delay could affect the critical path of the construction schedule  
50 C. Submittal: Any material, product, equipment, or general requirement as outlined in this and other specifications  
51 that require a favorable review or acceptance prior to proceeding with procuring the item or proceeding with  
52 the Work.  
53  
54

**1.5. SUBMITTAL REQUIREMENTS**

- 55 A. The GC and all Sub-contractors shall review the construction documents including the specifications of their  
56 individual Division or Trade to compile a complete list of all materials, products, or equipment that will require a  
57 positively reviewed submittal to be completed prior to procurement and installation.  
58

- 1                   1.       Submittals shall include but not be limited to any of the following that may apply:  
 2                   a.       Shop Drawings  
 3                   b.       Product Data  
 4                   c.       Assembly Drawings  
 5                   d.       Engineered Drawings  
 6                   e.       Product Samples  
 7            B.       The following items will require an approved submittal, verify with specifications for specific needs and  
 8                   requirements:  
 9                   1.       Contractor certifications for specialized work such as asbestos removal, well drilling, controls, AV, etc.

11 **1.6. ADMINISTRATIVE SUBMITTALS**

- 12           A.       The GC shall upload the following submittals within 15 working days of receipt of the City of Madison Start Work  
 13                   Letter. All Administrative Submittals shall be approved prior to requesting Progress Payment Number 1.  
 14                   1.       Contractors Project Directory, see specification 01 31 23, discuss requirements with CPM  
 15                   2.       Schedule of Values, see Specification 01 29 73  
 16                   3.       Submittals Schedule, see Specification 01 32 19  
 17                   4.       Waste Management Plan, see Specification 01 74 19  
 18                   5.       Closeout Requirement Checklist, see Specification 01 77 00  
 19                   6.       Warranty Checklist, see Specification 01 78 36

21 **PART 2 – PRODUCTS – THIS SECTION NOT USED**

23 **PART 3 - EXECUTION**

25 **3.1. OVERALL RESPONSIBILITIES OF ALL CONTRACTORS**

- 26           A.       All contractors shall be responsible for reviewing the drawings and specifications within their Divisions of Work  
 27                   to provide a complete and comprehensive list of submittals to the General Contractor.  
 28           B.       Each list shall indicate the title of the submittal, the associated specification of the submittal, whether the  
 29                   submittal can be considered an early/middle/late submittal, the anticipated date the submittal will be provided  
 30                   and the anticipated date the submittal needs to be approved.  
 31           C.       Contractors shall be aware that the goals for submittal review by the Architect staff and City staff will be as  
 32                   follows:  
 33                   1.       For items on the Critical Path as identified by the GC, five (5) working days  
 34                   2.       For most other submittals ten (10) working days  
 35                   3.       Additional time may be needed for complex submittals or if re-submittals are required.  
 36           D.       The general format of the Submittal Schedule shall be tabular as per this example:

<u>Title</u>	<u>Specification</u>	<u>Critical Path (Y or N)</u>	<u>Date provided</u>	<u>Date required</u>	<u>Remarks</u>
Concrete Mix Design	03 30 00	Y	Oct 1, 2014	Oct 15, 2014	
Paint Draw Downs	09 90 00	N	Jan 2, 2015	Jan 20, 2015	

39 **3.2. GENERAL CONTRACTORS RESPONSIBILITIES**

- 40           A.       The General Contractor shall be responsible for all of the following:  
 41                   1.       Consolidating all submittal lists from individual contractors into one master list.  
 42                   2.       Reviewing all submitted lists for completeness, timing with the overall contract, etc. The GC shall meet  
 43                   with individual contractors to make changes as necessary.  
 44                   3.       Upload the completed Submittals Schedule to the Submittal Library on the Project Management Web Site  
 45                   for review as SD 003.0. See Specification 01 33 23 Submittals for more information on this procedure.  
 46                   4.       Resubmit the schedule as needed after initial reviews have been completed.  
 47           B.       The GC shall work with other contractors to amend the Submittals Schedule throughout the execution of the  
 48                   project based on changes and modifications as needed.  
 49           C.       The GC and Project Architect shall be responsible for reviewing and briefing the submittal schedule and  
 50                   submittals status at each bi-weekly construction meeting.  
 51

- 1     **3.3. STAFF REVIEW RESPONSIBILITIES**  
2     A.     The Project Architect, consulting staff, Owner, and city staff will review the Submittal Schedule for completeness  
3             per the plans and specifications within their divisions of work. The reviewing staff may provide comments as  
4             needed. Some examples might include the following:  
5             1.     Submittal not required  
6             2.     Provide photos of samples with digital submittal  
7             3.     Insure one submittal for complete system  
8             4.     Append the schedule to include...  
9             5.     See Specification <xyz> for additional requirements  
10    B.     The Project Architect and City Project Manager will finalize review comments regarding the Submittal Schedule.  
11             Re-submittal of the submittal schedule may be required.

12  
13  
14  
15

**END OF SECTION**

**SECTION 01 32 26  
CONSTRUCTION PROGRESS REPORTING**

1  
2  
3  
4 PART 1 – GENERAL ..... 1  
5 1.1. SUMMARY ..... 1  
6 1.2. RELATED SPECIFICATION SECTIONS ..... 1  
7 1.3. PERFORMANCE AND QUALITY ASSURANCE REQUIREMENTS ..... 1  
8 PART 2 – PRODUCTS - THIS SECTION NOT USED ..... 1  
9 PART 3 - EXECUTION ..... 1  
10 3.1. DAILY PROGRESS JOURNAL ..... 1  
11 3.2. CONSTRUCTION PROGRESS MEETINGS ..... 2  
12

**PART 1 – GENERAL**

**1.1. SUMMARY**

- 16 A. Daily records of project activities, resources used, weather conditions, and other information related to the  
17 ongoing progress of the project are extremely important at all levels of Construction Management.  
18 B. Daily records provide the base for weekly progress reports and updating progress schedules.

**1.2. RELATED SPECIFICATION SECTIONS**

- 21 A. Section 01 31 19 Project Meetings  
22 B. Section 01 31 23 Project Management Web Site  
23 C. Section 01 32 23 Photographic Documentation  
24

**1.3. PERFORMANCE AND QUALITY ASSURANCE REQUIREMENTS**

- 26 A. The General Contractor (GC) shall be responsible for all Construction Progress Reporting as outlined in this and  
27 other specifications as noted.  
28 B. The GC shall maintain daily progress journals in a format of his/her choosing provided it is legible and contains  
29 the information as outlined in Section 3.1 below.  
30 C. The journal shall be located in the job trailer and shall be reviewable by the Project Architect or City Project  
31 Manager if so requested.  
32

**PART 2 – PRODUCTS - THIS SECTION NOT USED**

**PART 3 - EXECUTION**

**3.1. DAILY PROGRESS JOURNAL**

- 38 A. The GC shall maintain a daily progress journal of daily Work activities for each day on which Work is performed  
39 by any employee or entity for which the GC is responsible. Such reports shall include all relevant data  
40 concerning the progress of Work activities the GC and Subcontractors are responsible for and the effect of that  
41 activity on the time of performance of the Contract.  
42 B. Journal entries shall be made on the Daily Work Report Form located in the Construction Progress-Daily Journal  
43 Library on the Project Management Web Site. The form consists of the following areas:  
44 1. Weather; include temperature, humidity, precipitation, wind and other related information such as  
45 significant storm events, times, and details.  
46 2. Work completed by trade  
47 3. Delays encountered  
48 4. Deliveries received or delayed  
49 5. Hot issues that need to be addressed  
50 6. Safety issues  
51 7. Photograph progress and upload to the Photo Library on the Project Management Web Site.  
52 8. Other including inspections, testing, etc.  
53 9. Space for attaching documents  
54 C. Daily Work activity reports shall be completed and signed by the GC's Job Superintendent or other on-site  
55 representative authorized by the GC confirming each such report is current, accurate and complete.  
56 D. If applicable the GC shall include schedules of quantities and costs, progress schedules, wage rates, reports,  
57 estimates, invoices, records and other data as requested by the CPM concerning Work performed or to be

1 performed under this Contract if the CPM determines such information is needed to substantiate Change Order  
2 proposals, claims, or to resolve disputes.  
3

4 **3.2. CONSTRUCTION PROGRESS MEETINGS**

5 A. The GC shall provide a verbal summary of the previous two (2) weeks progress reports at each bi-weekly  
6 construction progress meeting.  
7

8  
9

**END OF SECTION**

**SECTION 01 32 33  
PHOTOGRAPHIC DOCUMENTATION**

1  
2  
3  
4 PART 1 – GENERAL ..... 1  
5 1.1. SCOPE ..... 1  
6 1.2. RELATED SPECIFICATION SECTIONS ..... 1  
7 PART 2 – PRODUCTS - THIS SECTION NOT USED ..... 1  
8 PART 3 - EXECUTION ..... 1  
9 3.1. REQUIREMENTS FOR DIGITAL PHOTOGRAPHS..... 1  
10 3.2. PICTURE CONTENT ..... 1  
11 3.3. PROJECT MANAGEMENT WEB SITE..... 1  
12

**PART 1 – GENERAL**

**1.1. SCOPE**

- 16 A. The General Contractor (GC) shall be required to take weekly digital photographs of construction progress and  
17 upload the photos directly to the Project Management Web Site (PMWS).  
18

**1.2. RELATED SPECIFICATION SECTIONS**

- 19 A. Section 01 31 23 Project Management Web Site  
20 B. Section 01 32 26 Construction Progress Reporting  
21  
22

**PART 2 – PRODUCTS - THIS SECTION NOT USED**

**PART 3 - EXECUTION**

**3.1. REQUIREMENTS FOR DIGITAL PHOTOGRAPHS**

- 27 A. All digital photographs shall be taken with a good quality digital camera, cell phone, tablet, and other such digital  
28 device.  
29 B. Digital photographs shall be properly zoomed in/out to capture a specific level of detail as necessary.  
30 C. Digital photographs shall be formatted to achieve a good, clear, and detailed image where the final file size is  
31 between 600 KB and 1.2 MB (1200KB).  
32 D. The camera default naming convention is acceptable. The GC does not need to rename or specifically identify  
33 pictures in the title.  
34 E. All digital photographs shall be saved in a JPEG (.jpg) format and uploaded directly to the PMWS.  
35  
36

**3.2. PICTURE CONTENT**

- 37 A. The GC shall take exterior photographs from at least two (2) different angles.  
38 1. This requirement shall only be applicable when there is exterior work connected with the project.  
39 2. When applicable this requirement shall begin prior to commencing any site work.  
40 3. This requirement shall end when the exterior work has been substantially completed.  
41 4. This requirement may be suspended due to weather conditions or substantial delays in exterior progress.  
42 B. The GC shall take interior photographs of interior construction, equipment installation, rough-ins and other such  
43 progress that helps document weekly progress reporting. Interior photographs should focus on specific  
44 significant installations as well as general progress throughout the progress of the contract.  
45  
46

**3.3. PROJECT MANAGEMENT WEB SITE**

- 47 A. The GC shall upload the digital photographs to the appropriate progress folder in the Project Images Library.  
48 B. Progress folders are labeled with the Construction Week Number and the date for Monday of that week.  
49 C. The GC shall notify the City of Madison Project Manager if additional progress folders need to be created.  
50  
51  
52  
53  
54

**END OF SECTION**



**SECTION 01 33 23**  
**SUBMITTALS**

1  
2  
3  
4 PART 1 – GENERAL ..... 1  
5 1.1. SUMMARY ..... 1  
6 1.2. RELATED REFERENCES ..... 1  
7 1.3. SUBMITTAL REQUIREMENTS ..... 1  
8 PART 2 – PRODUCTS – THIS SECTION NOT USED ..... 2  
9 PART 3 - EXECUTION ..... 2  
10 3.1. GENERAL CONTRACTORS PROCEDURES ..... 2  
11 3.2. SUBMITTAL REVIEW ..... 3  
12 3.3. PROJECT ARCHITECTS REVIEW ..... 3  
13

**PART 1 – GENERAL**

**1.1. SUMMARY**

- 17 A. The General Contractor (GC) shall be responsible for providing submittals for review of all contractors and sub-  
18 contractors as designated in the construction documents. Submittals shall include but not be limited to all of the  
19 following:  
20 1. Equipment specified and pre-approved in the specification; to ensure quality, construction, and  
21 performance specifications have not changed since final design.  
22 2. Equipment specified by performance in the specification; to ensure that the intended quality,  
23 construction, and performance specified is met by the selected material or product.  
24 3. Shop, piece, erection, and other such drawings as indicated in the specifications to ensure all structural,  
25 dimensional, and assembly requirements are being met.  
26 4. Submittals indicating installation sequencing  
27 5. Submittals indicating control sequencing  
28 6. Contractor licensing, certification, and other such regulatory documentation when required by a  
29 specification.  
30 7. Other submittals as may be required by individual specifications.  
31 B. The submittal process shall not be used to determine alternates to specified products or equipment. All  
32 considerations shall be reviewed during the bidding process and acceptable alternates shall be acknowledged by  
33 addendum prior to the closing of bidding. See bidding instructions for the information on submitting alternates  
34 for consideration.  
35 D. In the event that a manufacturer has significantly changed a product (discontinued a model, changed dimension  
36 or performance data changed available colors, etc.) since bid opening the GC shall submit a Request for  
37 Information (RFI) to the Project Architect requesting other approved alternates prior to uploading a digital  
38 submittal.  
39 E. Contractors and sub-contractors shall be responsible for knowing the submittal requirements of ALL sections  
40 within their scope of work under the contract. The Owner reserves the right to request documentation on any  
41 materials, equipment, or product being installed where a submittal is not on file. If the material, equipment, or  
42 product installed is determined not to meet the intent of the specification the contractor/sub-contractor shall be  
43 required to remove and replace the items involved. The GC shall be solely responsible for all costs associated  
44 with the removal and replacement.  
45

**1.2. RELATED REFERENCES**

- 46 A. Section 01 29 76 Progress Payment Procedures  
47 B. Section 01 31 23 Project Management Web Site  
48 C. Section 01 32 19 Submittals Schedule  
49 D. Section 01 32 26 Construction Progress Reporting  
50 E. All Technical Specifications, contract documents, construction drawings, and any published addendums during  
51 the bidding process.  
52 F. All contract documents generated during the execution of the contract including but not limited to Requests for  
53 Information (RFI) and Construction Bulletins (CB).  
54  
55

**1.3. SUBMITTAL REQUIREMENTS**

- 56 A. A completed submittal shall meet the following requirements:  
57



- 1 1. Digital submittal shall be original PDF of manufacturer's data sheets or high quality color scan of the  
2 same.
- 3 a. Submittals shall not include sales fliers or other similar documents that typically do not provide  
4 complete manufacturers data.
- 5 2. Documents within the PDF submittal shall be printable to a sized sheet no less than 8-1/2 by 11 inches  
6 and no larger than 24 by 36 inches.
- 7 3. At the beginning of each submittal the contractor shall identify the plan reference (WC-1, EF-3, etc.) in  
8 RED block letters that the submittal is for.
- 9 4. Where multiple model numbers appear in a table the contractor shall identify the specific model being  
10 submitted by using a RED square, box, or other designation to distinguish the correct model from others  
11 on the page.
- 12 B. A complete submittal will include all information associated with the product or equipment as presented in  
13 plans, equipment tables, and specifications. Information shall include but not be limited to the following:
  - 14 1. Dimensional data
  - 15 2. Performance data
  - 16 3. Resource requirements, power, water, waste, etc
  - 17 4. Clearance and maintenance requirements
  - 18 5. Finish information, colors, textures, etc.
  - 19 6. Warranty information
- 20 C. Where a submittal includes material samples (carpet, tile, paint draw downs, etc.) the contractor shall do the  
21 following:
  - 22 1. The Contractor shall submit the sample(s) as indicated in the specification.
  - 23 2. The Contractor shall include a quality photograph(s) of the product with the digital submittal.  
24 Photographs shall meet the following requirements:
    - 25 a. Formatted to be between 500Kb and 1.0 Mb in file size
    - 26 b. Have no glare or flash reflection on the sample
    - 27 c. Sample fills the frame of the photo and shows detail as needed. Include multiple photos from  
28 other angles as needed.
    - 29 d. Scanned copies of products or photos are not acceptable.
- 30 D. Uploaded submittals should be relative and related to a specific written specification.
  - 31 1. Do not upload submittals under a broad category or division (I.E. HVAC 23 00 00). Always upload by the  
32 specific specification that identifies a required product or performance to be met.
  - 33 2. Group related items together if the specification is written that way. (I.E. all of the plumbing fixtures and  
34 trim relative to one specific specification should be submitted together).
  - 35 3. Submittals shall be grouped and adhere to the divisions in the submittal schedule. Submittals that do not  
36 conform to the submittal schedule and/or specification divisions will be rejected for re-submittal.

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38 **PART 2 – PRODUCTS – THIS SECTION NOT USED**

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40 **PART 3 - EXECUTION**

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42 **3.1. GENERAL CONTRACTORS PROCEDURES**

- 43 A. All required submittals will be uploaded to the Construction Administration-Submittal Drawings Library on the  
44 Project Management Web Site (PMWS) by the GC.
  - 45 1. The GC shall open a new Submittal Form in the Submittals Drawings Library for each required submittal  
46 from the Submittals schedule.
  - 47 2. Fill in required information on the form that will be used for routing the review and comments.
  - 48 3. Attach all documentation as described in Section 1.3 above.
    - 49 a. Submit samples under separate cover to the Project Architect when necessary.
- 50 B. Uploading the submittal indicates that the GC has reviewed and approved the submittal against the contract  
51 document requirements.
- 52 C. The GC shall discuss submittal status at all progress meetings and shall monitor submittal review/approval/re-  
53 submittal so as to not incur delays in the project schedule.
- 54 D. A completed upload of the submittal to the PMWS initiates the review process workflow.
- 55 E. The GC and sub-contractors shall provide re-submittals as required.

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**3.2. SUBMITTAL REVIEW**

- A. Upon completion of the submittal upload by the GC the PMWS automatically notifies the appropriate Architect/Engineer and Owner Representative by Division/Specification number that there is a submittal for review.
- B. The submittal shall be reviewed internally by the required Architect/Engineer and Owner Representative in a timely fashion and provide commentary on missing items, incorrect information, or incomplete shop drawings, etc as needed.
- C. When the internal review is completed the PMWS will notify the Project Architect the submittal is ready for final review.

**3.3. PROJECT ARCHITECTS REVIEW**

- A. Upon completion of the internal review the Project Architect shall review all internal review comments, confer with the CPM as needed and determine the appropriate disposition status for the submittal (approved or resubmit).
- C. The Project Architect shall summarize final internal review comments onto the submittal cover sheet, provide a final disposition of the submittal and update the review status of the submittal to "Complete..." (with or w/o comments) or "Rejected".
- D. A completed Final Review status initiates the PMWS to notify the GC and appropriate sub-contractor(s) that the review of the submittal has been completed.

**END OF SECTION**

SECTION 01 40 00  
QUALITY REQUIREMENTS

- 1
- 2
- 3 PART 1 – GENERAL
- 4 1.1 [SUMMARY](#)
- 5 1.2 [DEFINITIONS](#)
- 6 1.3 [DELEGATED-DESIGN SERVICES](#)
- 7 1.4 [CONFLICTING REQUIREMENTS](#)
- 8 1.5 [ACTION SUBMITTALS](#)
- 9 1.6 [INFORMATIONAL SUBMITTALS](#)
- 10 1.7 [REPORTS AND DOCUMENTS](#)
- 11 1.8 [QUALITY ASSURANCE](#)
- 12 1.9 [QUALITY CONTROL](#)
- 13 1.10 [SPECIAL TESTS AND INSPECTIONS](#)
- 14 PART 2 – PRODUCTS
- 15 NOT USED
- 16 PART 3 – EXECUTION
- 17 1.1 [TEST AND INSPECTION LOG](#)
- 18 1.2 [REPAIR AND PROTECTION](#)

19 **PART 1 - GENERAL**

20 **1.1 SUMMARY**

- 21 A. Section includes administrative and procedural requirements for quality assurance and quality control.
- 22 B. Testing and inspection services are required to verify compliance with requirements specified or indicated.
- 23 These services do not relieve Contractor of responsibility for compliance with the Contract Document
- 24 requirements.
- 25 1. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance
- 26 and quality-control procedures that facilitate compliance with the Contract Document requirements.
- 27 2. Requirements for Contractor to provide quality-assurance and quality-control services required by
- 28 Architect, Owner, **Commissioning Authority**, or authorities having jurisdiction are not limited by
- 29 provisions of this Section.

30 **1.2 DEFINITIONS**

- 31 A. Experienced: When used with an entity or individual, "experienced" unless otherwise further described
- 32 means having successfully completed a minimum of **five** previous projects similar in nature, size, and
- 33 extent to this Project; being familiar with special requirements indicated; and having complied with
- 34 requirements of authorities having jurisdiction.
- 35 B. Field Quality-Control Tests: Tests and inspections that are performed on-site for installation of the Work
- 36 and for completed Work.
- 37 C. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee,
- 38 Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation,
- 39 erection, application, assembly, and similar operations.
- 40 1. Use of trade-specific terminology in referring to a trade or entity does not require that certain
- 41 construction activities be performed by accredited or unionized individuals, or that requirements
- 42 specified apply exclusively to specific trade(s).
- 43 D. Mockups: Full-size physical assemblies that are constructed on-site either as freestanding temporary built
- 44 elements or as part of permanent construction. Mockups are constructed to verify selections made under
- 45 Sample submittals; to demonstrate aesthetic effects and qualities of materials and execution; to review
- 46 coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate
- 47 compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated,
- 48 approved mockups establish the standard by which the Work will be judged.
- 49 1. Laboratory Mockups: Full-size physical assemblies constructed and tested at testing facility to
- 50 verify performance characteristics.
- 51 2. Integrated Exterior Mockups: Mockups of the exterior envelope constructed on-site as **as part of**
- 52 **permanent construction**, consisting of multiple products, assemblies, and subassemblies.
- 53 3. Room Mockups: Mockups of typical interior spaces complete with wall, floor, and ceiling finishes;
- 54 doors; windows; millwork; casework; specialties; furnishings and equipment; and lighting.
- 55 E. Preconstruction Testing: Tests and inspections performed specifically for Project before products and
- 56 materials are incorporated into the Work, to verify performance or compliance with specified criteria.
- 57

- 1 F. Product Tests: Tests and inspections that are performed by a nationally recognized testing laboratory  
2 (NRTL) according to 29 CFR 1910.7, by a testing agency accredited according to NIST's National  
3 Voluntary Laboratory Accreditation Program (NVLAP), or by a testing agency qualified to conduct product  
4 testing and acceptable to authorities having jurisdiction, to establish product performance and compliance  
5 with specified requirements.  
6 G. Source Quality-Control Tests: Tests and inspections that are performed at the source; for example, plant,  
7 mill, factory, or shop.  
8 H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall  
9 mean the same as testing agency.  
10 I. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of  
11 the Work to guard against defects and deficiencies and substantiate that proposed construction will comply  
12 with requirements.  
13 J. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of  
14 the Work to evaluate that actual products incorporated into the Work and completed construction comply  
15 with requirements. Contractor's quality-control services do not include contract administration activities  
16 performed by Architect.

17 **1.3 DELEGATED-DESIGN SERVICES**

- 18 A. Performance and Design Criteria: Where professional design services or certifications by a design  
19 professional are specifically required of Contractor by the Contract Documents, provide products and  
20 systems complying with specific performance and design criteria indicated.

21 **1.4 CONFLICTING REQUIREMENTS**

- 22 A. Conflicting Standards and Other Requirements: If compliance with two or more standards or requirements  
23 are specified and the standards or requirements establish different or conflicting requirements for minimum  
24 quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that  
25 are different, but apparently equal, to Architect for direction before proceeding.  
26 B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum  
27 provided or performed. The actual installation may comply exactly with the minimum quantity or quality  
28 specified, or it may exceed the minimum within reasonable limits. To comply with these requirements,  
29 indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer  
30 uncertainties to Architect for a decision before proceeding.

31 **1.5 ACTION SUBMITTALS**

- 32 A. Delegated-Design Services Submittal: In addition to Shop Drawings, Product Data, and other required  
33 submittals, submit a statement signed and sealed by the responsible design professional, for each product  
34 and system specifically assigned to Contractor to be designed or certified by a design professional  
35 currently licensed in the State of Wisconsin, indicating that the products and systems are in compliance  
36 with performance and design criteria indicated. Include list of codes, loads, and other factors used in  
37 performing these services.

38 **1.6 INFORMATIONAL SUBMITTALS**

- 39 A. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of  
40 written statement of responsibility submitted to authorities having jurisdiction before starting work on the  
41 following systems:  
42 1. Seismic-force-resisting system, designated seismic system, or component listed in the Statement  
43 of Special Inspections.  
44 2. Main wind-force-resisting system or a wind-resisting component listed in the Statement of Special  
45 Inspections.  
46 B. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate  
47 their capabilities and experience. Include proof of qualifications in the form of a recent report on the  
48 inspection of the testing agency by a recognized authority.  
49 C. Permits, Licenses, and Certificates: For Owner's record, submit copies of permits, licenses, certifications,  
50 inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments,  
51 correspondence, records, and similar documents established for compliance with standards and  
52 regulations bearing on performance of the Work.  
53

- 1 **1.7 REPORTS AND DOCUMENTS**
- 2 A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections.
- 3 Include the following:
- 4 1. Date of issue.
- 5 2. Project title and number.
- 6 3. Name, address, telephone number, and email address of testing agency.
- 7 4. Dates and locations of samples and tests or inspections.
- 8 5. Names of individuals making tests and inspections.
- 9 6. Description of the Work and test and inspection method.
- 10 7. Identification of product and Specification Section.
- 11 8. Complete test or inspection data.
- 12 9. Test and inspection results and an interpretation of test results.
- 13 10. Record of temperature and weather conditions at time of sample taking and testing and inspection.
- 14 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract
- 15 Document requirements.
- 16 12. Name and signature of laboratory inspector.
- 17 13. Recommendations on retesting and reinspecting.
- 18 B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting
- 19 manufacturer's technical representative's tests and inspections specified in other Sections. Include the
- 20 following:
- 21 1. Statement on condition of substrates and their acceptability for installation of product.
- 22 2. Statement that products at Project site comply with requirements.
- 23 3. Summary of installation procedures being followed, whether they comply with requirements and, if
- 24 not, what corrective action was taken.
- 25 4. Results of operational and other tests and a statement of whether observed performance complies
- 26 with requirements.
- 27 5. Other required items indicated in individual Specification Sections.
- 28 C. Factory-Authorized Service Representative's Reports: Prepare written information documenting
- 29 manufacturer's factory-authorized service representative's tests and inspections specified in other
- 30 Sections. Include the following:
- 31 1. Statement that equipment complies with requirements.
- 32 2. Results of operational and other tests and a statement of whether observed performance complies
- 33 with requirements.
- 34 3. Other required items indicated in individual Specification Sections.
- 35 **1.8 QUALITY ASSURANCE**
- 36 A. General: Qualifications paragraphs in this article establish the minimum qualification levels required;
- 37 individual Specification Sections specify additional requirements.
- 38 B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those
- 39 indicated for this Project and with a record of successful in-service performance, as well as sufficient
- 40 production capacity to produce required units. As applicable, procure products from manufacturers able to
- 41 meet qualification requirements, warranty requirements, and technical or factory-authorized service
- 42 representative requirements.
- 43 C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this
- 44 Project and with a record of successful in-service performance, as well as sufficient production capacity to
- 45 produce required units.
- 46 D. Installer Qualifications: A firm or individual experienced in installing, erecting, applying, or assembling work
- 47 similar in material, design, and extent to that indicated for this Project, whose work has resulted in
- 48 construction with a record of successful in-service performance.
- 49 E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in
- 50 jurisdiction where Project is located and who is experienced in providing engineering services of the kind
- 51 indicated. Engineering services are defined as those performed for installations of the system, assembly,
- 52 or product that are similar in material, design, and extent to those indicated for this Project.
- 53 F. Specialists: Certain Specification Sections require that specific construction activities shall be performed
- 54 by entities who are recognized experts in those operations. Specialists shall satisfy qualification
- 55 requirements indicated and shall be engaged for the activities indicated.
- 56 1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.
- 57 G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and
- 58 capability to conduct testing and inspection indicated, as documented according to **ASTM E 329**; and with
- 59 additional qualifications specified in individual Sections; and, where required by authorities having
- 60 jurisdiction, that is acceptable to authorities.

- 1 H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who  
2 is trained and approved by manufacturer to observe and inspect installation of manufacturer's products  
3 that are similar in material, design, and extent to those indicated for this Project.
- 4 I. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer  
5 who is trained and approved by manufacturer to inspect installation of manufacturer's products that are  
6 similar in material, design, and extent to those indicated for this Project.
- 7 J. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for  
8 compliance with specified requirements for performance and test methods, comply with the following:  
9 1. Contractor responsibilities include the following:  
10 a. Provide test specimens representative of proposed products and construction.  
11 b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to  
12 prevent delaying the Work.  
13 c. Build laboratory mockups at testing facility using personnel, products, and methods of  
14 construction indicated for the completed Work.  
15 d. When testing is complete, remove test specimens and test assemblies, mockups (unless  
16 indicated to be part of the final work), **and laboratory mockups**; do not reuse products on  
17 Project.
- 18 2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and  
19 similar quality-assurance service to Architect **and Commissioning Authority**, with copy to  
20 Contractor. Interpret tests and inspections and state in each report whether tested and inspected  
21 work complies with or deviates from the Contract Documents.
- 22 K. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of  
23 construction and finish required to comply with the following requirements, using materials indicated for the  
24 completed Work:  
25 1. Build mockups of size indicated.  
26 2. Build mockups in location indicated or, if not indicated, as directed by Architect **or Owner**.  
27 3. Notify Architect **and Owner seven** days in advance of dates and times when mockups will be  
28 constructed.  
29 4. Employ supervisory personnel who will oversee mockup construction. Employ workers that will be  
30 employed to perform same tasks during the construction at Project.  
31 5. Demonstrate the proposed range of aesthetic effects and workmanship.  
32 6. Obtain Architect's **and Owner's** approval of mockups before starting corresponding work,  
33 fabrication, or construction.  
34 a. Allow **seven** days for initial review and each re-review of each mockup.  
35 7. Maintain mockups during construction in an undisturbed condition as a standard for judging the  
36 completed Work.  
37 8. Demolish and remove mockups when directed unless otherwise indicated.
- 38 L. Laboratory Mockups: Comply with requirements of preconstruction testing and those specified in individual  
39 Specification Sections.

#### 40 1.9 QUALITY CONTROL

- 41 A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will  
42 engage a qualified testing agency to perform these services.  
43 1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies  
44 engaged and a description of types of testing and inspection they are engaged to perform.  
45 2. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed  
46 to comply with the Contract Documents will be charged to Contractor.
- 47 B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's  
48 responsibility. Perform additional quality-control activities, whether specified or not, to verify and document  
49 that the Work complies with requirements.  
50 1. Engage a qualified testing agency to perform quality-control services.  
51 a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by  
52 Owner.  
53 2. Notify testing agencies at least **48** hours in advance of time when Work that requires testing or  
54 inspection will be performed.  
55 3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written  
56 report, in duplicate, of each quality-control service.  
57 4. Testing and inspection requested by Contractor and not required by the Contract Documents are  
58 Contractor's responsibility.  
59 5. Submit additional copies of each written report directly to authorities having jurisdiction, when they  
60 so direct.
- 61 C. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's

- 1 responsibility, provide quality-control services, including retesting and reinspecting, for construction that  
2 replaced Work that failed to comply with the Contract Documents.
- 3 D. Testing Agency Responsibilities: Cooperate with Architect, **Commissioning Authority, Owner** and  
4 Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
- 5 1. Notify Architect, **Commissioning Authority, Owner** and Contractor promptly of irregularities or  
6 deficiencies observed in the Work during performance of its services.
- 7 2. Determine the locations from which test samples will be taken and in which in-situ tests are  
8 conducted.
- 9 3. Conduct and interpret tests and inspections and state in each report whether tested and inspected  
10 work complies with or deviates from requirements.
- 11 4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control  
12 service through Contractor.
- 13 5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or  
14 accept any portion of the Work.
- 15 6. Do not perform duties of Contractor.
- 16 E. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to  
17 inspect field-assembled components and equipment installation, including service connections. Report  
18 results in writing as specified in Section 01 33 00 "Submittal Procedures."
- 19 F. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to  
20 observe and inspect the Work. Manufacturer's technical representative's services include participation in  
21 preinstallation conferences, examination of substrates and conditions, verification of materials, observation  
22 of Installer activities, inspection of completed portions of the Work, and submittal of written reports.
- 23 G. Associated Contractor Services: Cooperate with agencies and representatives performing required tests,  
24 inspections, and similar quality-control services, and provide reasonable auxiliary services as requested.  
25 Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the  
26 following:
- 27 1. Access to the Work.
- 28 2. Incidental labor and facilities necessary to facilitate tests and inspections.
- 29 3. Adequate quantities of representative samples of materials that require testing and inspection.  
30 Assist agency in obtaining samples.
- 31 4. Facilities for storage and field curing of test samples.
- 32 5. Preliminary design mix proposed for use for material mixes that require control by testing agency.
- 33 6. Security and protection for samples and for testing and inspection equipment at Project site.
- 34 H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality-  
35 control services with a minimum of delay and to avoid necessity of removing and replacing construction to  
36 accommodate testing and inspection.
- 37 1. Schedule times for tests, inspections, obtaining samples, and similar activities.

38 **1.10 SPECIAL TESTS AND INSPECTIONS**

- 39 A. Special Tests and Inspections: **Owner will engage** a qualified **testing agency** to conduct special tests  
40 and inspections required by authorities having jurisdiction as the responsibility of Owner, and as follows:
- 41 1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and  
42 reviewing the completeness and adequacy of those procedures to perform the Work.
- 43 2. Notifying Architect, **Commissioning Authority, Owner**, and Contractor promptly of irregularities  
44 and deficiencies observed in the Work during performance of its services.
- 45 3. Submitting a certified written report of each test, inspection, and similar quality-control service to  
46 Architect and **Commissioning Authority, through Owner** with copy to Contractor and to  
47 authorities having jurisdiction.
- 48 4. Submitting a final report of special tests and inspections at Substantial Completion, which includes  
49 a list of unresolved deficiencies.
- 50 5. Interpreting tests and inspections and stating in each report whether tested and inspected work  
51 complies with or deviates from the Contract Documents.
- 52 6. Retesting and reinspecting corrected work.
- 53

1 **PART 2 - PRODUCTS (Not Used)**

2 **PART 3 - EXECUTION**

3 **3.1 TEST AND INSPECTION LOG**

- 4 A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:
- 5 1. Date test or inspection was conducted.
  - 6 2. Description of the Work tested or inspected.
  - 7 3. Date test or inspection results were transmitted to Architect.
  - 8 4. Identification of testing agency or special inspector conducting test or inspection.
- 9 B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and  
10 inspection log for Architect's, **Commissioning Authority's, and Owner's** reference during normal working  
11 hours.
- 12 1. Submit log at Project closeout as part of Project Record Documents.

13 **3.2 REPAIR AND PROTECTION**

- 14 A. General: On completion of testing, inspection, sample taking, and similar services, repair damaged  
15 construction and restore substrates and finishes.
- 16 1. Provide materials and comply with installation requirements specified in other Specification  
17 Sections or matching existing substrates and finishes. Restore patched areas and extend  
18 restoration into adjoining areas with durable seams that are as invisible as possible. Comply with  
19 the Contract Document requirements for cutting and patching in Section 01 73 00 "Execution."
- 20 B. Protect construction exposed by or for quality-control service activities.
- 21 C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for  
22 quality-control services.
- 23

**END OF SECTION**



SECTION 01 42 00  
REFERENCES

PART 1 – GENERAL

- 1.1 [DEFINITIONS](#)
- 1.2 [INDUSTRY STANDARDS](#)
- 1.3 [ABBREVIATIONS AND ACRONYMS](#)

PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

Not Used

**PART 1 - GENERAL**

**1.1 DEFINITIONS**

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
- B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.
- C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."
- D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."
- E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.
- F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- G. "Install": Unload, temporarily store, unpack, assemble, erect, place, anchor, apply, work to dimension, finish, cure, protect, clean, and similar operations at Project site.
- H. "Provide": Furnish and install, complete and ready for the intended use.
- I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

**1.2 INDUSTRY STANDARDS**

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
- B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.
- C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
  - 1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

**1.3 ABBREVIATIONS AND ACRONYMS**

- A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States."
- B. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list.
  - 1. AABC - Associated Air Balance Council; [www.aabc.com](http://www.aabc.com).
  - 2. AAMA - American Architectural Manufacturers Association; [www.aamanet.org](http://www.aamanet.org).
  - 3. AAPFCO - Association of American Plant Food Control Officials; [www.aapfco.org](http://www.aapfco.org).
  - 4. AASHTO - American Association of State Highway and Transportation Officials; [www.transportation.org](http://www.transportation.org).
  - 5. AATCC - American Association of Textile Chemists and Colorists; [www.aatcc.org](http://www.aatcc.org).
  - 6. ABMA - American Bearing Manufacturers Association; [www.americanbearings.org](http://www.americanbearings.org).

7. ABMA - American Boiler Manufacturers Association; [www.abma.com](http://www.abma.com).
8. ACI - American Concrete Institute; (Formerly: ACI International); [www.abma.com](http://www.abma.com).
9. ACPA - American Concrete Pipe Association; [www.concrete-pipe.org](http://www.concrete-pipe.org).
10. AEIC - Association of Edison Illuminating Companies, Inc. (The); [www.aeic.org](http://www.aeic.org).
11. AF&PA - American Forest & Paper Association; [www.afandpa.org](http://www.afandpa.org).
12. AGA - American Gas Association; [www.aga.org](http://www.aga.org).
13. AHAM - Association of Home Appliance Manufacturers; [www.aham.org](http://www.aham.org).
14. AHRI - Air-Conditioning, Heating, and Refrigeration Institute (The); [www.ahrinet.org](http://www.ahrinet.org).
15. AI - Asphalt Institute; [www.asphaltinstitute.org](http://www.asphaltinstitute.org).
16. AIA - American Institute of Architects (The); [www.aia.org](http://www.aia.org).
17. AISC - American Institute of Steel Construction; [www.aisc.org](http://www.aisc.org).
18. AISI - American Iron and Steel Institute; <http://www.steel.org>.
19. AITC - American Institute of Timber Construction; [www.aitc-glulam.org](http://www.aitc-glulam.org).
20. AMCA - Air Movement and Control Association International, Inc.; [www.amca.org](http://www.amca.org).
21. ANSI - American National Standards Institute; [www.ansi.org](http://www.ansi.org).
22. AOSA - Association of Official Seed Analysts, Inc.; [www.aosaseed.com](http://www.aosaseed.com).
23. APA - APA - The Engineered Wood Association; [www.apawood.org](http://www.apawood.org).
24. APA - Architectural Precast Association; [www.archprecast.org](http://www.archprecast.org).
25. API - American Petroleum Institute; [www.api.org](http://www.api.org).
26. ARI - Air-Conditioning & Refrigeration Institute; (See AHRI).
27. ARI - American Refrigeration Institute; (See AHRI).
28. ARMA - Asphalt Roofing Manufacturers Association; [www.asphaltroofing.org](http://www.asphaltroofing.org).
29. ASCE - American Society of Civil Engineers; [www.asce.org](http://www.asce.org).
30. ASCE/SEI - American Society of Civil Engineers/Structural Engineering Institute; (See ASCE).
31. ASHRAE - American Society of Heating, Refrigerating and Air-Conditioning Engineers; [www.ashrae.org](http://www.ashrae.org).
32. ASME - ASME International; (American Society of Mechanical Engineers); [www.asme.org](http://www.asme.org).
33. ASSE - American Society of Safety Engineers (The); [www.asse.org](http://www.asse.org).
34. ASSE - American Society of Sanitary Engineering; [www.asse-plumbing.org](http://www.asse-plumbing.org).
35. ASTM - ASTM International; [www.astm.org](http://www.astm.org).
36. ATIS - Alliance for Telecommunications Industry Solutions; [www.atis.org](http://www.atis.org).
37. AWEA - American Wind Energy Association; [www.awea.org](http://www.awea.org).
38. AWI - Architectural Woodwork Institute; [www.awinet.org](http://www.awinet.org).
39. AWMAC - Architectural Woodwork Manufacturers Association of Canada; [www.awmac.com](http://www.awmac.com).
40. AWPA - American Wood Protection Association; [www.awpa.com](http://www.awpa.com).
41. AWS - American Welding Society; [www.aws.org](http://www.aws.org).
42. AWWA - American Water Works Association; [www.awwa.org](http://www.awwa.org).
43. BHMA - Builders Hardware Manufacturers Association; [www.buildershardware.com](http://www.buildershardware.com).
44. BIA - Brick Industry Association (The); [www.gobrick.com](http://www.gobrick.com).
45. BICSI - BICSI, Inc.; [www.bicsi.org](http://www.bicsi.org).
46. BIFMA - BIFMA International; (Business and Institutional Furniture Manufacturer's Association); [www.bifma.org](http://www.bifma.org).
47. BISSC - Baking Industry Sanitation Standards Committee; [www.bissc.org](http://www.bissc.org).
48. BWF - Badminton World Federation; (Formerly: International Badminton Federation); [www.bissc.org](http://www.bissc.org).
49. CDA - Copper Development Association; [www.copper.org](http://www.copper.org).
50. CEA - Canadian Electricity Association; [www.electricity.ca](http://www.electricity.ca).
51. CEA - Consumer Electronics Association; [www.ce.org](http://www.ce.org).
52. CFFA - Chemical Fabrics and Film Association, Inc.; [www.chemicalfabricsandfilm.com](http://www.chemicalfabricsandfilm.com).
53. CFSEI - Cold-Formed Steel Engineers Institute; [www.cfsei.org](http://www.cfsei.org).
54. CGA - Compressed Gas Association; [www.cganet.com](http://www.cganet.com).
55. CIMA - Cellulose Insulation Manufacturers Association; [www.cellulose.org](http://www.cellulose.org).
56. CISCA - Ceilings & Interior Systems Construction Association; [www.cisca.org](http://www.cisca.org).
57. CISPI - Cast Iron Soil Pipe Institute; [www.cispi.org](http://www.cispi.org).
58. CLFMI - Chain Link Fence Manufacturers Institute; [www.chainlinkinfo.org](http://www.chainlinkinfo.org).
59. CPA - Composite Panel Association; [www.pbmdf.com](http://www.pbmdf.com).
60. CRI - Carpet and Rug Institute (The); [www.carpet-rug.org](http://www.carpet-rug.org).
61. CRRC - Cool Roof Rating Council; [www.coolroofs.org](http://www.coolroofs.org).
62. CRSI - Concrete Reinforcing Steel Institute; [www.crsi.org](http://www.crsi.org).
63. CSA - Canadian Standards Association; [www.csa.ca](http://www.csa.ca).
64. CSA - CSA International; (Formerly: IAS - International Approval Services); [www.csa-international.org](http://www.csa-international.org).

65. CSI - Construction Specifications Institute (The); [www.csinet.org](http://www.csinet.org).
66. CSSB - Cedar Shake & Shingle Bureau; [www.cedarbureau.org](http://www.cedarbureau.org).
67. CTI - Cooling Technology Institute; (Formerly: Cooling Tower Institute); [www.cti.org](http://www.cti.org).
68. CWC - Composite Wood Council; (See CPA).
69. DASMA - Door and Access Systems Manufacturers Association; [www.dasma.com](http://www.dasma.com).
70. DHI - Door and Hardware Institute; [www.dhi.org](http://www.dhi.org).
71. ECA - Electronic Components Association; (See ECIA).
72. ECAMA - Electronic Components Assemblies & Materials Association; (See ECIA).
73. ECIA - Electronic Components Industry Association; [www.eciaonline.org](http://www.eciaonline.org).
74. EIA - Electronic Industries Alliance; (See TIA).
75. EIMA - EIFS Industry Members Association; [www.eima.com](http://www.eima.com).
76. EJMA - Expansion Joint Manufacturers Association, Inc.; [www.ejma.org](http://www.ejma.org).
77. ESD - ESD Association; (Electrostatic Discharge Association); [www.esda.org](http://www.esda.org).
78. ESTA - Entertainment Services and Technology Association; (See PLASA).
79. EVO - Efficiency Valuation Organization; [www.evo-world.org](http://www.evo-world.org).
80. FCI - Fluid Controls Institute; [www.fluidcontrolsintitute.org](http://www.fluidcontrolsintitute.org).
81. FIBA - Federation Internationale de Basketball; (The International Basketball Federation); [www.fiba.com](http://www.fiba.com).
82. FIVB - Federation Internationale de Volleyball; (The International Volleyball Federation); [www.fivb.org](http://www.fivb.org).
83. FM Approvals - FM Approvals LLC; [www.fmglobal.com](http://www.fmglobal.com).
84. FM Global - FM Global; (Formerly: FMG - FM Global); [www.fmglobal.com](http://www.fmglobal.com).
85. FRSA - Florida Roofing, Sheet Metal & Air Conditioning Contractors Association, Inc.; [www.floridarroof.com](http://www.floridarroof.com).
86. FSA - Fluid Sealing Association; [www.fluidsealing.com](http://www.fluidsealing.com).
87. FSC - Forest Stewardship Council U.S.; [www.fscus.org](http://www.fscus.org).
88. GA - Gypsum Association; [www.gypsum.org](http://www.gypsum.org).
89. GANA - Glass Association of North America; [www.glasswebsite.com](http://www.glasswebsite.com).
90. GS - Green Seal; [www.greenseal.org](http://www.greenseal.org).
91. HI - Hydraulic Institute; [www.pumps.org](http://www.pumps.org).
92. HI/GAMA - Hydronics Institute/Gas Appliance Manufacturers Association; (See AHRI).
93. HMMA - Hollow Metal Manufacturers Association; (See NAAMM).
94. HPVA - Hardwood Plywood & Veneer Association; [www.hpva.org](http://www.hpva.org).
95. HPW - H. P. White Laboratory, Inc.; [www.hpwhite.com](http://www.hpwhite.com).
96. IAPSC - International Association of Professional Security Consultants; [www.iapsc.org](http://www.iapsc.org).
97. IAS - International Accreditation Service; [www.iasonline.org](http://www.iasonline.org).
98. IAS - International Approval Services; (See CSA).
99. ICBO - International Conference of Building Officials; (See ICC).
100. ICC - International Code Council; [www.iccsafe.org](http://www.iccsafe.org).
101. ICEA - Insulated Cable Engineers Association, Inc.; [www.icea.net](http://www.icea.net).
102. ICPA - International Cast Polymer Alliance; [www.icpa-hq.org](http://www.icpa-hq.org).
103. ICRI - International Concrete Repair Institute, Inc.; [www.icri.org](http://www.icri.org).
104. IEC - International Electrotechnical Commission; [www.iec.ch](http://www.iec.ch).
105. IEEE - Institute of Electrical and Electronics Engineers, Inc. (The); [www.ieee.org](http://www.ieee.org).
106. IES - Illuminating Engineering Society; (Formerly: Illuminating Engineering Society of North America); [www.ies.org](http://www.ies.org).
107. IESNA - Illuminating Engineering Society of North America; (See IES).
108. IEST - Institute of Environmental Sciences and Technology; [www.iest.org](http://www.iest.org).
109. IGMA - Insulating Glass Manufacturers Alliance; [www.igmaonline.org](http://www.igmaonline.org).
110. IGSHPA - International Ground Source Heat Pump Association; [www.igshpa.okstate.edu](http://www.igshpa.okstate.edu).
111. ILI - Indiana Limestone Institute of America, Inc.; [www.iliai.com](http://www.iliai.com).
112. Intertek - Intertek Group; (Formerly: ETL SEMCO; Intertek Testing Service NA); [www.intertek.com](http://www.intertek.com).
113. ISA - International Society of Automation (The); (Formerly: Instrumentation, Systems, and Automation Society); [www.isa.org](http://www.isa.org).
114. ISAS - Instrumentation, Systems, and Automation Society (The); (See ISA).
115. ISFA - International Surface Fabricators Association; (Formerly: International Solid Surface Fabricators Association); [www.isfanow.org](http://www.isfanow.org).
116. ISO - International Organization for Standardization; [www.iso.org](http://www.iso.org).
117. ISSFA - International Solid Surface Fabricators Association; (See ISFA).
118. ITU - International Telecommunication Union; [www.itu.int/home](http://www.itu.int/home).
119. KCMA - Kitchen Cabinet Manufacturers Association; [www.kcma.org](http://www.kcma.org).
120. LMA - Laminating Materials Association; (See CPA).

121. LPI - Lightning Protection Institute; [www.lightning.org](http://www.lightning.org).
122. MBMA - Metal Building Manufacturers Association; [www.mbma.com](http://www.mbma.com).
123. MCA - Metal Construction Association; [www.metalconstruction.org](http://www.metalconstruction.org).
124. MFMA - Maple Flooring Manufacturers Association, Inc.; [www.maplefloor.org](http://www.maplefloor.org).
125. MFMA - Metal Framing Manufacturers Association, Inc.; [www.metalframingmfg.org](http://www.metalframingmfg.org).
126. MHIA - Material Handling Industry of America; [www.mhia.org](http://www.mhia.org).
127. MIA - Marble Institute of America; [www.mhia.org](http://www.mhia.org).
128. MMPA - Moulding & Millwork Producers Association; [www.wmmpa.com](http://www.wmmpa.com).
129. MPI - Master Painters Institute; [www.paintinfo.com](http://www.paintinfo.com).
130. MSS - Manufacturers Standardization Society of The Valve and Fittings Industry Inc.; [www.mss-hq.org](http://www.mss-hq.org).
131. NAAMM - National Association of Architectural Metal Manufacturers; [www.naamm.org](http://www.naamm.org).
132. NACE - NACE International; (National Association of Corrosion Engineers International); [www.nace.org](http://www.nace.org).
133. NADCA - National Air Duct Cleaners Association; [www.nadca.com](http://www.nadca.com).
134. NAIMA - North American Insulation Manufacturers Association; [www.naima.org](http://www.naima.org).
135. NBGQA - National Building Granite Quarries Association, Inc.; [www.nbgqa.com](http://www.nbgqa.com).
136. NBI - New Buildings Institute; [www.newbuildings.org](http://www.newbuildings.org).
137. NCAA - National Collegiate Athletic Association (The); [www.ncaa.org](http://www.ncaa.org).
138. NCMA - National Concrete Masonry Association; [www.ncma.org](http://www.ncma.org).
139. NEBB - National Environmental Balancing Bureau; [www.nebb.org](http://www.nebb.org).
140. NECA - National Electrical Contractors Association; [www.necanet.org](http://www.necanet.org).
141. NeLMA - Northeastern Lumber Manufacturers Association; [www.nelma.org](http://www.nelma.org).
142. NEMA - National Electrical Manufacturers Association; [www.nema.org](http://www.nema.org).
143. NETA - InterNational Electrical Testing Association; [www.netaworld.org](http://www.netaworld.org).
144. NFHS - National Federation of State High School Associations; [www.nfhs.org](http://www.nfhs.org).
145. NFPA - National Fire Protection Association; [www.nfpa.org](http://www.nfpa.org).
146. NFPA - NFPA International; (See NFPA).
147. NFRC - National Fenestration Rating Council; [www.nfrc.org](http://www.nfrc.org).
148. NHLA - National Hardwood Lumber Association; [www.nhla.com](http://www.nhla.com).
149. NLGA - National Lumber Grades Authority; [www.nlga.org](http://www.nlga.org).
150. NOFMA - National Oak Flooring Manufacturers Association; (See NWFA).
151. NOMMA - National Ornamental & Miscellaneous Metals Association; [www.nomma.org](http://www.nomma.org).
152. NRCA - National Roofing Contractors Association; [www.nrca.net](http://www.nrca.net).
153. NRMCA - National Ready Mixed Concrete Association; [www.nrmca.org](http://www.nrmca.org).
154. NSF - NSF International; [www.nsf.org](http://www.nsf.org).
155. NSPE - National Society of Professional Engineers; [www.nspe.org](http://www.nspe.org).
156. NSSGA - National Stone, Sand & Gravel Association; [www.nssga.org](http://www.nssga.org).
157. NTMA - National Terrazzo & Mosaic Association, Inc. (The); [www.ntma.com](http://www.ntma.com).
158. NWFA - National Wood Flooring Association; [www.nwfa.org](http://www.nwfa.org).
159. PCI - Precast/Prestressed Concrete Institute; [www.pci.org](http://www.pci.org).
160. PDI - Plumbing & Drainage Institute; [www.pdionline.org](http://www.pdionline.org).
161. PLASA - PLASA; (Formerly: ESTA - Entertainment Services and Technology Association); [www.plasa.org](http://www.plasa.org).
162. RCSC - Research Council on Structural Connections; [www.boltcouncil.org](http://www.boltcouncil.org).
163. RFCI - Resilient Floor Covering Institute; [www.rfci.com](http://www.rfci.com).
164. RIS - Redwood Inspection Service; [www.redwoodinspection.com](http://www.redwoodinspection.com).
165. SAE - SAE International; [www.sae.org](http://www.sae.org).
166. SCTE - Society of Cable Telecommunications Engineers; [www.scte.org](http://www.scte.org).
167. SDI - Steel Deck Institute; [www.sdi.org](http://www.sdi.org).
168. SDI - Steel Door Institute; [www.steeldoor.org](http://www.steeldoor.org).
169. SEFA - Scientific Equipment and Furniture Association (The); [www.sefalabs.com](http://www.sefalabs.com).
170. SEI/ASCE - Structural Engineering Institute/American Society of Civil Engineers; (See ASCE).
171. SIA - Security Industry Association; [www.siaonline.org](http://www.siaonline.org).
172. SJI - Steel Joist Institute; [www.steeljoist.org](http://www.steeljoist.org).
173. SMA - Screen Manufacturers Association; [www.smainfo.org](http://www.smainfo.org).
174. SMACNA - Sheet Metal and Air Conditioning Contractors' National Association; [www.smacna.org](http://www.smacna.org).
175. SMPTE - Society of Motion Picture and Television Engineers; [www.smpte.org](http://www.smpte.org).
176. SPFA - Spray Polyurethane Foam Alliance; [www.sprayfoam.org](http://www.sprayfoam.org).
177. SPIB - Southern Pine Inspection Bureau; [www.spib.org](http://www.spib.org).
178. SPRI - Single Ply Roofing Industry; [www.spri.org](http://www.spri.org).
179. SRCC - Solar Rating & Certification Corporation; [www.solar-rating.org](http://www.solar-rating.org).

180. SSINA - Specialty Steel Industry of North America; [www.ssina.com](http://www.ssina.com).
  181. SSPC - SSPC: The Society for Protective Coatings; [www.sspc.org](http://www.sspc.org).
  182. STI - Steel Tank Institute; [www.steeltank.com](http://www.steeltank.com).
  183. SWI - Steel Window Institute; [www.steelwindows.com](http://www.steelwindows.com).
  184. SWPA - Submersible Wastewater Pump Association; [www.swpa.org](http://www.swpa.org).
  185. TCA - Tilt-Up Concrete Association; [www.tilt-up.org](http://www.tilt-up.org).
  186. TCNA - Tile Council of North America, Inc.; [www.tileusa.com](http://www.tileusa.com).
  187. TEMA - Tubular Exchanger Manufacturers Association, Inc.; [www.tema.org](http://www.tema.org).
  188. TIA - Telecommunications Industry Association (The); (Formerly: TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance); [www.tiaonline.org](http://www.tiaonline.org).
  189. TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance; (See TIA).
  190. TMS - The Masonry Society; [www.masonrysociety.org](http://www.masonrysociety.org).
  191. TPI - Truss Plate Institute; [www.tpinst.org](http://www.tpinst.org).
  192. TPI - Turfgrass Producers International; [www.turfgrassod.org](http://www.turfgrassod.org).
  193. TRI - Tile Roofing Institute; [www.tilerroofing.org](http://www.tilerroofing.org).
  194. UL - Underwriters Laboratories Inc.; [www.ul.com](http://www.ul.com).
  195. UNI - Uni-Bell PVC Pipe Association; [www.uni-bell.org](http://www.uni-bell.org).
  196. USAV - USA Volleyball; [www.usavolleyball.org](http://www.usavolleyball.org).
  197. USGBC - U.S. Green Building Council; [www.usgbc.org](http://www.usgbc.org).
  198. USITT - United States Institute for Theatre Technology, Inc.; [www.usitt.org](http://www.usitt.org).
  199. WASTEC - Waste Equipment Technology Association; [www.wastec.org](http://www.wastec.org).
  200. WCLIB - West Coast Lumber Inspection Bureau; [www.wclib.org](http://www.wclib.org).
  201. WCMA - Window Covering Manufacturers Association; [www.wcmanet.org](http://www.wcmanet.org).
  202. WDMA - Window & Door Manufacturers Association; [www.wdma.com](http://www.wdma.com).
  203. WI - Woodwork Institute; [www.wicnet.org](http://www.wicnet.org).
  204. WSRCA - Western States Roofing Contractors Association; [www.wsrca.com](http://www.wsrca.com).
  205. WWPA - Western Wood Products Association; [www.wwpa.org](http://www.wwpa.org).
- C. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list.
1. DIN - Deutsches Institut für Normung e.V.; [www.din.de](http://www.din.de).
  2. IAPMO - International Association of Plumbing and Mechanical Officials; [www.iapmo.org](http://www.iapmo.org).
  3. ICC - International Code Council; [www.iccsafe.org](http://www.iccsafe.org).
  4. ICC-ES - ICC Evaluation Service, LLC; [www.icc-es.org](http://www.icc-es.org).
- D. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list.
1. COE - Army Corps of Engineers; [www.usace.army.mil](http://www.usace.army.mil).
  2. CPSC - Consumer Product Safety Commission; [www.cpsc.gov](http://www.cpsc.gov).
  3. DOC - Department of Commerce; National Institute of Standards and Technology; [www.nist.gov](http://www.nist.gov).
  4. DOD - Department of Defense; [www.quicksearch.dla.mil](http://www.quicksearch.dla.mil).
  5. DOE - Department of Energy; [www.energy.gov](http://www.energy.gov).
  6. EPA - Environmental Protection Agency; [www.epa.gov](http://www.epa.gov).
  7. FAA - Federal Aviation Administration; [www.faa.gov](http://www.faa.gov).
  8. FG - Federal Government Publications; [www.gpo.gov/fdsys](http://www.gpo.gov/fdsys).
  9. GSA - General Services Administration; [www.gsa.gov](http://www.gsa.gov).
  10. HUD - Department of Housing and Urban Development; [www.hud.gov](http://www.hud.gov).
  11. LBL - Lawrence Berkeley National Laboratory; Environmental Energy Technologies Division; [www.eetd.lbl.gov](http://www.eetd.lbl.gov).
  12. OSHA - Occupational Safety & Health Administration; [www.osha.gov](http://www.osha.gov).
  13. SD - Department of State; [www.state.gov](http://www.state.gov).
  14. TRB - Transportation Research Board; National Cooperative Highway Research Program; The National Academies; [www.trb.org](http://www.trb.org).
  15. USDA - Department of Agriculture; Agriculture Research Service; U.S. Salinity Laboratory; [www.ars.usda.gov](http://www.ars.usda.gov).
  16. USDA - Department of Agriculture; Rural Utilities Service; [www.usda.gov](http://www.usda.gov).
  17. USDOJ - Department of Justice; Office of Justice Programs; National Institute of Justice; [www.ojp.usdoj.gov](http://www.ojp.usdoj.gov).
  18. USP - U.S. Pharmacopeial Convention; [www.usp.org](http://www.usp.org).
  19. USPS - United States Postal Service; [www.usps.com](http://www.usps.com).
- E. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list.
1. CFR - Code of Federal Regulations; Available from Government Printing Office;

- [www.gpo.gov/fdsys](http://www.gpo.gov/fdsys).
2. DOD - Department of Defense; Military Specifications and Standards; Available from DLA Document Services; [www.quicksearch.dla.mil](http://www.quicksearch.dla.mil).
  3. DSCC - Defense Supply Center Columbus; (See FS).
  4. FED-STD - Federal Standard; (See FS).
  5. FS - Federal Specification; Available from DLA Document Services; [www.quicksearch.dla.mil](http://www.quicksearch.dla.mil).
    - a. Available from Defense Standardization Program; [www.dsp.dla.mil](http://www.dsp.dla.mil).
    - b. Available from General Services Administration; [www.gsa.gov](http://www.gsa.gov).
    - c. Available from National Institute of Building Sciences/Whole Building Design Guide; [www.wbdg.org/ccb](http://www.wbdg.org/ccb).
  6. MILSPEC - Military Specification and Standards; (See DOD).
  7. USAB - United States Access Board; [www.access-board.gov](http://www.access-board.gov).
  8. USATBCB - U.S. Architectural & Transportation Barriers Compliance Board; (See USAB).
- F. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list.
1. CBHF; State of California; Department of Consumer Affairs; Bureau of Electronic and Appliance Repair, Home Furnishings and Thermal Insulation; [www.bearhfti.ca.gov](http://www.bearhfti.ca.gov).
  2. CCR; California Code of Regulations; Office of Administrative Law; California Title 24 Energy Code; [www.calregs.com](http://www.calregs.com).
  3. CDHS; California Department of Health Services; (See CDPH).
  4. CDPH; California Department of Public Health; Indoor Air Quality Program; [www.cal-iaq.org](http://www.cal-iaq.org).
  5. CPUC; California Public Utilities Commission; [www.cpuc.ca.gov](http://www.cpuc.ca.gov).
  6. SCAQMD; South Coast Air Quality Management District; [www.aqmd.gov](http://www.aqmd.gov).
  7. TFS; Texas A&M Forest Service; Sustainable Forestry and Economic Development; [www.txforestservation.tamu.edu](http://www.txforestservation.tamu.edu).

**PART 2 - PRODUCTS (Not Used)**

**PART 3 - EXECUTION (Not Used)**

**END OF SECTION**

**SECTION 01 43 39  
MOCKUPS**

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**PART 1 – GENERAL**

**1.1. SUMMARY**

- A. Definition
- Mockups are field samples constructed, applied, or assembled at the project site for review by the Owner, Owners Representative, Architect and Consultants.
  - Mockups are three dimensional, true scale models that illustrate materials and methods, equipment, workmanship, or location; based on plans, details, and assemblies.
- B. Approved mockups establish the standard of quality by which the final work will be judged.
- C. Approved mockups shall be properly documented and entered into the Submittal Library on the Project Management Web Site like any other required submittal. See section 3.4 below for more information.

**1.2. RELATED SPECIFICATIONS**

- A. Section 01 26 13 Request for Information (RFI)
- B. Section 01 26 46 Change Bulletin (CB)
- C. Section 01 26 63 Change Order (CO)
- D. Section 01 31 19 Project Meetings
- E. Section 01 32 16 Construction Progress Schedules
- F. Section 01 33 23 Submittals
- G. Section 01 45 00 Quality Control

**1.3. RELATED DOCUMENTS**

- A. The following documents shall be used for preparing mockups.
- All plans, specifications, and details including those derived as revisions (RFI, CB, CO).
  - Construction Progress Schedules. Mockups shall be done and completed in a timely fashion for review and approval so as to not impact the Contractors project schedule.
  - Any Manufacturers installation/assembly instructions.

**1.4. PERFORMANCE REQUIREMENTS**

- A. All Contractors shall be responsible for providing and constructing mockups as specified in their Division of Work in the plans and specifications.
- B. Materials to be used shall be as specified in the construction documents, full sized and properly assembled.
- C. Completed mockups shall be of sufficient size to provide visible detail of all components as needed for the sample.

**1.5. QUALITY ASSURANCE**

- A. The General Contractor (GC) shall be responsible for coordinating all of the following as needed:
- Designating the location for the mockup construction
  - Coordinating the work of all contractors and materials required to complete the mockup
  - Ensuring that the mockup meets the intent of the construction documents before scheduling the mockup review meeting.

1  
2 **PART 2 - PRODUCTS**

3  
4 **2.1. MATERIALS**

- 5 A. The materials used in mockups shall be only those materials indicated in the plans, specifications, and favorably  
6 reviewed submittals.  
7 B. Mockups shall be made of full scale materials as delivered to the project site.  
8 C. All materials associated with a particular detail, construction method, manufacturer's installation instructions  
9 shall be properly represented and visible in the mockup. This includes but is not limited to finished mortar joints,  
10 sealants, backer rods, tie bars, rebar, etc.  
11

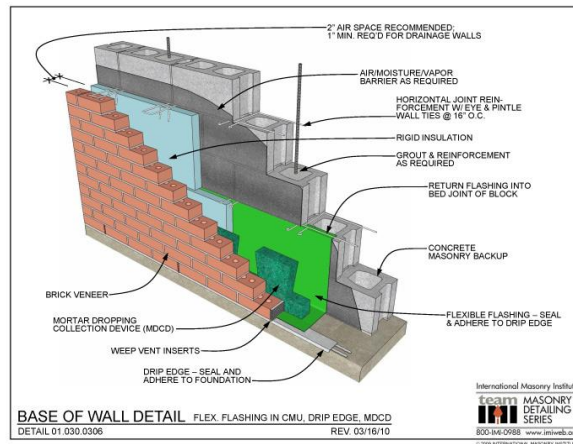
12 **PART 3 - EXECUTION**

13  
14 **3.1. REVIEW THE PLANS AND SPECIFICATIONS**

- 15 A. The GC shall review the plans and specifications with all required contractors prior to constructing the mockup.  
16 1. Mockups that will be built and remain in place, if favorably reviewed, will be installed in an area easily  
17 accessible for review.  
18 2. Mockups that will not be built in place or will not remain will be constructed in a space on the project site  
19 protected from weather, construction traffic, and other such disturbances until such time as the  
20 associated work has been completed.  
21 3. Insure all products being represented in the mockup meet the plans, specifications, and any published  
22 changes.  
23

24 **3.2. MOCKUP CONSTRUCTION**

- 25 A. Mockups shall be of sufficient size to show various material adjacencies, connectivity, patterns, and other such  
26 related features.  
27 B. Mockups shall be constructed in a layered fashion so that all products being used can be seen and evaluated.  
28 C. The construction detail below is an example of a properly layered mockup.  
29



- 30  
31 D. Required Mockups:  
32 1. **26 56 00:** Exterior façade lighting on MLK (south elevation) side of building: One new light fixture  
33 reference CC attachment to existing lighting (removed) support bracket, including repainting support  
34 bracket.  
35 2. **26 56 00:** Exterior façade lighting on MLK (south elevation) side of building: One pair of new light fixtures  
36 reference DD attachment to Level 2 exterior window sill including patch cabling pathway to and from  
37 fixtures through sill stone assembly.  
38 3. **05 73 00:** New exterior railing RAIL-1 installation detail at corner of existing light well / areaway, min. 4ft  
39 long from each corner. Location: New expanded areaway at north-west corner of building.  
40 4. **05 73 00:** New interior stair railing RAIL-3 at new stair: 4ft long railing at floor opening plus 4ft long railing  
41 including handrail at stair flight including anchoring detail to floor opening and stair stringer.  
42 5. **08 44 13:** Junction of new curtain wall system GLWS-4 with existing clay brick masonry wall at the north  
43 elevation. Size to be based on either Level 0 or Level 1 entry door framing height and width at the north



- 1 elevation, and to include the special shape movement joint at the intersection between framing system  
2 and masonry wall.
- 3 6. **07 42 13.13:** Corner of metal panel cladding system MTLP-1 at external corner, and at curtain wall jamb.  
4 Base size on at least three typical panel heights per the enlarged elevations and one panel width per  
5 manufacturer's typical panel sizes for the design intent.
- 6 7. **08 51 13:** New replacement window WIN-1 at level 2, Storage Room 221, east end of storage room. One  
7 complete window type W12 including window sill and jamb and head finishes.
- 8 8. **08 51 13:** New factory-style replacement window WIN-2 in place of demo'd brick infill panel at north  
9 elevation. One entire window type W4 including jamb and head finishes and new window sill.
- 10 9. **08 51 13:** One large interior accessory window IAW-1 on the inside of historic window type W11 at level  
11 2 mockup, including jamb and head conditions, and new window sill.
- 12 10. **09 30 16:** New terracotta floor tile XTILE-2A at Level 1 public lobby to match Historic floor tile XTILE-1.  
13 Minimum floor area of 4ft x 4ft.
- 14 11. **04 45 50:** Historic floor tile XTILE-2B repair where floor mounted urinal removed, at Level 3, Men's  
15 historic restroom. Minimum floor area of 18" x 18".
- 16 12. **08 44 10:** Rated glass wall GLWS-3 and associated egress door at Level 3, east stair side. Include glass  
17 panel above door, glass panel at one side of door, door hardware, and fire stopping sealant all around  
18 frame.
- 19 13. **075213 / 075216:** Typical ROOF-1 assembly at upper roof including termination detail at parapet wall  
20 with balusters, parapet wall without balusters, and new roof drain and overflow assembly. Min 4ft wide x  
21 8ft long in each location.
- 22 14. **09 84 33 and 09 93 00:** Room 260: One typical acoustical wall panel AWP-1A and new wood muntin  
23 detail. West side of Room 260.
- 24 15. **09 84 33 and 09 93 00:** Room 260: Typical acoustical ceiling panel AWP-1B and refinished wood nailer  
25 detail. West end of ceiling.
- 26 16. **09 84 33:** Room 260: Typical acoustical ceiling panel AWP-1B at new HVAC diffuser assembly. West end of  
27 ceiling.
- 28 17. **06 03 12 and 09 93 00:** Room 260: Typical wall wood paneling refinishing including one new wood panel,  
29 one existing wood panel, one intermediate pilaster, wood base, wood cornice and dentil detail, min.  
30 width 4ft wide x full height. South-west end of Room 260.
- 31 18. **06 03 12 and 09 93 00:** Room 260: Typical north-south faux wood beam refinishing, min. 8ft long,  
32 including new concealed sprinkler head and cap finish, historic rosette detail, and min. 4ft length of  
33 intermediate east-west faux cross-beams.
- 34 19. **05 70 00:** Room 260: Typical historic vent grille within wood panel zone, re-finishing and acoustic fabric  
35 behind.
- 36 20. **05 70 00:** Room 260: Typical radiator grille refinishing – both the main upper portion and the wall base  
37 portion.
- 38 21. **09 64 29:** Room 260: Refinished wood floor, 4' x 6' area at west end of room.
- 39 22. **09 51 23 and 05 45 00:** Typical ACT-3 and ESS-1 assembly in open office bay, min. full structural bay x 4ft  
40 wide panels each side of ESS-1. Location to be south-east corner of open office at Ground Level.
- 41 23. **08 81 13:** Typical window film WF-1 on conference room storefront system GLWS-2 glass panel. Min.  
42 width one glass panel width of finally installed system panel.
- 43 24. **23 33 00:** Typical fire/smoke damper assembly through ceiling deck of room 260. Include fire damper,  
44 supply air grille, Young's regulator, and damper, and access panel. West end of ceiling.
- 45 25. **26 51 00:** Interior Lighting: The light fixture schedule on AL105 calls for sample luminaires Type P, P1 and  
46 P2. These are not "installed mock-ups"; but they should be hung and electrified for verification of light  
47 quality.
- 48 26. **09 03 20:** Level 1 Historic plaster ceiling, cornice and beam molding: a 4' x 8' section of repair at a  
49 selected zone of flat ceiling, intermediate north-south beam, and deep beam along grid 2. Zone of  
50 mockup to be between grids 1 and 2, and grids J and K.
- 51 27. **04 01 20.63:** Samples (mock-ups) of typical masonry restoration work, including custom brick. Furnish  
52 sample (mock-up) panel 6' long x 3' high of the proposed masonry restoration work (new, replaced  
53 masonry units and finished repointing) including color range, texture, bond, mortar and workmanship.  
54 Provide separate mock-up panels for each type of brick and mortar and include limestone veneer and  
55 cap.
- 56 28. **04 01 40:** Prepare mock-ups directly on existing historic wall, for every worker and every treatment for  
57 which they are certified. Mock-ups shall include separate treatments as called out on the drawings and  
58 related specification Sections and as follows:

- 1 a. Repointing Mortar Installation - Repoint mortar joints, twelve feet in length and 3 courses high.
- 2 b. Engineered Stone Patch – Engineered stone patch material repair on at least 2 stones. Include one
- 3 stone on which to demonstrate proficiency in removing previous patching material and repairing
- 4 with new engineered stone patch material.
- 5 c. Crack Repair – Repair one crack, 18 inches in length, using dispersed hydrated lime injection
- 6 technique with spachal surface treatment.
- 7 d. Dutchman - Undertake Dutchman repairs in 2 locations, including one that is only cut and
- 8 prepared for application.
- 9 e. Masonry Adhesive – Perform one masonry adhesive process that fully meets the requirements of
- 10 this specification.
- 11 f. Stain – Perform one area of stone stain to match adjacent original stone (post-cleaning).
- 12 g. Redress Stone in-situ – Perform one area of stone resurfacing/redress.
- 13 h. Baluster Repair – Complete baluster repair in one (1) location/one (1) baluster. The work will
- 14 include the binding, removal, core-drill, helical anchor installation, lime injection/adhesive
- 15 installation and stain.
- 16

17 **3.3. MOCKUP REVIEW**

- 18 A. The General Contractor and all associated Sub-contractors (Contracting Team) shall meet with the Owner,
- 19 Owners Representative, Architect and Consultants (Design Team) as necessary to review the mock-up.
- 20 Contractors shall be prepared to answer questions on materials and methods as necessary.
- 21 B. The Contracting and Design Teams shall review the mockup in detail for materials, methods, and workmanship
- 22 with respect to the intent of the contract documents. Improvements or adjustments shall be discussed as
- 23 needed.
- 24 C. If the mockup is incomplete or does not show sufficient detail of products and workmanship the General
- 25 Contractor shall resubmit a new mockup.
- 26 D. Re-submittal of mockups to meet the intent of the contract documents shall be the responsibility of the General
- 27 Contractor. No Change Orders will be processed for additional time or materials associated with re-submitting a
- 28 mockup for approval.
- 29 1. In the event that a submitted mockup meets the criteria of the contract documents but does not meet
- 30 the expectations of the design team and alternative methods or materials are discussed the following
- 31 procedure shall be used:
- 32 a. Project Architect shall publish a Construction Bulletin (CB) to detail the required/recommended
- 33 changes.
- 34 b. The GC shall prepare and submit a new mockup.
- 35

36 **3.4. FINAL SUBMITTAL**

- 37 A. The field approved mockup shall be submitted by the General Contractor as any other submittal for project
- 38 documentation purposes. The mockup submittal shall consist of the following:
- 39 1. Digitally photograph the field approved mockup. Take as many detailed photos as necessary to capture
- 40 the complexity of the mockup.
- 41 2. Provide a written summary of the approved mockup. Include all recommended adjustments, level of
- 42 expected workmanship, and other such detail as discussed during the mockup review.
- 43 3. Submit the mockup to the Project Management Web Site. See Specification 01 33 23 Submittals for
- 44 additional information.
- 45
- 46
- 47
- 48

**END OF SECTION**

**SECTION 01 43 50**  
**AIR BARRIER SYSTEMS**

- PART 1 – GENERAL
- 1.1 [RELATED DOCUMENTS](#)
  - 1.2 [SUMMARY](#)
  - 1.3 [DEFINITIONS](#)
  - 1.4 [PERFORMANCE REQUIREMENTS](#)
  - 1.5 [SUBMITTALS](#)
  - 1.6 [QUALITY ASSURANCE](#)
  - 1.7 [PROJECT CONDITIONS](#)
- PART 2 – PRODUCTS  
Not Used
- PART 3 – EXECUTION
- 3.1 [FIELD QUALITY CONTROL](#)
  - 3.2 [REPAIR AND 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, apply to this Section.

**1.2 SUMMARY**

- A. Section Includes:
  - 1. This section includes administrative and procedural requirements for accomplishing an airtight building enclosure that controls infiltration or exfiltration of air.
- B. Related Sections:
  - 1. Section 07 13 26: Self-Adhering Sheet Air Barrier [**AB-2**].
  - 2. Requirements of this section relate to the coordination between subcontractors required to provide an airtight building enclosure, customized fabrication and installation procedures, not production of standard products.

**1.3 DEFINITIONS**

- A. The airtight components of the building enclosure and the joints, junctures and transitions between materials, products, and assemblies forming the air-tightness of the building enclosure are called “the air barrier system”. Services include coordination between the trades, the proper scheduling and sequencing of the work, pre-construction meetings, inspections, tests, and related actions, including reports performed by Contractor, by independent agencies, and by governing authorities. They do not include contract enforcement activities performed by Architect.

**1.4 PERFORMANCE REQUIREMENTS**

- A. General Performance: The Contractor shall ensure that the intent of constructing the building enclosure with a continuous air barrier system to control air leakage into, or out of the conditioned space is achieved. The air barrier system shall have the following characteristics:
  - 1. It shall be continuous, with all joints sealed.
  - 2. It shall be structurally supported to withstand positive and negative air pressures applied to the building enclosure.
  - 3. Continuity of the air barrier materials and products with joints to provide complete assemblies.
  - 4. Continuity of all the enclosure assemblies with joints and transition materials to provide a whole building air barrier system.
- B. Connection shall be made between:
  - 1. Foundation and walls.
  - 2. Walls and windows or doors.
  - 3. Different wall systems.
  - 4. Wall and roof.
  - 5. Wall and roof over unconditioned space.
  - 6. Walls, floor and roof across construction, control and expansion joints.
  - 7. Walls, floors and roof to utility, pipe and duct penetrations.

- C. Air Barrier Penetrations: All penetrations of the air barrier and paths of air infiltration / exfiltration shall be made air-tight.
- D. Compliance Requirements:
  - 1. Assemblies: an air permeance not to exceed 0.03 cfm/ft<sup>2</sup>p under a pressure differential of 0.3 in. water (1.57psf) (0.15 L/s.m<sup>2</sup> @ 75 Pa) when tested in accordance with ASTM E 1677.
  - 2. Materials: Materials used for the air barrier system in the opaque envelope shall have an air permeance not to exceed 0.004 cfm/ft<sup>2</sup> under a pressure differential of 0.3 in. water (1.57psf) (0.02 L/s.m<sup>2</sup> @ 75 Pa) when tested in accordance with ASTM E 2178. Or,
  - 3. Entire Building: The air leakage of the entire building shall not exceed 0.15 cfm/sf under a pressure differential of 0.3 in. water (1.57psf) (0.75 L/s.m<sup>2</sup> @ 75 Pa) when tested according to ASTM E 779.

#### 1.5 SUBMITTALS

- A. Field quality-control reports.
- B. Testing agency shall submit a certified written report, in duplicate, of each inspection, test, or similar service to the Architect. If the Contractor is responsible for the service, submit a certified written report, in duplicate, of each inspection, test, or similar service through the Contractor.
  - 1. Submit additional copies of each written report directly to the governing authority, when the authority so directs.
- C. Report Data: Written reports of each inspection, test, or similar service include, but are not limited to, the following:
  - 1. Date of issue.
  - 2. Project title and number.
  - 3. Name, address, and telephone number of testing agency.
  - 4. Dates and locations of samples and tests or inspections.
  - 5. Names of individuals making the inspection or test.
  - 6. Designation of the Work and test method.
  - 7. Identification of product and Specification Section.
  - 8. Complete inspection or test data.
  - 9. Test results and an interpretation of test results.
  - 10. Ambient conditions at the time of sample taking and testing.
  - 11. Comments or professional opinion on whether inspected or tested Work complies with Contract Document requirements.
  - 12. Name and signature of laboratory inspector.
  - 13. Recommendations on retesting.

#### 1.6 QUALITY ASSURANCE

- A. Requirement for Contractor to provide an airtight building enclosure is not limited by quality-control services required by Architect, Owner, or authorities having jurisdiction and are not limited by provisions of this section.
- B. Inspection and testing services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with Contract Document requirements.
  - 1. Qualifications for Air Barrier Testing and Inspection Agencies: Engage Air Barrier inspection and testing service agencies, including independent testing laboratories, that are prequalified and that specialize in the types of air barrier system inspections and tests to be performed.
- C. Specific quality-control requirements for individual construction activities are specified in the sections of the specifications. Requirements in those sections may also cover production of standard products. It is the Contractor's responsibility to ensure that each subcontractor is adequately and satisfactorily performing the quality assurance documentation, tests and procedures required by each section.
- D. Specified inspections, tests, and related actions do not limit Contractor's quality-control procedures that facilitate compliance with Contract Document requirements.

#### 1.7 PROJECT CONDITIONS

- A. Contractor Responsibilities: Unless otherwise indicated as the responsibility of another identified entity, Contractor shall provide coordination of the trades, and the sequence of construction to ensure continuity of the air barrier system joints, junctures and transitions between materials and assemblies of materials and products, from substructure to walls to roof. Provide quality assurance procedures, testing and verification as specified herein. Facilitate inspections, tests, and other quality-control services specified elsewhere in the Contract Documents and required by authorities having jurisdiction or by the Owner. Costs for these services are included in the Contract Sum.

- B. Organize preconstruction meetings between the trades involved in the whole building's air barrier system to discuss where each trade begins and ends and the responsibility and sequence of installation of all the air-tight joints, junctures, and transitions between materials, products and assemblies of products specified in the different sections, to be installed by the different trades.
- C. Build a mock-up before proceeding with the work, satisfactory to the Architect, of each air-tight joint type, juncture, and transition between products, materials and assemblies.
- D. Associated Services: Cooperate with agencies performing required inspections, tests, and similar services, and provide reasonable auxiliary services as requested. Notify the agency sufficiently in advance of operations to permit assignment of personnel. Auxiliary services required include, but are not limited to, the following:
  - 1. Provide access to the Work.
  - 2. Furnish incidental labor and facilities necessary to facilitate inspections and tests.
  - 3. Take adequate quantities of representative samples of materials that require testing or assist the agency in taking samples.
  - 4. Deliver samples to testing laboratories.
  - 5. Provide security and protection of samples and test equipment at the Project Site.
- E. Duties of the Testing and Inspection Agency: The independent agency engaged to perform inspections, sampling, and testing of air barrier materials, components and assemblies specified in individual Sections shall cooperate with the Architect and the Contractor in performance of the agency's duties. The testing agency shall provide qualified personnel to perform required inspections and tests.
  - 1. The agency shall notify the Architect and the Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
  - 2. The agency is not authorized to release, revoke, alter, or enlarge requirements of the Contract Documents or approve or accept any portion of the Work.
  - 3. The agency shall not perform any duties of the Contractor.
- F. Coordination: Coordinate the sequence of activities to accommodate required services with a minimum of delay. Coordinate activities to avoid the necessity of removing and replacing construction to accommodate inspections and tests.
  - 1. The Contractor is responsible for scheduling times for inspections, tests, taking samples, and similar activities.

**PART 2 - PRODUCTS (NOT USED)**

**PART 3 - EXECUTION**

**3.1 FIELD QUALITY CONTROL**

- A. Testing Agency: Contractor will engage a qualified testing agency to perform tests and inspections.
- B. Tests and Inspections:
  - 1. Qualitative Testing and Inspection:
    - a. Daily reports of observations, with copies to the Owner, Contractor and Architect.
    - b. Continuity of the air barrier system throughout the building enclosure with no gaps, holes.
    - c. Structural support of the air barrier system to withstand design air pressures.
    - d. Masonry and concrete surfaces are smooth, clean and free of cavities, protrusions and mortar droppings, with mortar joints struck flush, or as required by the manufacturer of the air barrier material.
    - e. Site conditions for application temperature and dryness of substrates.
    - f. Maximum length of exposure time of materials to ultra-violet deterioration.
    - g. Surfaces are properly primed.
    - h. Laps in material are 2" minimum, shingled in the correct direction (or mastic applied on exposed edges), with no fishmouths.
    - i. Mastic applied on cut edges.
    - j. Roller has been used to enhance adhesion.
    - k. Measure application thickness of liquid-applied materials to manufacturer's specifications for the specific substrate.
    - l. Materials used for compatibility.
    - m. Transitions at changes in direction, and structural support at gaps.
    - n. Connections between assemblies (membrane and sealants) for cleaning, preparation and priming of surfaces, structural support, integrity and continuity of seal.
    - o. All penetrations sealed.

2. ASTM E 1186/98 "Standard Practices for Air Leakage Site Detection in Building Envelopes and Air Retarder Systems."
  - a. Infrared scanning with pressurization/depressurization.
  - b. Smoke pencil with pressurization/depressurization.
  - c. Pressurization/depressurization with use of anemometer
  - d. Generated sound with sound detection
  - e. Tracer gas measurement of decay rate
  - f. Chamber pressurization/depressurization in conjunction with smoke tracers
  - g. Chamber depressurization using detection liquids
3. Quantitative Tests: Provide written test reports of all tests performed, with copies to the Owner, Contractor and Architect.
  - a. Material compliance for maximum air permeance, ASTM E 2178.
  - b. ASTM E 283, Determining rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors under Specified Pressure Differences Across the Specimen.
  - c. Assemblies, ASTM E 1677, test pressure and allowable air leakage rate to be determined by design professional for interior design conditions and location of project.
  - d. CAN/CGSB 1986 Standard 149.10, Determination of the Airtightness of Building Envelopes by the Fan Depressurization Method.
  - e. CAN/CGSB 1996 Standard 149.15 Determination of the Overall Envelope Airtightness of Office Buildings by the Fan Depressurization Method Using the Building's Air Handling System.
  - f. Canadian National Master Specification Sections 07272 Air Barrier Systems for Exterior Walls of Low-Rise Buildings.
  - g. Canadian National Master Specification 07272.1 : Durability Assessment of Bead-Applied Urethane-Based Sealant Foam for Air Barriers.
  - h. Whole building, floors, or suites, ASTM E779, Determining Airtightness of Buildings Air Leakage Rate by Single Zone Air Pressurization.
  - i. Windows and connections to adjacent opaque assemblies, ASTM E783
  - j. Tracer gas testing, ASTM E741
  - k. Pressure test, ASTM E330
  - l. Bond to substrate, ASTM D4541-95
  - m. Minimum dry or wet film thickness for liquid-applied materials are per the manufacturer's requirements.

**3.2 REPAIR AND PROTECTION**

- A. Upon completion of inspection, testing, sample taking and similar services, repair damaged construction and restore substrates and finishes. Comply with Contract Document requirements for Division 1 Section "Cutting and Patching."
- B. Protect construction exposed by or for quality-control service activities, and protect repaired construction.
- C. Repair and protection is Contractor's responsibility, regardless of the assignment of responsibility for inspection, testing, or similar services.

**END OF SECTION**

**SECTION 01 45 16**  
**FIELD QUALITY CONTROL PROCEDURES**

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**PART 1 – GENERAL**

**1.1. SUMMARY**

- 21 A. The City of Madison has developed a multi-faceted Quality Management Program that begins with contract  
22 signing and runs through contract closeout to ensure the best quality materials, workmanship, and product are  
23 delivered for the contracted Work.  
24 1. The Progress Management Web Site is a Construction Management tool that provides contractors and  
25 staff a single on-line location for the daily operations and progression of the Work.  
26 2. The Quality Management Observation (QMO) is an ongoing observation of the construction process as it  
27 progresses. The City of Madison does not use a “Punch List” or “Corrections List” as it is typically known  
28 throughout the construction industry. The QMO process acts as an “in progress punch list”.  
29 a. By using the QMO process the City of Madison’s goal is to have a zero item punch list prior to the  
30 90% progress payment and owner occupancy.  
31 B. All contractors shall be required to review the specifications identified in Section 1.2 below, and other related  
32 specifications identified therein to become familiar with the terminology and expectations of this City of  
33 Madison Public Works contract.  
34 C. It is the intent of this specification to outline the requirements, expectations, and responsibilities of the General  
35 Contractor (GC), Project Architect, and other representatives of the Owner for items of Quality Assurance and  
36 Quality Control.  
37 1. This specification is not intended to conflict with Specification 01 40 00 Quality Requirements or other  
38 specifications requiring testing and inspecting services.  
39 2. This specification does not relieve the GC from any requirements associated with regulatory inspections  
40 performed by the City of Madison Building Inspection Unit, or inspectors from other agencies as required  
41 by code.  
42 3. Any testing performed by an Owner’s Representative does not relieve the GC from performing any  
43 testing that may be required by the construction documents.  
44

**1.2. RELATED SPECIFICATION SECTIONS**

- 46 A. Section 01 26 13 Request for Information (RFI)  
47 B. Section 01 29 76 Progress Payment Procedures  
48 C. Section 01 31 13 Project Coordination  
49 D. Section 01 31 23 Project Management Web Site  
50 E. Section 01 40 00 Quality Requirements  
51 F. Section 01 77 00 Closeout Procedures  
52 G. Section 01 78 13 Completion and Correction List  
53

**1.3. PERFORMANCE REQUIREMENTS**

- 55 A. All contractors shall be responsible for a proper quality assurance/quality control (QA/QC) program throughout  
56 the execution of the Work defined within the construction documents, including all recognized construction  
57 industry standards and all applicable regulatory codes.  
58 B. The GC shall be responsible for all of the following:

1. Monitor the quality of all workmanship, supplies, materials, and products being installed by all contractors and installers to ensure they meet or exceed the minimum requirements set forth by the construction documents.
  2. Submit a Request for Information (RFI) whenever manufacturers' instructions or referenced standards conflict with the construction documents before proceeding with the Work.
  3. Ensure that Work requiring special certifications or licensing is being performed by is being performed and supervised by personnel that meet the appropriate requirements.
    - a. Ensure that all certificates and licenses are current throughout the execution of the project.
- C. The CoM and its representatives shall perform quality assurance and quality control activities throughout the execution of this project. This in no way relieves the GC of maintaining an acceptable QA/QC program. =

#### 1.4. QUALITY ASSURANCE

- A. The GC shall be responsible for the following:
1. All materials, equipment, and products shall be new, clean, undamaged, and meet the performance specifications defined within the construction documents including favorably reviewed submittals.
    - a. Any material, equipment, or product that does not meet the requirements of the construction documents shall be removed and replaced, including any adjacent and related work, at the GCs expense.
  2. All Work shall be performed by persons properly trained and/or qualified to produce workmanship of the quality specified in the construction documents.
  3. Providing access to updated as-builts, addenda, submittals, bulletins and other related construction documents at the project site.
- B. The CoM and its representatives may be responsible for any of the following:
1. Attend pre-installation meetings
  2. Attend construction progress meetings
  3. Review all submittals
  4. Conduct field visits for QA/QC purposes, provide feedback to the GC and sub-contractors using Quality Management Observation (QMO) reports.
  5. Review delivered equipment
  6. Witness equipment installations, startups, testing as specified in other specifications

#### 1.5. QUALITY MANAGEMENT OBSERVATION REPORT

- A. The Quality Management Observation report or QMO is used as a QA/QC tool by those entities responsible for QA/QC activities, including but not limited to, the GC, CoM, PA, CX agent, etc.
- B. QMOs are designed to be an early observation of non-conforming construction work before it becomes buried by follow on work. As such it is most often used as an "in progress punch list".
- C. QMO forms are part of the Quality Control Library on the Project Management Web Site.

### PART 2 – PRODUCTS - THIS SECTION NOT USED

### PART 3 - EXECUTION

#### 3.1. QUALITY MANAGEMENT RESPONSIBILITIES

- A. While making routine progress visits to the construction project the GC, CPM, and A/E, and applicable others shall observe the details of the construction and installations to ensure that the intent of the construction documents is being followed.
- B. If during the progress visit there is a determination of contract non-conformance a QMO report shall be initiated to begin the documentation process.
  1. The GC field superintendent shall be informed immediately of any issue that may cause harm, damage to finished work, or be buried prior to properly filing a QMO report.
- C. The following information when filing a QMO report:
1. Open a QMO report in the Quality Control Library on the Project Management Web Site
  2. Enter the date and time of the field visit
  2. Provide references to construction documents if any (examples; specification, drawing page, details, approved submittals, RFI, CB, etc)
  3. Provide a short title for the observation being made
  4. Provide a detailed description of the observation being made





**SECTION 01 50 00**  
**TEMPORARY FACILITIES AND CONTROLS**

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27

**PART 1 – GENERAL**

**1.1. SUMMARY**

- 30  
31 A. This Section includes general procedural requirements for temporary facilities and controls including, but not  
32 limited to the following:  
33 1. Temporary Utilities  
34 2. Telecommunications Services  
35 3. Temporary Sanitary Facilities  
36 4. Barriers  
37 5. Fencing  
38 6. Exterior Enclosures  
39 7. Security  
40 8. Vehicular Access and Parking  
41 9. Waste Removal  
42 10. Project Identification  
43 11. Field Offices  
44

**1.2. RELATED SPECIFICATION SECTIONS**

- 45  
46 A. Section 01 31 19 Progress Meetings  
47 B. Section 01 31 23 Project Management Web Site  
48 C. Section 01 74 19 Construction Waste Management and Disposal  
49

**1.3. QUALITY ASSURANCE**

- 50  
51 A. Regulations: Comply with industry standards and applicable laws and regulations if authorities having  
52 jurisdiction, including but not limited to:  
53 1. Building Code requirements  
54 2. Health and safety regulations  
55 3. Utility company regulations  
56 4. Police, Fire Department and Rescue Squad rules  
57 5. Environmental protection regulations  
58 6. Joint Commission - Hospital Accreditation Standards

- 1 B. Standards: Comply with NFPA 241 "Standard for Safeguarding Construction, Alterations, and Demolition
- 2 Operations," ANSI A10 Series standards for "Safety Requirements for Construction and Demolition," and NECA
- 3 Electrical Design Library "Temporary Electrical Facilities".
- 4 C. Electrical Service: Comply with NEMA, NECA, and UL standards and regulations for temporary electric service.
- 5 Install service in compliance with NFPA 70 "National Electric Code".
- 6

7 **1.4. TEMPORARY UTILITIES**

- 8 A. Contractor will provide the following:
  - 9 1. Electrical power and metering, consisting of existing facilities.
  - 10 2. Water supply, consisting of existing facilities.
- 11 B. General:
  - 12 1. Existing facilities may be used.
  - 13 2. New permanent facilities may be used.
- 14 C. Water Service: water is available from existing building services.
  - 15 1. Use trigger-operated nozzles for water hoses, to avoid waste of water.
- 16 D. Temporary Electric Power Service: Electrical Contractor shall extend temporary power from existing building
- 17 services.
- 18 E. Temporary Lighting: Electrical Contractor shall provide temporary lighting with local switching
  - 19 1. Install and operate temporary lighting, minimum of 30 fc, to fulfill security and protection requirements,
  - 20 without operating the entire system, and will provide adequate illumination for all areas of work,
  - 21 including construction operations and traffic conditions.
- 22 F. Temporary Heat: General Contractor shall provide temporary heat required by construction activities, for curing
- 23 or drying of completed installations or protection of installed construction from adverse effects of low
- 24 temperatures or high humidity. Select safe equipment that will not have a harmful effect on completed
- 25 installations or elements being installed. Coordinate ventilation requirements to produce the ambient condition
- 26 required and minimize consumption of energy.
  - 27 1. Heating Facilities: Except where use of the permanent system is authorized, provide vented self-
  - 28 contained LP gas or fuel oil heaters with individual space thermostatic control.
    - 29 a. Use of gasoline-burning space heaters, open flame, or salamander type heating units is
    - 30 prohibited.
- 31

32 **1.5. TELECOMMUNICATIONS SERVICES AND WI-FI**

- 33 A. Provide, maintain, and pay for telecommunications services to field office at time of project mobilization through
- 34 construction closeout.
- 35 B. Telecommunications services shall include:
  - 36 1. Windows-based personal computer dedicated to project telecommunications.
  - 37 2. Shared access to the internet via WIFI or similar wireless connection.
    - 38 a. Access must be capable to support minimum of 10 wireless devices.
  - 39 3. Email Account/address dedicated for GC Project Manager of GC Supervisor on site.
- 40

41 **1.6. TEMPORARY SANITARY FACILITIES**

- 42 A. Provide and maintain required facilities and enclosures. Provide at time of project mobilization.
- 43 B. Temporary toilets: Comply with regulations and health codes for the type, number, location, operation, and
- 44 maintenance of fixtures and facilities. Install where facilities will best serve the Project's needs.
  - 45 1. Provide toilet tissue, paper towels, paper cups, and similar disposable materials for each facility. Provide
  - 46 covered waste containers for used material.
  - 47 2. Toilets: Install self-contained toilet units. Shield toilets to ensure privacy.
- 48 C. Maintain daily in clean and sanitary condition
- 49 D. Water: Provide potable water approved by local health authorities
- 50

51 **1.7. BARRIERS**

- 52 A. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be
- 53 hazardous to workers or the public and to protect existing facilities and adjacent properties from damage from
- 54 construction operations and demolition.
- 55

56 **1.8. FENCING**

- 57 A. Construction: Refer to Plan Documents and Specification Section 01 76 00: Fencing Materials and Barricades
- 58

1 **1.9. EXTERIOR ENCLOSURES**

- 2 A. Provide temporary weather tight closure of exterior openings to accommodate acceptable working conditions  
3 and protection for Products, to allow for temporary heating and maintenance of required ambient temperatures  
4 identified in individual specification sections, and to prevent entry of unauthorized persons. Provide access doors  
5 with self-closing hardware and locks.  
6

7 **1.10. SECURITY**

- 8 A. Provide security and facilities to protect Work, existing facilities, and Owner's operations from unauthorized  
9 entry, vandalism, or theft.  
10

11 **1.11. VEHICULAR ACCESS AND PARKING**

- 12 A. Comply with regulations relating to use of streets and sidewalks, access to emergency facilities, and access for  
13 emergency vehicles.  
14 B. Coordinate access and haul routes with governing authorities and Owner.  
15 C. Provide and maintain access to fire hydrants, free of obstructions.  
16 D. No construction parking is provided as part of this project.  
17

18 **1.12. WASTE REMOVAL**

- 19 A. See Section 01 74 19 - Waste Management, for additional requirements.  
20 B. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.  
21 C. Provide containers with lids. Remove trash from site periodically.  
22 D. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible  
23 containers; locate containers holding flammable material outside the structure unless otherwise approved by the  
24 authorities having jurisdiction.  
25 E. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.  
26

27 **1.13. PROJECT IDENTIFICATION**

- 28 A. Provide project identification sign of design and construction indicated in Section 01 58 13.  
29 B. Erect on site at location determined by Owner .  
30 C. No other signs are allowed without Owner permission except those required by law.  
31

32 **1.14. FIELD OFFICES**

- 33 A. Office: Weather tight, with lighting, electrical outlets, heating, cooling equipment, and equipped with sturdy  
34 furniture, drawing rack and drawing display table.  
35 B. Field Office shall be located within the Project Limits.  
36 C. Provide space for Project Meetings with table and chairs to accommodate a minimum of 20 persons.  
37 D. Provide a minimum of a 40" LCD monitor or other digital projection device to be connected to the computer  
38 identified in Section 1.4 Telecommunications Services (above), for use during progress meetings in connection  
39 with reviewing construction progress information posted to the Project Management Web Site (Specification 01  
40 31 23) hosted by the Owner.  
41 E. All food and drink shall remain in the field offices.  
42

43 **PART 2 - PRODUCTS**

44  
45 **2.1. TEMPORARY PARTITIONS**

- 46 A. Provide dustproof partitions to limit dust and dirt migration and to separate occupied areas from fumes and  
47 noise.  
48 1. Non-fire rated partitions, standard  
49 a. Wood stud framing, 6-mil polyethylene  
50

51 **2.2. EQUIPMENT**

- 52 A. Temporary Lifts and Hoists: Contractors requiring temporary lifts and hoists shall provide facilities for hoisting  
53 materials and employees.  
54 B. Electrical Outlets: Electrical Contractor shall provide properly configured NEMA polarized outlets to prevent  
55 insertion of 110-120 volt plugs into higher voltage outlets. Provide receptacle outlets equipped with ground-fault  
56 circuit interrupters, reset button and pilot light, for connection of power tools and equipment.  
57 C. Electrical Power Cords: Contractors requiring power cords shall provide grounded extension cords; use "hard-  
58 service" cords where exposed to abrasion and traffic. Provide waterproof connectors to connect separate

lengths of electric cords, if single lengths will not reach areas where construction activities are in progress. Do not exceed safe length-voltage ratio.

- D. Lamps and Light Fixtures: Electrical Contractor shall provide general service incandescent lamps of wattage required for adequate illumination. Provide guard cages or tempered glass enclosures, where exposed to breakage. Provide exterior fixtures where exposed to moisture.
- E. Heating Units: General Contractor shall provide temporary heating units that have been tested and labeled by UL, FM or another recognized trade association related to the type of fuel being consumed.
- F. First Aid Supplies: General Contractor shall provide first aid supplies complying with governing regulations.
- G. Fire Extinguishers: General Contractor shall provide hand-carried, portable UL-rated, fire extinguishers of NFPA recommended classes for the exposures, extinguishing agent and size required by location and class of fire exposure.

### **PART 3 - EXECUTION**

#### **3.1. TEMPORARY FIRE PROTECTION**

- A. Until fire protection needs are supplied by permanent facilities, General Contractor shall install and maintain temporary fire protection facilities of the types needed to protect against reasonably predictable and controllable fire losses.
- B. Comply with NFPA 10 "Standard for Portable Fire Extinguishers," and NFPA 241 "Standard for Safeguarding Construction, Alterations and Demolition Operations".
- C. Locate fire extinguishers where convenient and effective for their intended purpose.
- D. Store combustible materials in containers in fire-safe locations.
- E. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire protection facilities, stairways and other access routes for fighting fires.
- F. Prohibit smoking on the premises.
- G. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
- H. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site
- I. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

#### **3.2. COLLECTION AND DISPOSAL OF WASTE**

- A. Collect waste from construction areas and elsewhere daily
- B. Comply with requirements of NFPA 241 for removal of combustible waste material and debris. Enforce requirements strictly.
- C. Do not hold materials more than 7 days during normal weather or 3 days when the temperature is expected to rise above 80 deg F.
- D. Handle hazardous, dangerous, or unsanitary waste materials separately from other waste by containerizing properly. Dispose of material in a lawful manner.
- E. Contractor is responsible for rodent and pest control for duration of construction.

#### **3.3. ENVIRONMENTAL PROTECTION**

- A. Provide protection, operate temporary facilities and conduct construction in ways and by methods that comply with environmental regulations, and minimize the possibility that air, waterways and subsoil might be contaminated or polluted, or that other undesirable effects might result.
- B. Avoid use of tools and equipment which produce harmful noise.
- C. Restrict use of noise making tools and equipment to hours that will minimize complaints from persons or firms near the site.

#### **3.4. REMOVAL OF TEMPORARY UTILITIES, FACILITIES, AND CONTROLS**

- A. Remove temporary utilities, equipment, facilities, and materials prior to Substantial Completion inspection.
- B. Remove underground installations to a minimum depth of 2 feet (600 mm). Grade site as indicated.
- C. Clean and repair damage caused by installation or use of temporary work.
- D. Restore existing facilities used during construction to original condition.
- E. Restore new permanent facilities used during construction to specified condition.

**END OF SECTION**

**SECTION 01 57 19.11**  
**INDOOR AIR QUALITY (IAQ) MANAGEMENT**

- PART 1 – GENERAL
  - 1.1 [SUMMARY](#)
  - 1.2 [DEFINITIONS](#)
  - 1.3 [SUBMITTALS](#)
  - 1.4 [PRECONSTRUCTION MEETING](#)
- PART 2 – PRODUCTS
  - Not Used
- PART 3 – EXECUTION
  - 3.1 [IAQ MANAGEMENT - EMISSIONS CONTROL](#)
  - 3.2 [IAQ MANAGEMENT - MOISTURE CONTROL](#)

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Special requirements for Indoor Air Quality (IAQ) management during construction operations.
    - a. Control of emissions during construction.
    - b. Moisture control during construction.
  - 2. Procedures for testing baseline IAQ. Baseline IAQ requirements specify maximum indoor pollutant concentrations for acceptance of the facility.
- B. Related Sections:
  - 1. 01 40 00 – Quality Requirements: Meetings and project coordination.

**1.2 DEFINITIONS**

- A. Definitions pertaining to sustainable development: As defined in ASTM E2114.
- B. Adequate ventilation: Ventilation, including air circulation and air changes, required to cure materials, dissipate humidity, and prevent accumulation of particulates, dust, fumes, vapors, or gases.
- C. Hazardous Materials: Any material that is regulated as a hazardous material in accordance with 49 CFR 173, requires a Material Safety Data Sheet (MSDS) in accordance with 29 CFR 1910.1200, or which during end use, treatment, handling, storage, transportation or disposal meets or has components which meet or have the potential to meet the definition of a Hazardous Waste in accordance with 40 CFR 261. Throughout this specification, hazardous material includes hazardous chemicals.
  - 1. Hazardous materials include: pesticides, biocides, and carcinogens as listed by recognized authorities, such as the Environmental Protection Agency (EPA) and the International Agency for Research on Cancer (IARC).
- D. Indoor Air Quality (IAQ): The composition and characteristics of the air in an enclosed space that affect the occupants of that space. The indoor air quality of a space refers to the relative quality of air in a building with respect to contaminants and hazards and is determined by the level of indoor air pollution and other characteristics of the air, including those that impact thermal comfort such as air temperature, relative humidity and air speed.
- E. Interior final finishes: Materials and products that will be exposed at interior, occupied spaces; including flooring, wall covering, finish carpentry, and ceilings.
- F. Packaged dry products: Materials and products that are installed in dry form and are delivered to the site in manufacturer's packaging; including carpets, resilient flooring, ceiling tiles, and insulation.
- G. Wet products: Materials and products installed in wet form, including paints, sealants, adhesives, special coatings, and other materials which require curing.

**1.3 SUBMITTALS**

- A. Indoor Air Quality (IAQ) Management Plan: Not less than 10 days before the Pre-construction meeting, prepare and submit an IAQ Management Plan including, but not limited to, the following:
  - 1. Procedures for control of emissions during construction.
    - a. Identify schedule for application of interior finishes.
  - 2. Procedures for moisture control during construction.
    - a. Identify porous materials and absorptive materials.
    - b. Identify schedule for inspection of stored and installed absorptive materials.
  - 3. Revise and resubmit Plan as required by Owner.
    - a. Approval of Contractor's Plan will not relieve the Contractor of responsibility for compliance with applicable environmental regulations.

- B. Product Data:
1. Submit product data for filtration media used during construction and during operation. Include Minimum Efficiency Reporting Value (MERV).
  2. Submit air pressure difference maps for each mode of operation of HVAC.
  3. Material Safety Data Sheets: Submit MSDSs for inclusion in Operation and Maintenance Manual for the following products. Coordinate with Section 01 78 23.
    - a. Adhesives.
    - b. Floor and wall patching/leveling materials.
    - c. Caulking and sealants.
    - d. Insulating materials.
    - e. Fireproofing and firestopping.
    - f. Carpet.
    - g. Paint.
    - h. Clear finish for wood surfaces.
    - i. Lubricants.
    - j. Cleaning products.
- C. Inspection and Test Reports:
1. Moisture control inspections.
  2. Moisture penetration testing.

#### 1.4 PRECONSTRUCTION MEETING

- A. After award of Contract and prior to the commencement of the Work, schedule and conduct meeting with Owner and Architect to discuss the proposed IAQ Management Plan and to develop mutual understanding relative to details of environmental protection.

### PART 2 - PRODUCTS (NOT USED)

### PART 3 - EXECUTION

#### 3.1 IAQ MANAGEMENT - EMISSIONS CONTROL

- A. During construction operations, follow the recommendations in SMACNA IAQ Guidelines for Occupied Buildings under Construction, 2<sup>nd</sup> Edition, 2007, ANSI/SMACNA 008-2008 (Chapter 3).
- B. HVAC Protection:
1. Seal return registers during construction operations.
  2. Provide temporary exhaust during construction operations.
  3. To the greatest extent possible, isolate and/or shut down the return side of the HVAC system during construction. When ventilation system must be operational during construction activities, provide temporary filters.
  4. Do not use new HVAC equipment for construction ventilation without prior approval of Architect.
- C. Source Control: Provide low and zero VOC materials as specified.
- D. Pathway Interruption: Isolate areas of work as necessary to prevent contamination of clean or occupied spaces. Provide pressure differentials and/or physical barriers to protect clean or occupied spaces.
- E. Housekeeping: During construction, maintain project and building products and systems to prevent contamination of building spaces.
- F. Temporary Ventilation: Provide an ACH (air changes per hour) of 1.5 or more and as follows:
1. Provide minimum 48 hour pre-ventilation of packaged dry products prior to installation. Remove from packaging and ventilate in a secure, dry, well-ventilated space free from strong contaminant sources and residues. Provide a temperature range of 60 degrees F minimum to 90 degree F maximum continuously during the ventilation period. Do not ventilate within limits of Work unless otherwise approved by Architect.
  2. Provide adequate ventilation during and after installation of interior wet products and interior final finishes.
  3. Provide filtration media with a Minimum Efficiency Reporting Value (MERV) of 8 as determined by ASHRAE 52.2 during construction. Coordinate with work of Division 23, Heating Ventilating and Air Conditioning (HVAC). If permanently installed air handlers are to be used for ventilation (with approval of Architect), such filtration must be provided at each return air opening.
- G. Scheduling: Schedule construction operations involving wet products prior to packaged dry products to the greatest extent possible.

- H. Flush-Out: After construction ends, prior to occupancy and with all interior finishes installed, perform a building flush-out by supplying a total air volume of 14,000 cu.ft. of outdoor air per sq.ft. of floor area while maintaining an internal temperature of at least 60 degrees F and relative humidity no higher than 60%. Alternatively: if occupancy is desired prior to completion of flush-out, the space may be occupied following delivery of a minimum of 3,500 cubic feet of outdoor air per square foot of floor area. If this option is taken, once the building is occupied, it must be ventilated at a minimum rate of 0.30 cubic feet per minute (cfm) or the design minimum outdoor airflow rate – whichever is greater. During each day of the flush-out period, ventilation must begin 3 hours prior to occupancy and continue through occupancy. These conditions must be maintained until the nominal 14,000 cubic feet of outdoor air is delivered. The contractor is responsible for ensuring this flush-out occurs in any case.

### 3.2 IAQ MANAGEMENT - MOISTURE CONTROL

- A. Housekeeping:
1. Keep materials dry. Protect stored on-site and installed absorptive materials from moisture damage.
  2. Verify that installed materials and products are dry prior to sealing and weatherproofing the building envelope.
  3. Install interior absorptive materials only after building envelope is sealed and weatherproofed.
- B. Inspections: Document and report results of inspections; state whether or not inspections indicate satisfactory conditions.
1. Examine materials for dampness as they arrive. If acceptable to Architect/Owner, dry damp materials completely prior to installation; otherwise, reject materials that arrive damp.
  2. Examine materials for mold as they arrive and reject materials that arrive contaminated with mold.
  3. Inspect stored and installed absorptive materials regularly for dampness and mold growth. Inspect weekly,.
    - a. Where stored on-site or installed absorptive materials become wet, notify Architect. Inspect for damage. If acceptable to Architect/Owner, dry completely prior to closing in assemblies; otherwise, remove and replace with new materials.
  4. Basement: Monitor basement and crawlspace humidity, and dehumidify when relative humidity is greater than 85 percent for more than 2 weeks or at the first sign of mold growth.
  5. Site drainage: Verify that final grades of site work and landscaping drain surface water and ground water away from the building.
  6. Weather-proofing: Inspect moisture control materials as they are being installed. Include the following:
    - a. Air barrier: Verify air barrier is installed without punctures and/or other damage. Verify air barrier is sealed completely.
    - b. Lashing: Verify correct shingling of the flashing for roof, walls, windows, doors, and other penetrations.
    - c. Insulation layer: Verify insulation is installed without voids.
    - d. Roofing: In accordance with ASTM D7186 Standard Practice for Quality Assurance Observation of Roof Construction and Repair.
  7. Plumbing: Verify satisfactory pressure test of pipes and drains is performed before closing in and insulating lines.
  8. HVAC: Inspect HVAC system as specified in Section 01 91 00 – Commissioning, and the following:
    - a. Condensate pans are sloped and plumbed correctly.
    - b. Access panels are installed to allow for inspection and cleaning of coils and ductwork downstream of coils.
    - c. Ductwork and return plenums are air sealed.
    - d. Duct insulation is installed and sealed.
    - e. Chilled water line and refrigerant line insulation are installed and sealed.
- C. Schedule:
1. Schedule work such that absorptive materials, including but not limited to porous insulations, paper-faced gypsum board, ceiling tile, and finish flooring, are not installed until they can be protected from rain and construction-related water.
  2. Weather-proof as quickly as possible. Schedule installation of moisture-control materials, including but not limited to air barriers, flashing, exterior sealants and roofing, at the earliest possible time.



- D. Testing for Moisture Penetration:
1. Windows: Test as per ASTM E1105 Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform or Cyclic Static Air Pressure Difference; unless otherwise indicated, acceptable upper limits are **no leakage for 15 minutes.**
  2. Horizontal Waterproofing (not roofing): Test as per ASTM D5957 Standard Guide for Flood Testing Horizontal Waterproofing Installations; acceptable upper limits are **no leakage for 15 minutes.**
  3. Exterior Walls:
    - a. Water Leakage: Review as per ASTM E2128 Standard Guide for Evaluating Water Leakage of Building Walls.

**END OF SECTION**

**SECTION 01 58 13**  
**TEMPORARY PROJECT SIGNAGE**

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**PART 1 – GENERAL**

**1.1. SECTION INCLUDES**

- A. Project identification sign.

**1.2. QUALITY ASSURANCE**

- A. Design sign and structure to withstand 50 miles/hr wind velocity.
- B. Sign Painter: Experienced as a professional sign painter for minimum three years.
- C. Finishes, Painting: Adequate to withstand weathering, fading, and chipping for duration of construction.

**1.3. SUBMITTALS**

- A. See Section 01 30 00 – Administrative Requirements for submittal procedures.
- B. Shop Drawing: Show content, layout, lettering, color, structure, sizes.

**PART 2 - PRODUCTS**

**2.1. SIGN MATERIALS**

- A. Structure and Framing: New, wood, structurally adequate.
- B. Sign Surfaces: Exterior grade plywood with medium density overlay, minimum 3/4" thick, standard large sizes to minimize joints.
- C. Rough Hardware: Galvanized

**2.2. PROJECT IDENTIFICATION SIGN**

- A. One painted sign, 32 sq ft area, bottom 6 feet above ground.
- B. Content:
  - 1. Project title, City of Madison logo and name of Owner as indicated on Contract Documents.
  - 2. Names and title of Architect.
  - 3. Name of Prime Contractor.
  - 4. Full color project rendering from high resolution image as furnished by Architect.

**PART 3 - EXECUTION**

**3.1. INSTALLATION**

- A. Install project identification sign within 30 days after date fixed by Notice to Proceed.
- B. Erect at designated location.
- C. Install sign surface plumb and level, with butt joints. Anchor securely.

**3.2. REMOVAL**

- A. Remove sign, framing supports, and foundations at completion of Project and restore the area.

**END OF SECTION**

**SECTION 01 60 00  
PRODUCT REQUIREMENTS**

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17 3.8. OWNER PROVIDED, CONTRACTOR INSTALLED EQUIPMENT ..... 4  
18

**PART 1 – GENERAL**

**1.1. SUMMARY**

- 22 A. The purpose of this specification is to provide general guidelines and responsibilities related to the receiving,  
23 handling, and storage of all materials and products from arrival on the job site through installation.  
24 1. Immediate inspection of delivered goods means a timely replacement if damaged.  
25 2. Proper storage helps prevent damage and loss by weather, vandalism, theft, and job site accidents.  
26 3. Proper storage helps with job site performance and safety.  
27 2. Proper handling helps prevent damage and job site accidents.  
28 B. Each Contractor shall be directly responsible for the receiving, handling, and storage of all materials and  
29 products associated with the Work of their Division or Trade.  
30 C. Each Contractor responsible for Work associated with Owner provided materials or products shall be responsible  
31 for the receiving, handling and storage of the material/product as outlined in Section 3.8 below..  
32

**1.2. RELATED SPECIFICATIONS**

- 34 A. Parts of this specification will reference articles within “The City of Madison Standard Specifications for Public  
35 Works Construction”.  
36 1. Use the following link to access the Standard Specifications web page:  
37 <http://www.cityofmadison.com/business/pw/specs.cfm>  
38 a. Click on the “Part” chapter identified in the specification text. For example if the specification  
39 says “Refer to City of Madison Standard Specification 210.2” click the link for Part II, the Part II  
40 PDF will open.  
41 b. Scroll through the index of Part II for specification 210.2 and click the text link which will take you  
42 to the referenced text.  
43 c. City Standard Detail Drawings (SDD) may be located from the index in Part VIII.  
44 B. Section 01 57 21 Indoor Air Quality  
45 C. Section 01 74 13 Progress Cleaning  
46 D. Section 01 76 00 Protecting Installed Construction  
47 E. Other Divisions and Specifications that may address more specifically the requirements for the storage and  
48 handling of materials and products associated Work of other Divisions or Trades.  
49

**1.3. QUALITY ASSURANCE**

- 51 A. The GC shall be responsible for ensuring that these minimum storage and handling requirements are met by all  
52 contractors on the project site including but not limited to the following:  
53 1. Receiving deliveries of materials, products, and equipment.  
54 a. Inspect all deliveries upon arrival for damage, completeness, and compliance with the  
55 construction documents.  
56 i. Deliveries shall remain in original packaging or crates, shipping manifest shall be kept with  
57 the delivery and the packaging shall have visible identification of the items within the  
58 packaging.

- 1                   b.     Immediately report any damaged products or equipment to the GC, begin arrangements for  
2                   immediate replacement.
- 3                   c.     Materials or equipment that have been damaged, are incomplete, or do not comply with the  
4                   construction documents shall not be permitted to be installed.
- 5                   2.     All materials and products shall be stored within the designated limits of the project site. Only store the  
6                   amount of material necessary for upcoming operations so as not to interfere with other construction  
7                   activities and access to Work by the Owner and Architect. Any offsite storage shall be at the expense of  
8                   the contractor storing the material or product. All offsite storage requirements shall comply with this  
9                   specification. All offsite storage of materials is subject to Owner Representative Quality Management  
10                  review at any time.
- 11                  3.     Large storage containers may be used but shall be weather tight, securable, placed on concrete blocks,  
12                  timbers, or jack stands and shall be level.
- 13                  4.     When lifting equipment is required the equipment rating shall be greater than the loading requirements  
14                  of the item being lifted. In addition all of the following shall apply as necessary:
- 15                  a.     Only designated and/or designed lift points shall be used.
- 16                  b.     Large items shall have tag lines and handlers at all times during lifting operations.
- 17                  c.     Lift at multiple points as needed to prevent bending.
- 18                  5.     Materials and products stored inside of the structure shall comply with all of the following:
- 19                  a.     Storage shall not be allowed to impede the flow of work in progress.
- 20                  b.     Storage shall not be allowed to hide completed work from review and inspections.
- 21                  c.     Storage shall not exceed the design loads of the structural components it is being stored upon.
- 22                  6.     All materials and products shall be stored according the manufacturers minimum recommended  
23                  requirements. All of the following shall be considered before storing any product or material:
- 24                  a.     Dust and dirt
- 25                  b.     Moisture and humidity, including rain and snow
- 26                  c.     Excessive temperatures, direct sun, etc
- 27                  d.     Product or material weight and size
- 28                  e.     Potential for breakage
- 29                  f.     Product incompatibility with other products such as corrosiveness, chemical reactions,  
30                  flammability, etc.
- 31                  g.     Product or material value and replacement cost
- 32                  7.     The Contractor shall be responsible for providing fully functional tarps or plastic wrap, to protect  
33                  materials and products from the weather. All coverings shall be free of large holes and tears, and shall be  
34                  tied, strapped, or weighted down to resist blowing.
- 35                  8.     The Contractor shall be responsible for any temporary heating, cooling, or other utility requirement that  
36                  may be associated with the storage of a material or product.
- 37                  9.     The Contractor shall be responsible for securing materials and products of value such as copper, A/V  
38                  equipment, etc. Such items shall be stored in securable shipping containers, job trailers or other such  
39                  storage devices. Container shall be kept secured when not in use.
- 40                  B.     The GC shall inspect the job site daily to ensure that all products and materials stay weather tight and are  
41                  secured against vandalism or theft as required by this specification.
- 42                  C.     The Owners Representative may at any time request improvements regarding storage of any material or product  
43                  being provided under these construction documents.
- 44

45 **PART 2 – PRODUCTS – THIS SECTION NOT USED**

46

47 **PART 3 - EXECUTION**

48

49 **3.1. GENERAL CONTRACTOR REQUIREMENTS**

- 50                  A.     Designate material storage and handling areas as needed including all of the following:
- 51                          1.     Designate specific areas of the site for delivery and storage of materials to be used during the execution  
52                          of the Work.
- 53                          2.     Designated areas shall not be located so as to interfere with the installation of any Work including Work  
54                          by others such as the installation of utilities or the maintenance of existing utilities. This shall include not  
55                          storing items in active utility easements as designated by the site plan.
- 56                  B.     Arrange for openings in the building as needed to allow delivery and installation of large items. Openings shall  
57                  be appropriately sized to include the use of booms, slings, and other such lifting devices that may be larger than  
58                  the item being installed.

- 1                   1.       When openings are required in completed Work (new or existing) the GC shall be responsible for  
2                   providing an appropriate opening and for restoring the opening to the original or better condition upon  
3                   completion. Restoration shall be weather tight and complete.  
4            C.       Repeated moving and handling of items being stored shall not be allowed. The GC shall be responsible for any  
5                   damage and replacement because of mishandling or excessive handling.  
6

7       **3.2. BULK MATERIAL**

- 8       A.       Bulk material such as sand, gravel, top soil and other types of fill shall be stored away from the construction area  
9                   and shall be stock piled as follows:  
10              1.       All bulk material shall be piled safely and efficiently in as small an area as practical. Only store the  
11                   amount of material necessary for upcoming operations so as not to interfere with other construction  
12                   activities and access to Work by the Owner and Architect.  
13              2.       All stock piles shall have silt fence/sock properly installed around the perimeter to prevent erosion and  
14                   loss of material. Refer to City of Madison Standard Specification Section 210.1(f) and other related  
15                   specification or details.  
16              3.       Fine grained material shall be protected with tarps to prevent blowing. Tarps shall be weighted or staked  
17                   to stay in place.  
18       B.       Bulk material such as brick, concrete block, stone, and other palletized materials shall be stored on original  
19                   shipping pallets until ready for use.  
20

21       **3.3. DRY PACKAGED MATERIAL**

- 22       A.       Dry packaged material such as cement, mortar, etc shall be stored on pallets, on slightly elevated ground or clear  
23                   stone pad to keep water away from the base of the material being stored. Protect from moisture.  
24

25       **3.4. STRUCTURAL AND FRAMING MATERIAL**

- 26       A.       All structural and framing material shall be stored in an organized manner arranged by type, size and dimension.  
27                   Materials shall be stored on pallets or timbers as necessary and shall not be allowed to lie directly on the ground.  
28       B.       Long and heavy items shall be supported at several points to prevent bending and warping.  
29

30       **3.5. EQUIPMENT**

- 31       A.       Equipment delivered to the site shall be stored away from all construction activities until the item can either be  
32                   moved inside or properly installed.  
33       B.       Equipment shall be stored on slightly elevated ground or clear stone pad to keep water away from the base of  
34                   the equipment.  
35

36       **3.6. FINISH PRODUCTS**

- 37       A.       Finish products such as flooring, tile, counters, lockers, toilets, partitions, lighting, and other similar items should  
38                   not be delivered and stored until the structure has been enclosed, is weather tight, temperature controlled and  
39                   the contractor is ready for such items to be installed.  
40              1.       Storage of finished products outside for any length of time shall not be allowed.  
41       B.       Products that cannot be stored inside the structure shall be stored in secured containers or job trailers until such  
42                   time as they are ready to be installed.  
43       C.       Products with a high potential for breakage such as glass, mirrors, tiles, toilet fixtures, etc. shall be stored with  
44                   additional protection as necessary such as but not limited to the following:  
45              1.       Store in original shipping containers until ready for installation.  
46              2.       Do not store in high traffic areas.  
47              3.       Shield with other materials such as cardboard, plywood, or similar products.  
48

49       **3.7. DUCTWORK, PIPING, AND CONDUIT**

- 50       A.       All piping and conduit shall be stored horizontally unless otherwise specified by the manufacturer or Division and  
51                   Trade Specifications.  
52              1.       Do not store directly on grade.  
53              2.       Cover metal pipes and tubes to prevent rust and corrosion, allow ventilation to prevent condensation.  
54              3.       Whenever possible use pipe stands for storing pipe and conduit to prevent tripping and rolling hazards.  
55       B.       All ductwork shall be stored horizontally or vertically as necessary unless otherwise specified by the  
56                   manufacturer or Division and Trade Specifications.  
57              1.       During storage, both ends of each duct shall be protected with plastic sheathing to prevent dust and dirt  
58                   from getting inside the duct. Sheathing shall be sufficiently taped to the duct.

- 1                            2.    After installation, free/open ends shall remain protected with taped plastic sheathing and or temporary  
2 filters as specified by division or Trade specifications.  
3
- 4    **3.8.    OWNER PROVIDED, CONTRACTOR INSTALLED EQUIPMENT**
- 5    A.    Section 3.8.A. shall apply to all equipment being provided to any contractor directly from the Owner for  
6 installation under the contract.
- 7            1.    The Owner or Owners Representative shall do the following:
- 8                    a.    Inspect all deliveries upon receipt and notify manufacturer of any issues directly.  
9                    b.    Review the received shipment with the contractor.
- 10                            i.    Only provide products or materials to the contractor that were not damaged through  
11 shipping or handling.  
12                            ii.    Confirm missing products or materials and anticipated delivery schedule if known.
- 13            2.    The Contractor responsible for the installation of Work associated with Owner provided materials or  
14 products shall “take ownership” and provide safe and secure storage and handling as previously  
15 described within this specification.
- 16                            i.    The Contractor shall be liable for the repair or replacement of any material or product  
17 damaged after taking ownership of the product from receipt through final acceptance.
- 18    B.    Section 3.8.B. shall apply to all equipment being provided by the Owner but shipped directly to any sub-  
19 contractor or the project site for installation under the contract.
- 20            1.    The GC and/or Contractor responsible for the Work associated with the Owner provided materials or  
21 products shall do the following:
- 22                            a.    Inspect all deliveries upon receipt and notify the Owner or Owners Representative of any issues  
23 directly.  
24                            i.    Owner or Owners Representative shall notify manufacturer of any issues directly.  
25                            b.    Review the received shipment with the Owner or Owners Representative
- 26                            i.    Confirm missing products or materials and anticipated delivery schedule if known.
- 27            2.    The Contractor shall “take ownership” and provide safe and secure storage and handling as previously  
28 described within this specification.
- 29                            i.    The Contractor shall be liable for the repair or replacement of any material or product  
30 damaged after taking ownership of the product from receipt through final acceptance.  
31  
32  
33  
34

**END OF SECTION**

**SECTION 01 71 23  
FIELD ENGINEERING**

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**PART 1 – GENERAL**

**1.1. REQUIREMENTS INCLUDED**

- A. The Contractor shall provide and pay for field engineering services required for the Project:
1. Land surveying services required to execute the Work, to include building addition location and layout, and location and layout of pavements and all proposed site improvements.
  2. Verification of existing building dimensions, elevations, and relationship to proposed additions.
  3. Professional Engineering services to execute Contractor’s construction methods.
  4. Registered Professional Engineer in the State of Wisconsin to determine the load capacity of the existing structure for use of Contractors temporary facilities, equipment, lifts, machinery, material storage, etc.

**1.2. RELATED REQUIREMENTS**

- A. Conditions of the Contract

**1.3. PROCEDURES**

- A. A property survey has been prepared for the Owner and has been bound with Contract Drawings. Surveys shall describe physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. If information is incomplete, notify Owner to furnish additional information. Verify easement locations, front, side, and rear yard restrictions, if any; and property line locations. Verify control points, and establish bench marks. Locate and layout roads, walks, parking areas and all civil structures and all proposed site improvements.
- B. Verify locations of underground services, utilities, structures, etc. which may be encountered or affected by the Work.

**1.4. PROJECT SURVEY REQUIREMENTS**

- A. Using datum, the lot lines and present levels have been established as indicated on the Drawings. Other grades, lines, levels and benchmarks, shall be established and maintained by the Contractor, who shall be responsible for them. As work progresses, the Contractor shall layout on forms and floor, the locations of all partitions, walls and fix column centerlines as a guide to all trades. The Contractor shall make provision to preserve property line stakes, benchmarks, or datum point. If any are lost, displaced or disturbed through neglect of any Contractor, Contractor’s agents or employee, the Contractor responsible shall pay the cost of restoration.
- B. Establish lines and levels, locate and layout, by instrumentation and similar appropriate means, additions, column locations, floor levels, stakes for walks, etc.
- C. Provide data to all Subcontractors for their use as applicable.
- D. From time to time, verify layouts by same methods.

**1.5. RECORDS**

- A. Maintain a complete, accurate log of all control and survey work as it progresses.

**PART 2 – PRODUCTS – THIS SECTION NOT USED**

**PART 3 – EXECUTION – THIS SECTION NOT USED**

**END OF SECTION**

SECTION 01 73 00  
EXECUTION

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  - 3.7 [STARTING AND ADJUSTING](#)
  - 3.8 [PROTECTION OF INSTALLED CONSTRUCTION](#)

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:
  - 1. Construction layout.
  - 2. Field engineering and surveying.
  - 3. Installation of the Work.
  - 4. Cutting and patching.
  - 5. Progress cleaning.
  - 6. Starting and adjusting.
  - 7. Protection of installed construction.
- B. Related Requirements:
  - 1. Section 01 10 00 "Summary" for limits on use of Project site.
  - 2. Section 01 77 00 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, replacing defective work, and final cleaning.

**1.2 INFORMATIONAL SUBMITTALS**

- A. Certificates: Submit certificate signed by **professional engineer licensed in the State of Wisconsin** certifying that location and elevation of improvements comply with requirements.
- B. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

**1.3 QUALITY ASSURANCE**

- A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.
- B. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
  - 1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.
  - 2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.
  - 3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.



4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- C. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

- A. General: Comply with requirements specified in other Sections.
1. For projects requiring compliance with sustainable design and construction practices and procedures, use products for patching that comply with sustainable design requirements.
- B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, **mechanical and electrical systems**, and other construction affecting the Work.
1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services; and other utilities.
  2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
  2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
  3. 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. Proceeding with the Work indicates acceptance of surfaces and conditions.

### **3.2 PREPARATION**

- A. Existing Utility Information: Furnish information to **local utility** and **Owner** that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Section 01 31 00 "Project Management and Coordination."

**3.3 CONSTRUCTION LAYOUT**

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.
- B. General: Engage a **professional engineer licensed in the State of Wisconsin** to lay out the Work using accepted surveying practices.
  - 1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
  - 2. Establish limits on use of Project site.
  - 3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
  - 4. Inform installers of lines and levels to which they must comply.
  - 5. Check the location, level and plumb, of every major element as the Work progresses.
  - 6. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
  - 7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.
- C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.
- D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.
- E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

**3.4 FIELD ENGINEERING**

- A. Identification: Owner will identify existing benchmarks, control points, and property corners.
- B. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
- C. Benchmarks: Establish and maintain a minimum of **two** permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.
  - 1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
- D. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.

**3.5 INSTALLATION**

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
  - 1. Make vertical work plumb and make horizontal work level.
  - 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
  - 3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.
- F. Tools and Equipment: Where possible, select tools or equipment that minimize production of excessive noise levels.
- G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other portions of the Work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

- H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.
  - 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
  - 2. Allow for building movement, including thermal expansion and contraction.
  - 3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- J. Remove and replace damaged, defective, or non-conforming Work.

### 3.6 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
  - 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
  - 2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
  - 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
    - a. Use containers intended for holding waste materials of type to be stored.
  - 4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
  - 1. Remove liquid spills promptly.
  - 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in **Section 01 50 00 "Temporary Facilities and Controls"** and **Section 01 74 19 "Construction Waste Management and Disposal."**
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

### 3.7 STARTING AND ADJUSTING

- A. Coordinate startup and adjusting of equipment and operating components with requirements in Section 01 91 13 "General Commissioning Requirements."
- B. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- C. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.
- D. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- E. Manufacturer's Field Service: Comply with qualification requirements in Section 01 40 00 "Quality Requirements."

**3.8 PROTECTION OF INSTALLED CONSTRUCTION**

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Protection of Existing Items: Provide protection and ensure that existing items to remain undisturbed by construction are maintained in condition that existed at commencement of the Work.
- C. Comply with manufacturer's written instructions for temperature and relative humidity.

**END OF SECTION**

**SECTION 01 73 29  
CUTTING AND PATCHING**

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17

**PART 1 – GENERAL**

**1.1. SUMMARY**

- 20  
21 A. This Section includes general procedural requirements for cutting and patching including, but not limited to the  
22 following:  
23 1. Examination  
24 2. Preparation  
25 3. Performance  
26 4. Cleanup and Restoration  
27

**1.2. RELATED SPECIFICATION SECTIONS**

- 28  
29 A. Divisions 02 through 32 Sections for specific requirements and limitations applicable to cutting and patching  
30 individual parts of the Work.  
31 B. Division 07 Section "Penetration Fire Stopping" for patching fire-rated construction.  
32

**1.3. DEFINITIONS**

- 33  
34 A. Cutting: Removal of in-place construction necessary to permit installation or performance of other Work.  
35 B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other  
36 Work.  
37 C. Level Alpha  
38

**1.4. QUALITY ASSURANCE**

- 39  
40 A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying  
41 capacity or load-deflection ratio.  
42 B. Operational Elements: Do not cut and patch operating elements and related components in a manner that results  
43 in reducing their capacity to perform as intended or that may result in increased maintenance or decreased  
44 operational life or safety.  
45 C. Miscellaneous Elements: Do not cut and patch miscellaneous elements or related components in a manner that  
46 could change their load-carrying capacity that results in reducing their capacity to perform as intended, or that  
47 may result in increased maintenance or decreased operational life or safety. Some miscellaneous elements  
48 include the following:  
49 1. Water, moisture, or vapor barriers  
50 2. Membranes and flashings  
51 3. Exterior curtain-wall construction  
52 4. Equipment supports  
53 5. Piping, ductwork, vessels, and equipment  
54 6. Noise and vibration control elements and systems  
55 D. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and  
56 patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that  
57 would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has  
58 been cut and patched in a visually unsatisfactory manner.

1 **1.5. WARRANTY**

- 2 A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting  
3 and patching operations, by methods and with materials so as not to void existing warranties.  
4 B. All cutting and patching work performed under this contract shall be warranted like new work as defined by the  
5 Specification governing the work.  
6

7 **PART 2 - MATERIALS**

8  
9 **2.1. GENERAL**

- 10 A. Comply with requirements specified within other sections of the Specifications.  
11 B. In-Place Materials: Use materials identical to existing in-place materials. For exposed surfaces use materials that  
12 visually match in-place adjacent surfaces to the fullest extent possible.  
13 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the  
14 visual and functional performance of in-place materials.  
15

16 **PART 3 - EXECUTION**

17  
18 **3.1. EXAMINATION**

- 19 A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.  
20 1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including  
21 compatibility with in-place finishes or primers.  
22 2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.  
23

24 **3.2. PREPARATION**

- 25 A. Temporary Support: Provide temporary support of Work to be cut.  
26 B. Protection: Protect in-place construction and existing conditions during cutting and patching to prevent damage.  
27 Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting  
28 and patching operations. If the failure to protect, or the lack of protection, of in-place construction and/or  
29 existing conditions results in damage, the contractor shall be responsible for repair to previous condition.  
30 C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.  
31 D. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be  
32 removed, relocated, or abandoned, bypass such services/systems before cutting to eliminate interruption to  
33 occupied areas.  
34

35 **3.3. PERFORMANCE**

- 36 A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the  
37 earliest feasible time, and complete without delay.  
38 1. Cut in-place construction to provide for installation of other components or performance of other  
39 construction, and subsequently patch as required to restore surfaces to their original condition.  
40 B. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations,  
41 including excavation, using methods least likely to damage elements retained or adjoining construction. If  
42 possible, review proposed procedures with original Installer; comply with original Installer's written  
43 recommendations.  
44 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and  
45 chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance  
46 of adjacent surfaces. Temporarily cover openings when not in use.  
47 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.  
48 3. Concrete or Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.  
49 4. Excavating and Backfilling: Comply with requirements in applicable Division 31 Sections where required by  
50 cutting and patching operations.  
51 5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap,  
52 valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other  
53 foreign matter after cutting.  
54 6. Proceed with patching after construction operations requiring cutting are complete.  
55 C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following  
56 performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and  
57 comply with installation requirements specified in other Sections.

1 D. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of  
2 installation.  
3

4 **3.4. CLEANUP AND RESTORATION**

- 5 A. Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a  
6 manner that will eliminate evidence of patching and refinishing.
- 7 1. Clean piping, conduit, and similar features before applying paint or other finishing materials.
  - 8 2. Restore damaged pipe covering to its original condition.
  - 9 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another,  
10 patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish,  
11 color, texture, and appearance. Remove in-place floor and wall coverings and replace with new  
12 materials, if necessary, to achieve uniform color and appearance.
  - 13 4. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch  
14 and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats  
15 until patch blends with adjacent surfaces.
  - 16 5. Ceilings: Patch, repair, or re-hang in-place ceilings as necessary to provide an even-plane surface of  
17 uniform appearance.
  - 18 6. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weather tight  
19 condition.
  - 20 7. Cleaning: Clean areas and spaces where cutting and patching are performed. Completely remove paint,  
21 mortar, oils, putty, and similar materials.
  - 22 8. Any smoke and fire caulking that has been disturbed must be replaced by the Contractor as required by  
23 code.  
24  
25  
26  
27

**END OF SECTION**

**SECTION 01 74 13  
PROGRESS CLEANING**

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16

**PART 1 – GENERAL**

**1.1. SUMMARY**

- 20 A. Throughout the execution of this contract all contractors shall be responsible for maintaining the project site in a  
21 standard of cleanliness as described in this specification.  
22 B. All contractors shall also comply with the requirements for cleaning as described in other specifications.  
23 C. Work included in this specification shall include but not be limited to:  
24 1. Safety Cleaning  
25 2. Project Site Cleaning  
26 3. Progress Cleaning  
27 4. Final Cleaning  
28

**1.2. RELATED SPECIFICAITONS**

- 30 A. Section 01 35 00 Special Procedures  
31 B. Section 01 60 00 Product Requirements  
32 C. Section 01 74 19 Construction Waste Management and Disposal  
33 D. Section 01 76 00 Protecting Installed Construction  
34

**1.3. QUALITY ASSURANCE**

- 36 A. The General Contractor (GC) shall conduct daily inspections, more often if necessary, of the entire project site to  
37 ensure the requirements of cleanliness are being met as described within these specifications.  
38 B. All contractors shall comply with other regulatory requirements as they apply to waste recycling, reuse, hauling,  
39 and disposal requirements of any governmental authority having jurisdiction.  
40 C. The Owner reserves the right to have work done by others in the event any contractor fails to perform cleaning  
41 as described within these specifications. The cost of any Owner provided cleaning shall be charged to the  
42 contractor through a deduct change order.  
43

**PART 2 - PRODUCTS**

**2.1. CLEANING MATERIALS AND EQUIPMENT**

- 47 A. The Contractor shall provide all required personnel, equipment, and materials necessary to maintain the  
48 required level of cleanliness as described in this specification.  
49 B. Use only cleaning materials and equipment that are compatible with the surface being cleaned, as  
50 recommended by the manufacturer, or as approved by the A/E.  
51 C. Use only cleaning materials, equipment, and methods as recommended in the manufacturers care and use guide  
52 of the material, finish or equipment being cleaned.  
53

**PART 3 - EXECUTION**

**3.1. SAFETY CLEANING**

- 57 A. All Contractors shall be responsible for safety cleaning as required by OSHA and other regulatory requirements  
58 as applicable.



- 1 B. Safety Cleaning shall include but not be limited to the following:  
2 1. All work areas, passageways, ramps, and stairs shall be kept free of debris, scrap materials, pallets, and  
3 other large items that would obstruct exiting routes. Small items such as tools, electrical cords, etc are  
4 picked up when not in use.  
5 2. Form and scrap lumber shall have nails/screws removed or bent over. Lumber shall be neatly stacked in  
6 an area designated by the GC.  
7 3. Spills of oil, grease, and other such liquids shall be cleaned immediately or sprinkled with sand/oil-dry  
8 first, then cleaned.  
9 4. Oily, flammable, or hazardous items shall be stored in appropriate covered containers and storage  
10 devices unless actively being used.  
11 5. Oily, or flammable rags, and other such waste shall only be disposed of in authorized covered containers.  
12 6. Disposal by burning shall not be allowed at any time.  
13

14 **3.2. PROJECT SITE CLEANING**

- 15 A. This section applies to the general cleanliness of the project site as a whole for the duration of the execution of  
16 this contract.  
17 B. Exterior Project Site Areas  
18 1. The GC and other Contractors as appropriate shall ensure the following levels of cleanliness are applied  
19 to the exterior project site areas.  
20 a. The overall appearance of the project site is neat and orderly. Defined areas for material storage,  
21 material waste, job trailers, and the project area are clean and well maintained.  
22 b. The construction fence is maintained, erect with no gaps, and properly posted per all regulatory  
23 requirements.  
24 c. All erosion control measures are properly maintained, cleaned, and repaired as necessary.  
25 d. All loose materials (construction or waste) are properly tied or weighted down to resist blowing.  
26 e. All construction materials are properly covered with fully functional tarps or plastic wrap,  
27 protected from the weather, coverings are tied, strapped, or weighted down to resist blowing.  
28 f. Dust control is applied as necessary or as required by any regulatory requirement.  
29 C. Interior Project Site Areas  
30 1. All Contractors shall ensure the following levels of cleanliness are applied to the interior project site  
31 areas.  
32 a. The overall appearance of the project site is neat and orderly. Defined areas for material storage,  
33 material waste, and project area are clean and well maintained.  
34 b. Stored materials are kept in original shipping containers whenever possible. Stored materials not  
35 in shipping containers are properly stored and protected according to other applicable  
36 specifications.  
37 c. All scraps and debris shall be properly disposed of as often as necessary to keep work areas,  
38 passageways, stairs, and ramps free of debris and clear for emergency exiting.  
39 d. Boxes, pallets, and other such shipping containers, are broken down, stored in a consolidated area  
40 or, disposed of as often as is necessary.  
41 e. Hand tools, supplies, materials, electrical cords not being used are picked up and stored in gang  
42 boxes, not left as walking hazards in work areas, passageways, etc.  
43 D. Job Trailer  
44 1. The interior of the job trailer shall be kept clean and available as a work space at all times. The GC shall  
45 ensure that the following is provided for within the job trailer:  
46 a. Meeting space including tables and chairs.  
47 b. Sufficient space for all contractors to access the official construction documents, provide updates,  
48 etc.  
49

50 **3.3. PROGRESS CLEANING**

- 51 A. This sub-section shall apply to all Progress Cleaning prior to the installation of finishes, fixtures, and trim (IE  
52 rough-in).  
53 1. For the purposes of this section "clean" shall be defined as a level of cleanliness free of dust and other  
54 material capable of being removed by use of reasonable effort using a good quality janitor broom and  
55 shop-vac.  
56 2. Daily cleanings shall be conducted by all contractors at the end of the work day as follows:  
57 a. Debris in excavated areas shall be removed prior to backfill and compaction.  
58 b. Debris in wall cavities, chase spaces, etc shall be removed prior to enclosing the spaces.

- 1 c. Large items shall be properly stored, returned to designated areas, or disposed of as necessary.  
2 d. Loose materials shall be properly secured.  
3 e. Flammable or hazardous materials are properly stored or disposed of.  
4 3. Weekly cleaning shall be conducted by all contractors as designated by the GC. Weekly cleanings shall  
5 include all the above for a daily cleaning and other necessary cleaning as designated by the GC.  
6 B. This sub-section shall apply to Progress Cleaning in preparation for the installation of finishes, fixtures, and trim.  
7 a. Surfaces receiving finishes shall be thoroughly cleaned prior to contractors applying finish  
8 materials. The GC shall be responsible for inspecting the area and surfaces being cleaned for  
9 finish prior to the sub-contractor applying the finish. This shall include but not be limited to the  
10 following:  
11 i. Wall surfaces shall be wiped clean of dirt and oily residues, vacuumed free of dust, and  
12 shall be free of surface imperfections prior to painting or installing wall coverings.  
13 ii. Metal surfaces shall be wiped clean of dirt and oily residues, and be free of surface  
14 imperfections prior to painting.  
15 iii. Flooring shall be broom swept of large and loose items then vacuumed clean of dust and  
16 small particles, and damp mopped clean and dried prior to installing any flooring finish.  
17 Additional cleaning may be required depending on the preparation requirements  
18 recommended by the flooring material manufacturer.  
19 C. This sub-section shall apply to Progress Cleaning after the installation of finishes, fixtures, and trim.  
20 1. For the purposes of this section "clean" shall be defined as a level of cleanliness free of dust and other  
21 material capable of damaging or visually disfiguring finished work, finishes, fixtures, and trim.  
22 2. Progress Cleaning at this point in the contract shall be conducted immediately as follows:  
23 a. Dust, dirt, etc shall be swept and vacuumed off of finish flooring and trim.  
24 b. Liquid spills shall be cleaned up according to the spill type. This shall include drips and spills  
25 caused by paint, stain, sealants, and other such items.  
26 3. The Contractor(s) at no additional cost to the Owner shall be responsible for replacing any finished work,  
27 finishes, fixtures, and trim damaged or disfigured because of inadequate or improper cleaning.  
28

### 29 3.4. FINAL CLEANING

- 30 A. As noted in Specification 01 29 76 Progress Payment Procedures, Progress Payment Milestone Schedule, Final  
31 Cleaning shall not be conducted prior to requesting the 90% contract total progress payment and all of the  
32 following shall be complete:  
33 1. All final regulatory inspections including but not limited to Building Inspection Department and Madison  
34 Fire Department inspections have been successfully completed.  
35 2. All Quality Management Observation (QMO) reports have been closed out.  
36 3. All Demonstration and Training has been completed.  
37 4. All Attic Stock has been consolidated and located to its designated area  
38 5. All protection for installed construction shall be removed prior to final cleaning by the contractor  
39 responsible for providing the protections. This shall include the removal of any adhesive residues left  
40 behind from tapes. Contractors shall only use manufacturer authorized cleaning materials for removing  
41 adhesives, etc.  
42 B. For the purposes of this section "clean" shall be defined as a level of cleanliness generally provided by skilled  
43 cleaners using commercial quality building maintenance equipment and materials.  
44 C. The GC shall be responsible for ensuring that all requirements under this section are being met.  
45 D. General Requirements  
46 1. Employ experienced personnel or professional cleaners for final cleaning as necessary for the areas or  
47 equipment being cleaned.  
48 2. Cleaning equipment used shall be commercial grade equipment commonly used by professional cleaners.  
49 3. Cleaning equipment and materials shall be cleaned, rinsed, or replaced to ensure a uniform level of  
50 cleanliness is being maintained during the final cleaning. This shall include but not be limited to the  
51 following:  
52 a. Vacuum cleaner bags and/or filters are changed and/or cleaned as often as necessary.  
53 b. Dust & wipe down rags are washed, rinsed, or replaced before starting each room.  
54 c. Mopping equipment  
55 i. Mop water for washing shall have cleaning solution added to the amount and temperature  
56 per manufacturer's recommendations. Mop washing water shall be replaced often to  
57 maintain the levels of the cleaning solution and temperature required.  
58 ii. Mop water for rinsing shall remain clean, clear, and be replaced as often as necessary.



**SECTION 01 74 19  
CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL**

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20

**PART 1 – GENERAL**

**1.1. SUMMARY**

- 24 A. This specification includes administrative and procedural requirements for the recycling, re-use, salvaging, and  
25 disposal of non-hazardous construction and demolition waste.  
26 B. The General Contractor (GC) shall be fully responsible for complying with all applicable ordinances and other  
27 such regulatory requirements during the execution of this contract.  
28

**1.2. RELATED SPECIFICAITONS**

- 30 A. 01 29 76 Progress Payment Procedures  
31 B. 01 31 23 Project Management Web site  
32 C. 01 32 19 Submittals Schedule  
33 D. 01 33 23 Submittals  
34 E. 01 77 00 Closeout Procedures  
35 F. Other Divisions and Specifications that may address the proper disposal of construction or demolition waste as it  
36 pertains to work being conducted under that particular specification.  
37

**1.3. CITY ORDINANCES**

- 39 A. There are two (2) Madison General Ordinances (MGO) that the City of Madison has regarding construction and  
40 demolition waste.  
41 1. MGO 10.185, Recycling and Reuse of Construction and Demolition Debris, describes the requirements  
42 associated with this ordinance including definitions, documentation requirements, and penalties.  
43 2. MGO 28.185, Approval of Demolition (Razing, Wrecking) and Removal, describes the requirements  
44 associated with applying for and receiving a demolition permit.  
45 B. All City of Madison, Board of Public Works, contracts being conducted by City Engineering, Facility Management,  
46 for construction, remodeling, or demolition shall comply with the above ordinances regardless of project type or  
47 size.  
48

**1.4. DEFINITIONS**

- 50 A. Clean: Untreated and unpainted material, free of contamination caused by oils, solvents, caulks, and other  
51 chemicals.  
52 B. Construction and Demolition Debris: Materials resulting from the construction, remodeling, repair, and  
53 demolition of utilities, structures, buildings, and roads.  
54 C. Disposal: Off-site removal of construction and demolition debris and the subsequent sale, recycling, reuse, or  
55 deposit in authorized landfill or incinerator.  
56 D. Hazardous: Exhibiting the characteristics of hazardous substance, i.e. ignitability, corrosiveness, toxicity, or  
57 reactivity and including but not limited to asbestos containing materials, lead, mercury and PCBs.  
58 E. Non-hazardous: Exhibiting none of the characteristics of a hazardous substance.

- 1 F. Nontoxic: Not immediately poisonous to humans or poisonous after a long period of exposure.
- 2 G. Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured
- 3 into a new product.
- 4 H. Recycle: Any process by which construction or demolition debris is diverted from final disposal as solid waste at
- 5 a permitted landfill and instead is collected, separated, and/or processed into raw materials for new, reused, or
- 6 reconstituted products; or for the recovery of materials for energy production processes.
- 7 I. Recycler: Any recycling facility, transfer station, or other waste handling facility which accepts construction and
- 8 demolition debris for recycling, or for other transferring to a recycling facility.
- 9 J. Recycling: The process of sorting, cleaning, treating, or reconstituting solid waste and other discarded materials
- 10 for the purpose of preparing the material to be recyclable. Recycling does not include burning, incinerating or
- 11 thermally destroying waste.
- 12 K. Return: To give back reusable items or unused products to vendors for credit.
- 13 L. Reuse: Shall mean any of the following:
- 14 1. The on-site use of reprocessed construction and demolitions debris.
- 15 2. The off-site redistribution of a material, for use in the same manner or similar manner at another
- 16 location.
- 17 3. The use of non-toxic, clean wood as an alternative fuel source.
- 18 M. Salvage: To remove a waste material from the project site for resale or reuse by the Owner or others.
- 19 N. Toxic: Poisonous to humans either immediately or after a long period of exposure.
- 20 O. Trash: Any product or material unable to be re-used, returned, recycled, or salvaged.
- 21 P. Waste: Extra materials or products that have reached the end of its useful life or its intended use. Waste
- 22 includes salvageable, returnable, recyclable and re-useable construction and demolition materials, and trash.
- 23

#### 24 1.5. PERFORMANCE REQUIREMENTS

- 25 A. The GC shall develop a Waste Management Plan that results in end-of-project rates for salvage/recycling/reuse
- 26 of 75 percent (minimum) by weight of the total waste generated by the Work. Percentages may be adjusted on
- 27 a project by project basis depending on selected LEED goals associated with the project.
- 28 B. The GC shall salvage or recycle 100 percent of all uncontaminated packaging materials including but not limited
- 29 to the following:
- 30 1. Paper
- 31 2. Cardboard
- 32 3. Beverage containers
- 33 4. Boxes
- 34 5. Plastic Sheet and film
- 35 6. Polystyrene packaging
- 36 7. Wood crates and pallets
- 37 8. Plastic pails and buckets
- 38 C. Promote a resourceful use of supplies and materials through proper planning and handling. Generate the least
- 39 amount of waste possible by minimizing errors, poor planning, breakage, mishandling, contamination or other
- 40 similar factors.
- 41 D. Use all reasonable means to divert construction waste from landfills and incinerators through recycling, reuse, or
- 42 salvage as appropriate.
- 43

#### 44 1.6. SUBMITTALS AND DELIVERABLES

- 45 A. The GC shall provide his/her completed Waste Management Plan to the Project Management Web Site as a
- 46 submittal for review by the Project Architect and City Project Manager.
- 47 1. See item 1.8 below for Waste Management Plan submittal requirements.
- 48 2. The Waste Management Plan shall be completed, submitted, and approved as a pre-requisite for
- 49 Progress Payment number 1.
- 50 3. Copies of all documentation required by this specification shall be submitted to the appropriate Project
- 51 Management Web Site Library. Documentation shall be reviewed by the City Project Manager during all
- 52 Progress Payment reviews for compliance and accuracy.
- 53 B. The Waste Management Coordinator shall provide copies of items 1 through 5 below to the appropriate Project
- 54 Management Web Site Library and shall update the Waste Management Summary Log to reflect the records
- 55 being submitted.
- 56 1. Records of Donations: Indicate receipt and acceptance of itemized salvageable waste donated to
- 57 individuals or organizations. Indicate if the organization is tax exempt.

- 1                   2.     Records of Sales: Indicate receipt and acceptance of itemized salvageable waste sold to individuals or
- 2                                   organizations. Indicate if the organization is tax exempt.
- 3                   3.     Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by
- 4                                   recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts and
- 5                                   invoices.
- 6                   4.     Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and
- 7                                   incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts and invoices.
- 8                   5.     Statement of Refrigerant Recovery: The Refrigerant Recovery Technician responsible for recovering
- 9                                   refrigerant shall provide the GC with a statement indicating all of the following:
- 10                                  a.     All recovery was performed according to EPA Regulations.
- 11                                  b.     All refrigerant present was recovered; indicate the total quantity recovered by unit.
- 12                                  c.     Date of Recovery.
- 13                                  d.     Name, address, company name, and phone number of technician performing the recovery.
- 14                                  e.     Technician shall sign and date the statement.
- 15            C.     LEED Submittal: The GC shall provide the following information using the appropriate LEED letter template upon
- 16                                   project completion: indicating that the requirements of the credit have been met. *NOTE: This requirement shall*
- 17                                   *only apply to projects having a LEED certification goal.*
- 18                                  1.     Total waste material generated.
- 19                                  2.     Total waste material diverted by diversion method; recycling, salvage, re-use, etc.
- 20                                  3.     Statement that the credit requirements have been met.
- 21                                  4.     GC shall sign the letter.
- 22

23 **1.7.    QUALITY ASSURANCE**

- 24            A.     Waste Management Coordinator: The GC shall be responsible for designating a Waste Management
- 25                                   Coordinator. Coordinator may be the GC Supervisor, GC Project Manager or other member of the GC staff
- 26                                   having knowledge of proper waste management procedures and all applicable regulations.
- 27            B.     Regulatory Requirements: comply with all hauling and disposal regulations of authorities having jurisdiction.
- 28            C.     The Waste Management Coordinator shall comply with Specification 01 31 19 Project Meetings, Section 3.7.B.1
- 29                                   and conduct a Waste Management Conference at the job site. This conference shall be repeated as necessary as
- 30                                   additional trades are added to the Work. The conference shall include but not be limited to the following:
- 31                                  1.     Identify the Waste Management Coordinator; provide trade contractors with name, phone, and email
- 32                                   information.
- 33                                  2.     Review and discuss the Waste Management Plan and the roles of the Coordinator.
- 34                                  3.     Review the requirements for documenting and reporting procedures of each type of waste and its
- 35                                   disposition.
- 36                                  4.     Review procedures for material separation; indicate availability and locations of containers and bins.
- 37                                  5.     Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
- 38                                  6.     Review waste management procedures specific to each trade.
- 39            D.     Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.
- 40

41 **1.8.    WASTE MANAGEMENT PLAN**

- 42            A.     Develop a plan consisting of waste identification, a waste reduction work plan, and cost/revenue analysis.
- 43                                   Indicate quantities by weight or volume. Use the same units of measure throughout the waste management
- 44                                   plan.
- 45                                  1.     Waste Identification: Indicate anticipated types and quantities of site clearing, demolition waste, and
- 46                                   construction waste that will be generated during the execution of this contract. Include assumptions for
- 47                                   the estimates.
- 48                                  2.     Waste Reduction Work Plan: The work plan shall consist of but not be limited to all of the following:
- 49                                   a.     Identify methods for reducing construction waste. Re-using, framing and forming materials, re-
- 50                                   planning material cuts to minimize waste, etc.
- 51                                   b.     Identify what types of materials will be recycled. Provide lists of local companies that receive
- 52                                   and/or process the materials. Include names, addresses, and phone numbers.
- 53                                   c.     Identify what types of materials will be disposed of and whether it will be disposed of in a landfill
- 54                                   facility or by incineration facility. Provide lists of local companies that receive and/or process the
- 55                                   materials. Include names, addresses, and phone numbers.
- 56                                   d.     Identify methods to be used on site for separating waste including all of the following:
- 57                                   i.     Sizes of containers to be used.
- 58                                   ii.    Labels to be used on the containers to identify the type of waste allowed in the container.

- 1                                   iii.     Designated locations on the project site for waste material containers.  
2     B.     If project requires demolition incorporate the ordinance required (MGO 28.185) Recycling and Reuse Plan into  
3     the Waste Management Plan.  
4     C.     Provide all of the following for the Waste Management Coordinator:  
5         1.     Name, employer, employer address, phone number, and email address of the designated coordinator.  
6             a.     The GC shall also provide this information with the required Project Directory Submittal at the  
7             beginning of the project.  
8     D.     If at the option of the GC, he/she chooses to contract with a Waste Management Disposal Company that allows  
9     comingled and unsorted waste materials, the GC shall include with his/her Waste Management Plan the  
10     following:  
11         1.     Name, address, phone number, state permitting information, and other pertinent information about the  
12         disposal company.  
13         2.     Documentation from the disposal company indicating company policies and procedures regarding  
14         comingled and unsorted waste materials to include:  
15             a.     GC responsibilities on the project site.  
16             b.     Disposal company procedures for receiving, sorting, recycling, and disposing of comingled and  
17             unsorted waste material.  
18

19     **PART 2 – PRODUCTS – THIS SECTION NOT USED**

20  
21     **PART 3 - EXECUTION**

22  
23     **3.1.    PLAN IMPLEMENTATION**

- 24     A.     Implement the approved waste management plan. Provide adequate containers, storage space, signage,  
25     transportation and other items required to implement the plan during the execution of this contract.  
26     B.     The GC and Waste Management Coordinator shall be responsible for monitoring and reporting the status of the  
27     Waste Management Plan and shall monitor the waste management practices on site as frequently as needed.  
28     C.     Train all workers, sub-contractors, and suppliers on proper waste management procedures as appropriate for  
29     the work being conducted on the project site.  
30         1.     Distribute the waste management plan to everyone concerned within seven (7) days of submittal  
31         approval.  
32         2.     Distribute the waste management plan to new workers, sub-contractors, and suppliers when they first  
33         appear on the project site.  
34         3.     Conduct additional training as needed during the execution of the contract to keep a positive focus on  
35         the waste management plan.  
36     D.     Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways,  
37     and other adjacent and used facilities.  
38         1.     Designate and label specific areas on the project site necessary for separating materials to be salvaged,  
39         recycled, reused, donated, and sold.  
40         2.     Comply with any specification or regulatory requirements pertaining to dust, dirt, environmental  
41         protection, and noise control.  
42

43     **3.2.    HAZARDOUS AND TOXIC WASTE**

- 44     A.     The Owner shall be responsible under separate contract for the removal of any asbestos related materials. All  
45     other materials shall be removed by the GC.  
46     B.     All hazardous and toxic waste shall be separated, stored, and disposed of according to all applicable regulations.  
47     C.     All hazardous and toxic materials on site shall have a Material Safety and Data Sheet (MSDS) available that  
48     indicates storage requirements, emergency information, and disposal requirements as necessary.  
49

50     **3.3.    GENERAL GUIDELINES FOR ALL WASTES**

- 51     A.     Recycle all paper and beverage containers used by workers, sub-contractors, suppliers and visitors to the project  
52     site.  
53     B.     All revenues, savings, rebates, tax credits, and other such incentives received from recycling, reusing, or  
54     salvaging waste materials shall accrue to the GC unless specified otherwise in the contract documents.  
55     C.     Separate recyclable, reusable, and salvageable waste from other waste materials, trash, and debris except where  
56     Waste Management Disposal Company allows comingled waste materials, see section 1.8.D above.  
57         1.     Separate by type in appropriate containers or designated areas according to the approved waste  
58         management plan away from the construction area. Do not store within the drip lines of existing trees.

- 1                    2.     Inspect containers and bins frequently for contamination and inappropriately sorted materials. Remove  
2                    contaminated materials and resort as necessary.
- 3                    3.     Stockpile bulk materials such as sand, topsoil, stone, etc., on site away from the construction area and  
4                    without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water, and  
5                    cover to prevent windblown dust. Do not store within the drip lines of existing trees.
- 6                    4.     Whenever possible store items off the ground and/or protect them from the weather.
- 7

8     **3.4.    GUIDELINES FOR RECYCLABLE, RE-USABLE, AND SALVAGEABLE WASTE**

- 9                    A.     The following guidelines is not a complete or all inclusive list and shall be adjusted as needed by the methods  
10                    and procedures identified in the Waste Management Plan.
- 11                    B.     Asphalt Paving: Break-up into transportable pieces or grind, transport to an authorized recycling facility.
- 12                    C.     Carpet and Pad: Separate carpet and pad scraps, containerize and transport to an authorized recycling facility.
- 13                    D.     Ceiling System Components: Suspended ceiling system components shall be sorted by material type as follows:  
14                    1.     Broken, cut, or damaged tiles shall be containerized, transport to an authorized recycling facility.  
15                    2.     Damaged, or cut tracks, trim and other metal grid system components shall be sorted with other metals  
16                    of similar types, palletize, transport to an authorized recycling facility.
- 17                    E.     Clean Fill: When allowed by Division 31 Specifications; concrete, masonry, stone, asphalt pavement, sand and  
18                    other such materials may be used as clean fill on this project site. The GC shall verify with the Project Architect,  
19                    Structural Engineer, or Civil Engineer as necessary prior to using any materials as clean fill. Materials shall be  
20                    processed, placed, and compacted as specified. If not being re-used on site, transport to an authorized recycling  
21                    facility.
- 22                    F.     Clean Wood Materials: Including but not limited framing cutoffs, wood sheathing or paneling materials,  
23                    structural or engineered wood products, and pallets or crates. Clean Wood shall be free of paints, stains, oils,  
24                    preservatives and other such contaminants.  
25                    1.     Useable pieces shall be sorted by type and dimension, bundled and transported off site by the GC or  
26                    returned to the supplier.  
27                    2.     Non-useable pieces shall be palletized or containerized, transport to an authorized recycling facility.  
28                    3.     Clean, uncontaminated sawdust and wood shavings shall be bagged, transport to an authorized recycling  
29                    facility.
- 30                    G.     Concrete: Break-up into transportable pieces, remove all reinforcing and other metals, transport to an  
31                    authorized recycling facility.
- 32                    H.     Glass Products: Shall be sorted by types, do not include light fixture lamps and bulbs. Products broken in  
33                    shipment shall be returned to the supplier. Broken or cracked items still in frames shall be taped to prevent  
34                    further breakage and injury to workers. Transport to an authorized recycling facility.
- 35                    I.     Gypsum Board: Stack large clean pieces on wooden pallets or container, store in a dry location, transport to an  
36                    authorized recycling facility.
- 37                    J.     Light Fixture Lamps and Bulbs: Fluorescent tubes shall be containerized, transport to an authorized recycling  
38                    facility.
- 39                    K.     Masonry and CMU: Remove all metal reinforcing, anchors, and ties, clean undamaged pieces and neatly stack on  
40                    pallets, transport damaged pieces to an authorized recycling facility.
- 41                    L.     Metals: Sort metals by type as follows, this does not include piping:  
42                    1.     Architectural metals including but not limited to siding, soffit, and roofing panels shall be sorted by  
43                    material, palletize or bundle as needed and transport to an authorized recycling facility.  
44                    2.     Structural steel, sort by size and type; palletize and transport to an authorized recycling facility.  
45                    3.     Miscellaneous metals such as aluminum, brass, bronze, etc shall be sorted by type, containerized or  
46                    palletized as necessary, transport to an authorized recycling facility.
- 47                    M.     Packaging and shipping materials  
48                    1.     Cardboard boxes and containers: Breakdown all cardboard boxes and containers into flat sheets. Bundle  
49                    and store in a dry location until transported for recycling.
- 50                    2.     Pallets:  
51                    a.     Whenever possible require deliveries using pallets to remove them from the project site.  
52                    b.     Neatly stack pallets in preparation for reusing them or providing them to other companies for  
53                    salvage or re-use.  
54                    c.     Break down pallets into component wood pieces that comply with the requirements for recycling  
55                    clean wood materials. Neatly stack or palletize pieces in preparation for transportation.
- 56                    3.     Crates: Break down crates into component wood pieces that comply with the requirements for recycling  
57                    clean wood materials. Neatly stack or palletize pieces in preparation for transportation.
- 58                    4.     Polystyrene Packaging: Separate and bag materials.



- 1 N. Piping and conduit: Reduce all piping and conduit to straight lengths, sort and store by size, material and type.  
2 Remove supports, hangers, valves, boxes, sprinkler heads, and other such components, sort and store by size,  
3 material and type. Transport to authorized recycling facilities according to material types.  
4 O. Roofing: Roofing materials shall be sorted and containerized by type, transport to authorized recycling facilities  
5 according to material types.  
6 P. Site-Clearing Waste: Sort all site waste by type.  
7 1. Only stockpile soils types and quantities required for re-use on the project site. All remaining quantities  
8 shall be transported off site to an authorized facility that receives such materials.  
9 2. Brush, branches, and trees with no marketable re-use shall be transported to facilities for chipping into  
10 mulch.  
11 3. Trees with a marketable re-use shall be salvaged and transported to facilities that specialize in processing  
12 trees for future use as wood products.  
13

14 **3.5. GUIDELINES FOR DISPOSAL OF WASTES**

- 15 A. The following guidelines shall be adjusted as needed by the methods and procedures identified in the Waste  
16 Management Plan.  
17 B. Any waste that is contaminated, organic, or cannot be recycled, re-used, or salvaged shall be legally disposed of  
18 in an authorized landfill or incinerator. Disposal methods shall follow all applicable regulatory requirements.  
19 C. No waste material of any kind, except those types designated as clean fill in section 3.4 above, shall be allowed  
20 to be buried on the project site at any time.  
21 D. No burning of any kind of waste material shall be permitted on this project site at any time.  
22 E. Paint and Stain: Paints, stains, and their containers shall be disposed of as follows:  
23 1. Whenever possible containers should be thoroughly cleaned immediately after emptying and sorted with  
24 as appropriate (metal or plastic) for recycling  
25 2. Empty containers, regardless of type or base material, may be disposed of with lids off with general  
26 garbage.  
27 3. Latex paint may be placed with general garbage if properly solidified as follows:  
28 a. Small amounts (an inch or less in can): Remove lids and allow paint to dry out in the can and  
29 harden. Protect cans from rain and freezing.  
30 b. Large amounts (more than one inch): Mix paint with equal amounts of cat litter, stir and allow to  
31 completely dry. Alternate method: mix with commercial paint hardener.  
32 4. Oil-based or combustible paints and stains, regardless of liquid or solid, shall be transported to an  
33 approved facility that takes such items such as Dane County Clean Sweep Sites.  
34 F. Treated Wood Materials: Treated wood materials including but not limited to wood that has been painted,  
35 stained, or chemically treated shall not be recycled or incinerated.  
36  
37  
38  
39

**END OF SECTION**

**SECTION 01 76 00**  
**PROTECTING INSTALLED CONSTRUCTION**

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**PART 1 – GENERAL**

**1.1. SUMMARY**

- 25 A. The purpose of this specification is to provide clear responsibilities, guide lines, and requirements related to  
26 providing protection to already installed construction.  
27 B. Already installed construction shall include but not be limited to the following:  
28 1. Any existing site feature such as pavement, curbs, drainage features, utilities, landscaping features (trees,  
29 shrubbery, plantings, flagpoles, etc) and other such exterior items not associated with the building  
30 whether on or adjacent to the project site.  
31 2. Any existing structure on or adjacent to the project site.  
32 3. Any existing interior work that may be adjacent to the new work including all paths of ingress/egress to  
33 areas associated with accessing the Work.  
34 4. Any existing feature of any kind within the public right-of-way that may be on the project site property,  
35 adjacent to the project site or across the street from the project site.  
36 C. All contractors shall be familiar with the specifications of their Division of Work for specific requirements on  
37 protection of the Work.  
38 D. The requirements noted within this specification do not relieve any contractor of the responsibility for  
39 compliance with any code, statute, ordinance, or other such regulatory requirement having jurisdictional  
40 authority over these contract documents.

**1.2. QUALITY ASSURANCE**

- 43 A. It shall be the responsibility of every contractor and worker assigned to the project to be diligent in protecting all  
44 existing work, and newly installed construction.  
45 B. It shall be the General Contractors' (GC) responsibility under the contract to provide all reasonable protection  
46 methods, materials, or precautionary measures required to protect new or existing construction as described in  
47 within this specification to the project as a whole.  
48 1. The GC shall be responsible to ensure any damaged new or existing construction is repaired or replaced  
49 at no additional cost to the Contract.  
50 2. The GC at his/her discretion may direct other contractors to provide and maintain protection of  
51 completed work associated with their Division of Work. I.E.: The carpet installer may be required by the  
52 GC to provide carpet protection along traveled paths, ingress/egress, etc after installation.  
53 C. It shall be the responsibility of the GC to ensure that all materials being used to protect installed construction are  
54 compatible with, and/or adjacent to, the materials being protected. This shall include but not be limited to the  
55 material used as covering, tapes used to fasten protective materials, etc.

1  
2 **1.3. RELATED SPECIFICATIONS**

- 3 A. Parts of this specification will reference articles within “The City of Madison Standard Specifications for Public  
4 Works Construction”.
- 5 1. Use the following link to access the Standard Specifications web page:  
6 <http://www.cityofmadison.com/business/pw/specs.cfm>  
7 a. Click on the “Part” chapter identified in the specification text. For example if the specification  
8 says “Refer to City of Madison Standard Specification 210.2” click the link for Part II, the Part II  
9 PDF will open.  
10 b. Scroll through the index of Part II for specification 210.2 and click the text link which will take you  
11 to the referenced text.  
12 c. City Standard Detail Drawings (SDD) may be located from the index in Part VIII.
- 13 B. Section 01 60 00 Product Requirements  
14 C. Section 01 74 13 Progress Cleaning  
15

16 **PART 2 - PRODUCTS**

17  
18 **2.1. FENCING MATERIALS AND BARRICADES**

- 19 A. Except where noted in other areas of the construction documents, the responsible contractor shall provide a six  
20 foot galvanized chain link fence including full height mesh screen at the project lines as shown on the Civil  
21 Drawings. For temporary barricade situations, the responsible contractor may provide one of the following that  
22 sufficiently provide a sturdy physical barrier and/or visual barrier as necessary for the intended application.
- 23 1. Standard orange construction barrels each with a standard rubber base ring and reflective tape  
24 a. Provide flashing amber lights as needed to increase night time visibility  
25 2. Steel “T” style fence posts  
26 3. 4’0” high standard orange construction fence  
27 4. Traffic barricades  
28 5. Jersey barriers  
29 6. Other types of fencing or barricades typically used in the construction industry
- 30 B. The contractor responsible for providing the fencing materials and barricades shall also be responsible for  
31 maintaining them. This shall include but not limited to fixing damaged fencing, standing up barrels that have  
32 been knocked over, realigning barrels, and ensuring flashing lights are fully operational at all times.
- 33 C. The following fencing and barricade designations, and their use descriptions shall be used throughout this  
34 specification to provide uniformity in describing protection requirements.
- 35 1. Type A, Jersey Barriers, to be used as permanent blocking devices to deny access to alternate project site  
36 entrances or exits.  
37 2. Type B, Traffic Barricades, to be used as temporary blocking devices to deny access to alternate project  
38 site entrances or exits.  
39 3. Type C, Construction Barrels without construction fencing shall be used for lane closures, temporary  
40 blocking devices to deny access and the protection of single locations (I.E. identify the location of an  
41 access structure) that do not require fencing.  
42 4. Type D, Construction Barrels with construction fencing where it becomes necessary to surround an object  
43 with a complete visual barricade and it is impractical or unacceptable to install fence posts. The surround  
44 shall be constructed in such a manner as to provide a buffer zone around and access to the item being  
45 protected.  
46 5. Type E, Steel “T” Fence Posts shall be used at the project lines, as indicated on the Civil Drawings, with six  
47 foot galvanized chain link fencing to surround an object with a complete visual barricade and it is  
48 practical to install fence posts. The surround shall be constructed in such a manner as to provide a buffer  
49 zone around and access to the item being protected. All posts shall be driven installed. Surface mounted  
50 posts to only be used for temporary barricades.  
51 6. Type X, Other fencing or barricade types that may be designated and detailed within the construction  
52 documents shall use additional alpha numeric designations.  
53

54 **2.2. EROSION CONTROL PROTECTION**

- 55 A. Refer to City of Madison Standard Specification 210.2 for authorized materials associated with erosion control  
56 materials.  
57

1 **2.3. INTERIOR FINISH PROTECTION MATERIALS**

- 2 A. Except where noted in other areas of the construction documents or this specification the responsible  
3 contractor:  
4 1. Shall not provide the cheapest or least effective method as an effort to meet any protection requirement.  
5 2. Shall provide materials of sufficient quality, and durability to provide adequate protection based on the  
6 seasonal conditions and the anticipated duration at the time the protection will be needed.  
7 3. Shall provide sufficient quantity of protection material to protect the construction as needed.  
8 B. Prior to installing protective measures the responsible contractor shall propose to the GC, Project Architect (PA)  
9 and City Project Manager (CPM) the proposed plan for protection, materials to be used and samples as  
10 necessary.  
11 1. The PA and CPM reserve the right to disapprove any proposed method and/or material and/or make  
12 alternate proposals.  
13

14 **PART 3 - EXECUTION**

15  
16 **3.1. GENERAL EXECUTION REQUIREMENTS**

- 17 A. The GC shall be responsible for ensuring all of the following procedures and requirements are implemented as  
18 needed for the duration of the Work performed under this contract.  
19 B. The GC shall also be responsible for the following:  
20 1. Reporting any incident of damage to existing property, right-of-way, or utility to the CPM immediately  
21 upon rendering the incident safe, and notifying emergency response teams, and emergency utility crews  
22 as needed.  
23 2. Conduct a site walk through prior to leaving at the end of each day to assess:  
24 a. Protection measures are properly in place, provide correction actions as necessary.  
25 b. Note damage to existing completed work and schedule repair/replacement as needed.  
26 3. Ensure all contractors and workers are being diligent in protecting existing work, and newly installed  
27 construction.  
28

29 **3.2. PROTECT ADJACENT PROPERTIES**

- 30 A. Whenever possible through the design process the City of Madison shall have previously provided notice to  
31 adjacent property owners that work will be occurring on or near their property. The City of Madison shall also  
32 have obtained any permanent or temporary easements that may be necessary to complete any Work on  
33 adjacent properties.  
34 B. It shall be the responsibility of the GC to do the following for all Work under this contract being performed on or  
35 adjacent to the property line:  
36 1. Contact the adjacent property owner and provide him/her with information on the work to be done,  
37 equipment to be used, and estimated duration of the work. Information to be updated and  
38 communicated to property owner(s) as construction progresses and site conditions change.  
39 a. If any adjacent property is a rented or leased space the GC shall also make contact and provide  
40 the same information to the tenants.  
41 b. Determine from the owner and/or tenants if there are any concerns for children, pets, special  
42 plantings, or other concerns.  
43 2. Discuss the following with all contractors performing work on or near the property line.  
44 a. Work to be completed and timeline.  
45 b. Concerns of adjacent property owners/tenants from item 1 above.  
46 c. Which protective measures will be necessary to protect adjacent properties and address the  
47 concerns of adjacent property owners/tenants.  
48 3. Ensure all protective measures are placed and maintained during the execution of Work on or adjacent to  
49 the property line. Interact with the adjacent property owners/tenants as needed.  
50 C. Any contractor doing work on or adjacent to the property line shall install and maintain any protective measure  
51 identified in the contract documents, this specification, or as directed by the GC.  
52 D. The GC shall be responsible for restoring any damage to structure and property located on or adjacent to the  
53 property line.  
54 1. Restoration shall include but not be limited to repair or replacement using like materials and finishes to  
55 its original condition or better.  
56 2. Restoration of landscaping materials shall include watering of any seed, sod, or other planting of any kind  
57 for a reasonable period of time to encourage germination and root development.  
58 E. The GC shall keep the CPM informed directly to any issues pertaining to adjacent property owners and tenants.

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**3.3. PROTECT LANDSCAPING FEATURES**

- A. Except where specifically stated in other areas of the construction documents the following minimal protection requirements shall apply under this section.
  - 1. Whenever possible do not install new landscape features until exterior building construction has been completed, equipment such as scaffolding and lifts are no longer needed and have been removed, and heavy equipment operation is no longer required.
  - 2. Whenever possible remove and temporarily store all existing landscape features such as benches, waste receptacles, signage, and other such features that will be within the area of Work that can be removed.
  - 3. Landscape features that cannot be removed such as flag poles, light poles, light bollards, etc. shall be protected with Type D fencing for areas on pavement or Type E fencing for areas on soil.
  - 4. Planting beds shall be protected using Type E fencing around the exposed perimeter of the planting bed as needed.
  - 5. The City of Madison Standard Specification 107.13 shall apply to all tree protection in and around the project site at all times.

**3.4. PROTECT UTILITIES**

- A. The contractor shall be responsible for notifying all utilities to determine emergency response procedures and protection requirements prior to installing any construction protection.
  - 1. This includes requesting utility marking through Diggers Hotline.
    - a. Call 811 or 1-800-242-8511 to request a public utility locate
    - b. For emergency locate call (262) 432-7910 or (877) 500-9592
  - 2. Contact the Owner and CPM for any available private utility information on the property that may be available prior to calling a private utility locating company.
- B. Except where specifically stated in other areas of the construction documents the following minimal protection requirements shall apply under this section.
  - 1. Hydrants, lamp posts, electrical transformers, and other utility pedestals shall be protected with Type D fencing for areas on pavement or Type E fencing for areas on soil. Fence posts shall be located so as to not be directly over the utility main.
  - 2. Storm sewer structures in pavement shall have proper inlet protection according to City of Madison Standard Specification 210.1(g) and Type C Construction Barrels when necessary.
  - 3. Storm sewer structures in turf and other landscaped areas shall have proper inlet protection according to City of Madison Standard Specification 210.1(g) and Type E fencing for areas on soil.
  - 4. Stormwater management features such as greenways, retention/detention ponds, bio-filtration ponds and other such features shall be properly protected according to the appropriate erosion control measure specified on the Erosion Control Plan. See multiple sections of City of Madison Standard Specification 210.1
    - a. For the protection of hard to see items such as structures, castings, inlets, etc. in grassy areas provide Type E fencing for areas on soil.
    - c. For the protection of storm water management features having special soils and plants such as bio-filtration ponds provide Type E fencing for areas on soil.
  - 5. Other structures and covers including but not limited to cleanouts, wiring hand holes, valve boxes, access structures, grease trap structures, etc shall be protected as follows:
    - a. Provide Type E fencing for areas on soil.
    - b. When paving operations are complete provide a construction barrel or cone near structures as necessary depending on required heavy construction traffic.

**3.5. PROTECT PUBLIC RIGHT OF WAY**

- A. Except where specifically stated in other areas of the construction documents the following minimal protection requirements shall apply under this section.
  - 1. All public right-of-way (area from behind the sidewalk to the centerline of the street) shall remain open and accessible except during periods of active work. At such times the public right of way shall be properly closed and signed as referenced in City of Madison Standard Specification 107.9.
  - 2. Bus stops and bus stop structures shall remain accessible at all times.
  - 3. Traffic signage and traffic signals, traffic control boxes shall be protected with Type D fencing for areas on pavement or Type E fencing for areas on soil.
    - a. Protection at traffic signage/signals shall not obstruct the viewing of the sign/signal for its intended purpose at any time.

- 1 B. When additional protection for traffic control is required, the use of barricades, guardrails, lane closures and  
2 other such procedures will be detailed within the construction documents.  
3 C. When additional protection for overhead sidewalk cover is required the contract documents shall indicate the  
4 specific location and structural requirements of the protective structure.  
5

6 **3.6. PROTECT STORED MATERIALS**

- 7 A. All contractors shall refer to Specification 01 60 00 Product Requirements for all storage and protection  
8 requirements of building materials and products delivered to the site.  
9

10 **3.7. PROTECT WORK - EXTERIOR**

- 11 A. Provide all temporary services that may be required to protect the installed material from heat, cold, humidity,  
12 etc, while materials such as concrete, mortar, sealants, paints, etc, are drying and/or curing.  
13 B. Open trenches, pits, and other such excavations shall be properly covered, lined, or shored as needed during  
14 periods of inclement weather to prevent the caving of soils onto existing work in progress. Refer to the  
15 appropriate specifications and/or regulatory requirements governing this type of work as necessary.  
16 C. Provide adequate protection at all openings with heavy duty tarps, plastic sheathing, or wood framing and  
17 sheathing as needed to protect interior work in progress from inclement weather as needed.  
18 D. Protect exterior finishes of all kinds with heavy duty tarps or plastic sheathing as needed while landscaping is  
19 being installed through full germination of seeded areas or installation of filter fabric and mulches to keep dust,  
20 dirt, and mud off of finished exterior surfaces.  
21 E. Designate specific curb mounting points and provide wood blocking where small vehicles, skid loaders and other  
22 such equipment may need access to areas being landscaped.  
23 F. Provide plywood turning pads for skid loaders to turn on to prevent tire marking on new pavement.  
24 G. Do not permit the parking of vehicles with any kind of fluid leaks to park on new pavement.  
25 H. The contractor shall be responsible for cleaning, repairing, or replacing any completed work or work in progress  
26 under this specification as deemed necessary by the CPM without additional cost to the contract.  
27

28 **3.8. PROTECT WORK - INTERIOR**

- 29 A. The GC shall do all of the following:  
30 1. Provide all temporary services that may be required to protect the installed material from heat, cold,  
31 humidity, etc, while materials such as concrete, mortar, sealants, paints, etc, are drying and/or curing.  
32 2. Provide adequate visual and/or physical protection as needed to protect newly completed interior work  
33 such as paint, flooring material, sealants, grouts, etc that may be drying and/or curing.  
34 3. Provide adequate space and materials for cleaning boots, tool boxes, supplies, and other items coming  
35 into the project site once finish work has begun.  
36 4. Clean dirtied areas and repair/replace damaged areas immediately.  
37 B. The contractors responsible for interior work shall be responsible for protecting their work and finishes from dirt,  
38 mud, snow, spills, splatters, and physical damage after installation as follows:  
39 1. Protect vinyl composite, rubber composite, painted/stained concrete, and tiled flooring as follows:  
40 a. Define foot traffic areas and protect with Ramboard Temporary Floor Protection products as a  
41 minimum basis of design or other protection product(s) compatible with installed flooring product  
42 if Ramboard is not compatible. Products to be used shall be new.  
43 i. Tape all edges, seams, etc with a good quality tape that does not leave sticky residue. Do  
44 not allow any debris or other material between the installed flooring and the protection  
45 material.  
46 ii. Repair tears immediately, replace worn areas with like material as necessary.  
47 2. Protect carpeted areas as follows:  
48 a. Define foot traffic areas and protect with a minimum of 6mil, clear, polyethylene sheeting 3 feet  
49 wide. Products to be used shall be new.  
50 i. Tape all edges, seams, etc with a good quality tape that does not leave sticky residue. Do  
51 not allow any debris or other material between the installed flooring and the protection  
52 material.  
53 ii. Repair tears immediately, replace worn areas with like materials as necessary.  
54 3. Protect all finished walls in high traffic areas with Ramboard Temporary Wall protection products or  
55 approved equal.  
56 i. Tape all edges, seams, etc with a good quality tape that does not leave sticky residue. Do  
57 not allow any debris or other material between the installed flooring and the protection  
58 material.

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- ii. Repair tears immediately, replace worn areas with like materials as necessary.
  - 3. Protect counter tops, cabinets, and other finished surfaces with large sheets of thick cardboard or Ramboard products. Do not allow toolboxes, finish materials, parts and other such items to be placed on finished materials.
  - C. All protection shall stay in place until the CPM, PA, and GC mutually deem the project is ready for Final Cleaning. The contractors responsible for protecting the work shall be responsible for removing the protection and removing any adhesive residue at that time. Contractors shall only use manufacturer authorized cleaning materials for removing adhesives, etc.
  - D. Contractors doing work in un-protected areas of finished work shall be required to provide drop cloths and other protection as noted within this specification for the duration of their work.
    - 1. Finished areas shall be sufficiently covered to accommodate all equipment, and materials being used to complete the work being done.
    - 2. Finished areas shall be sufficiently covered to prevent splatters, over spray, etc when doing touch-up work.
    - 3. Contractors who do not provide sufficient protection under this sub-section shall be responsible for any costs associated with cleaning, repairing or replacing already finished construction at no additional cost to the contract.

**END OF SECTION**

**SECTION 01 77 00  
CLOSEOUT PROCEDURES**

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16 3.5. CONTRACT CLOSEOUT PROCEDURE ..... 4  
17

**PART 1 – GENERAL**

**1.1. SUMMARY**

- 21 A. The purpose of this specification is to clearly define and quantify the requirements associated with closing a City  
22 of Madison Public Works Contract for facility related work.  
23 B. All contracts have two distinct but related paths. Each path needs to be properly closed independently in order  
24 to close the contract as a whole.  
25 1. Construction closeout is related to closing out all of the Work associated with the construction  
26 documents.  
27 a. It shall be the responsibility of all contractors to be fully aware of the required Work and closeout  
28 requirements involved in their individual trades.  
29 2. Contract closeout is related to closing out all of the administrative aspects of the contract in general.  
30 a. It shall be the responsibility of all contractors to be fully aware of the administrative requirements  
31 required by the contract and to provide the supporting documentation required.  
32 3. Construction Closeout must be completed before Contract Closeout can begin.  
33 C. This specification will provide general knowledge associated with the following areas:  
34 1. Construction Closeout Requirements  
35 2. Construction Closeout Procedure  
36 3. Contract Closeout Requirements  
37 4. Contract Closeout Procedure  
38 5. Final Payment and Certificate of Completion  
39

**1.2. RELATED SPECIFICATIONS**

- 41 A. Contractors shall review all references to other specifications including specifications relating to the execution of  
42 the Work associated with their Division or Trade.  
43 B. Section 01 29 76 Progress Payment Procedures  
44 C. Section 01 31 23 Project Management Web Site  
45 D. Section 01 32 26 Construction Progress Reporting  
46 E. Section 01 45 16 Field Quality Control Procedures  
47 F. Section 01 74 13 Progress Cleaning  
48 G. Section 01 45 16 Construction Waste Management and Disposal  
49 H. Section 01 76 00 Protecting Installed Construction  
50 I. Section 01 78 13 Completion and Correction List  
51 J. Section 01 78 23 Operation and Maintenance Data  
52 K. Section 01 78 36 Warranties  
53 L. Section 01 78 39 As-Built Drawings  
54 M. Section 01 78 43 Spare Parts and Extra Materials  
55 N. Section 01 79 00 Demonstration and Training  
56 O. Other requirements as noted in the contract documents signed by the General Contractor  
57



1 **1.3. DEFINITIONS**

- 2 A. **Substantial Compliance:** A letter provided to the City of Madison Building Inspection and signed by the Project  
3 Architect indicating that all Work has been completed to a level that would allow Owner Occupancy and that all  
4 construction is in compliance with the construction documents. A copy of this letter is also provided to the  
5 State of Wisconsin Department of Health and Safety as necessary to clear plan review requirements. This letter  
6 does not represent construction closeout.
- 7 B. **Certificate of Occupancy:** The Regulatory letter from the City of Madison Building Inspection Department  
8 indicating that all regulatory requirements and inspections have been completed and the building may now be  
9 occupied for its intended use. This letter does not represent construction closeout.
- 10 C. **Certificate of Substantial Completion:** A letter provided by the Department of Public Works, signed by the City  
11 Engineer indicating that Construction activities are substantially complete. This letter does represent  
12 construction closeout and the date of this letter begins the date of the Warranty Period.
- 13 D. **Construction Closeout:** The point in the contract where all contractual requirements associated the execution of  
14 the Work as described in the plans, specifications, and other documents have been successfully met and the  
15 items described in 1.3.A, .B, and .C above have been completed.
- 16 E. **Final Progress Payment:** The progress payment associated with achieving Construction closeout as described in  
17 1.3.D above. At this point the contractor may request all monies associated with the contract be paid with the  
18 exception of held retainage.
- 19 F. **Contract Closeout:** The point in the contract where all contractual requirements associated with the City of  
20 Madison, Board of Public Works contract has been successfully met.
- 21 G. **Final Payment:** The final contract payment submittal that may be approved by the City of Madison after all  
22 contractual requirements of the Public Works Contract have been met and any remaining monies (retainage)  
23 due to the contractor may be released for the Final Payment.

24  
25 **1.4. QUALITY ASSURANCE – CONSTRUCTION CLOSEOUT**

- 26 A. All contractors shall be responsible for properly executing the construction closeout requirements associated  
27 with their Work as described in the specifications governing their Work.
- 28 B. The GC shall be responsible for all of the following:
- 29 1. Ensuring that all contractors have met the construction closeout requirements associated with their  
30 Work.
- 31 2. Coordinate the collection of all construction closeout deliverables from all contractors, provide the  
32 deliverables to the Project Architect and City Project Manager for review as necessary, and ensure all  
33 contractors correct deficiencies of deliverables and resubmit as needed for final acceptance.
- 34 3. Ensure all closeout requirements identified in the Construction Closeout Checklist below have been  
35 completed as intended by the construction documents.

36  
37 **1.5. QUALITY ASSURANCE – CONTRACT CLOSEOUT**

- 38 A. The City of Madison, Department of Civil Rights (DCR) monitors contract compliance for construction and  
39 procurement contracts to ensure that local, state and federal regulations are followed by contractors working on  
40 City of Madison Public Works (PW) projects. DCR will monitor all PW projects from contract award through the  
41 final payment at the close of the project. Contractors will be required to submit reporting paperwork  
42 throughout the PW project process.
- 43 1. Contractors are encouraged to visit the web site identified below for additional information, checklists,  
44 forms, and other information provided by DCR as it relates to Contract Compliance.  
45 <http://www.cityofmadison.com/Business/PW/contractCompliance.cfm>
- 46 2. Questions regarding the process should be directed to parties and offices as identified on the various  
47 forms, documents, and instructions or contact:  
48 City of Madison, Department of Civil Rights  
49 210 Martin Luther King Jr. Blvd., Room 523  
50 Madison, WI 53703  
51 (608) 266-4910
- 52 B. All Sub-Contractors have submitted the applicable required documents described in item 1.5.D below to the  
53 General Contractor (GC) for Contract Closeout.
- 54 C. The GC has submitted the required applicable documents described in item 1.5.D below for all contractors to the  
55 appropriate City of Madison Agency per instructions associated with each submittal.
- 56 D. The documents required for submittal to the City of Madison for Contract Closeout may include any/all of the  
57 items listed below depending on contract type. It is the sole responsibility of all contractors to know and submit  
58 the required and complete documentation in a timely fashion.

- 1 1. Weekly Payroll Reports
- 2 2. Employee Utilization Reports
- 3 3. Agent or Subcontractor Affidavit of Compliance with Prevailing Wage Rate Determination
- 4 4. Prime Contractor Affidavit of Compliance with Prevailing Wage Rate Determination
- 5 5. Documentation required for Small Business Enterprise (SBE) goals
- 6 6. Other documents as maybe required or requested through the Finalization Review Process

**PART 2 – PRODUCTS – THIS SECTION NOT USED**

**PART 3 - EXECUTION**

**3.1. CONSTRUCTION CLOSEOUT CHECKLIST**

- A. All contractors shall be responsible for reviewing the drawings and specifications within their Divisions of Work to provide a complete and comprehensive list of all Construction Closeout Requirements to the GC.
  1. The checklist shall include all items identified within the construction documents that require any of the following (and examples) prior to moving into Contract Closeout Procedures:
    - a. Documents indicating a specified level of performance has been achieved, such as:
      - i. Test reports of all types
      - ii. Startup reports
    - b. Required documentation, such as:
      - i. As-builts and record drawings
      - ii. Operation and maintenance data
    - c. Physical items to be turned over to the owner, such as:
      - i. Attic stock
      - ii. Keys
    - d. Required maintenance completed, such as:
      - i. Ducts cleaned
      - ii. Filters replaced
    - e. Commissioning and LEED related items and submittals
    - f. Owner and Maintenance Training
  - B. Each list shall indicate the title of the closeout requirement, the associated specification of the requirement, the required result or deliverable, the responsible contractor(s), and a column to verify the item has been turned in and completed.
  - C. The GC shall be responsible for all of the following:
    1. Consolidating all the closeout lists into one master Construction Closeout Checklist.
      - a. The checklist shall be in a tabular data format similar to the sample below
    2. Upload the completed checklist to the Contract Closeout-Miscellaneous Documents Library on the Project Management Web Site for review.
    3. Resubmit the checklist as needed after initial reviews have been completed.
  - D. The GC shall work with all contractors to amend the Construction Closeout Checklist throughout the execution of the project based on changes and modifications as necessary.

<u>Title</u>	<u>Specification</u>	<u>Description</u>	<u>Responsibility</u>	<u>Completed</u>
Quality Management Observation Reports	01 45 16	All QMO reports have been properly responded to, reviewed and closed by the CPM.	All, GC	
As-Built Drawings	01 78 39	As-Built drawings have been reviewed and accepted per the specification	All, GC	
Testing and Balancing of HVAC	23 09 23	Provide final TnB reports indicating design performance has been achieved	HVAC	

**3.2. CONSTRUCTION CLOSEOUT REQUIREMENTS**

- A. The timely submittal or completion of closeout requirements shall go hand in hand with the Progress Payment Milestone Schedule that can be found in Specification 01 29 76 Progress Payments. No payments shall be made until all requirements for that payment have been met.
  1. The GC and all major Subcontractors, PA, and CPM, shall review all requirements for Construction/Contract Closeout during two (2) special meetings.

- 1 a. The first meeting shall be held at the 50% Contract Total Payment milestone. This meeting shall  
2 discuss the requirements associated with various construction/contract closeout documentation  
3 and events when they are due with respect to progress payments.  
4 b. The second meeting shall be held at the 70% Contract Total Payment milestone. This meeting  
5 shall review the contractors progress regarding the closeout checklist, begin making plans for  
6 upcoming deadlines such as scheduling training, where to put attic stock, and when they are due  
7 with respect to progress payments.  
8 2. The GC, PA, and CPM, shall utilize the Construction Closeout checklist to ensure that all construction  
9 closeout requirements have been met.

10  
11 **3.3. CONSTRUCTION CLOSEOUT PROCEDURE**

- 12 A. Upon successful completion and final acceptance of all Construction Closeout Requirements the GC may submit  
13 to the CPM and PA the request for Final Progress Payment (100% contract total, less retainage).  
14 B. The PA will confirm with the design consultants, CPM, and other City of Madison staff that all requirements of  
15 the Work have been completed and will do the following:  
16 1. Approve the final progress payment application  
17 2. Provide the required signed payment documents to the CPM  
18 3. Provide the required Letter of Substantial Compliance to the following as required:  
19 a. State Safety and Building Division  
20 b. Local Building Inspection office  
21 c. GC  
22 d. CPM  
23 C. The CPM shall draft the City Letter of Substantial Completion for signature by the City Engineer. This letter shall  
24 state any of the following that may still be tied to the contract and/or warranty:  
25 1. Indicate that the date of the letter shall also be the beginning of the Warranty period.  
26 2. Indicate any allowed due outs, reasons for them, and anticipated dates of finalization.  
27 a. QMO issues such as off season testing of equipment  
28 b. Off season training of equipment  
29 D. The GC and all subcontractors shall finalize all warranty letters associated with their Work using the date noted  
30 on the City Letter of Substantial Completion, and provide the CPM with all warranties as described in  
31 Specification 01 78 36 Warranties. Upon receipt and final approval of the Warranties the CPM may initiate final  
32 processing of the Final Progress Payment (100% contract total, less retainage).  
33

34 **3.4. CONTRACT CLOSEOUT REQUIREMENTS**

- 35 A. The GC and all sub-contractors shall follow all requirements associated with documenting contract compliance  
36 and provide documentation as required or requested by DCR or PW staff. All contractors are encouraged to stay  
37 current with submissions of the following documentation:  
38 1. Weekly Payroll Reports no later than the Progress Payment equal to 50% of the contract total.  
39 2. Employee Utilization Reports  
40 3. Agent or Subcontractor Affidavit of Compliance with Prevailing Wage Rate Determination  
41 4. Prime Contractor Affidavit of Compliance with Prevailing Wage Rate Determination  
42 5. Documentation required for Small Business Enterprise (SBE) goals  
43 6. Other documents as maybe required or requested through the Finalization Review Process  
44 B. Near the Progress Payment equal to 80% of the contract total the GC shall request in writing a Finalization  
45 Review. At that time DCR or PW staff shall prepare a report of all contract documentation submitted to date. A  
46 list of missing items or outstanding issues will be emailed to the GC. No additional follow-up will be generated  
47 by DCR or PW Staff.  
48

49 **3.5. CONTRACT CLOSEOUT PROCEDURE**

- 50 A. The Contract Closeout Procedure will not begin until the Construction Closeout Procedure has been completed.  
51 B. When the GC feels he/she has successfully met all of the Contract Closeout Requirements associated with  
52 Section 3.3 above the GC may submit to the request for Final Payment to the CPM.  
53 C. The CPM shall sign and submit the Final Payment request for processing.  
54 D. DCR and PW staff shall do a complete review of all documentation associated with item 3.3.A above.  
55 E. The GC shall be notified directly by DCR or PW Staff of any documentation that may still be missing, have  
56 incomplete information, or other outstanding issues. It shall be the responsibility of the GC to continue follow-  
57 up with DCR and PW staff until all documentation has been successfully submitted and accepted.

- 1           F.     When all required documentation associated with Contract Closeout has been successfully submitted and  
2                     accepted by DCR and PW Staff the City of Madison shall process the Final Payment of any remaining monies  
3                     including retainage.

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**END OF SECTION**

**SECTION 01 78 13  
COMPLETION AND CORRECTION LIST**

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9

10 **PART 1 – GENERAL**

11  
12 **1.1. SUMMARY**

- 13 A. The City of Madison has developed a multi-faceted Quality Management Program that begins with contract  
14 signing and runs through contract closeout to ensure the best quality materials, workmanship, and product are  
15 delivered for the contracted Work.  
16 1. The Progress Management Web Site is a Construction Management tool that provides contractors,  
17 consultants, and staff a single on-line location for the daily operations and progression of the Work.  
18 2. The Quality Management Observation (QMO) is an ongoing observation of the construction process as it  
19 progresses. The City of Madison does not use a “Punch List” or “Corrections List” as it is typically known  
20 throughout the construction industry. The QMO process acts as an “in progress punch list”. Work  
21 identified as not in compliance with the contract documents by the Owner, Owner Representatives,  
22 Owner Consultants, etc. shall be resolved immediately at the Contractor’s expense. Unresolved issues  
23 will be subject to withholding of progress payment(s) until completed.  
24 3. Very stringent expectations are tied to Construction Closeout and Contract Closeout procedures. Specific  
25 milestones throughout the project need to be met and the milestones are tied to the Progress Payment  
26 Schedule.  
27 B. All contractors shall be required to review the specifications identified in Section 1.2 below, and other related  
28 specifications identified therein to become familiar with the terminology and expectations of this City of  
29 Madison Public Works contract.  
30

31 **1.2. RELATED SPECIFICATIONS**

- 32 A. Section 01 29 76 Progress Payment Procedures  
33 B. Section 01 31 23 Project Management Web Site  
34 C. Section 01 45 16 Field Quality Control Procedures  
35 D. Section 01 77 00 Closeout Procedures  
36

37 **PART 2 – PRODUCTS – THIS SECTION NOT USED**

38  
39 **PART 3 – EXECUTION – THIS SECTION NOT USED**

40  
41  
42  
43 **END OF SECTION**

**SECTION 01 78 23  
 OPERATION AND MAINTENANCE DATA**

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 16

**PART 1 – GENERAL**

**1.1. SUMMARY**

- 19  
 20 A. The purpose of this specification is to provide clear responsibilities and guide lines related to providing well  
 21 documented and complete Operation and Maintenance (O&M) Data related to general facility use, equipment,  
 22 systems, finishes, and materials to City of Madison Staff (Owner, Owner Representatives, Maintenance, and  
 23 Custodial Personnel) as needed.  
 24 B. Operation and Maintenance Data shall apply to both of the following categories except where specific  
 25 requirements are noted under their separate titles as follows:  
 26 1. Operation and Maintenance Data: Generally shall mean the owner manual that provides information on  
 27 start-up, shut-down, operation, troubleshooting, maintenance, parts, and other such documentation as it  
 28 pertains to all equipment and systems installed under the Work.  
 29 2. Use and Care instructions: Where applicable use and care instructions shall also be considered O&M for  
 30 such things as flooring, tile, partitions, and other such finishes and trim related items, installed under the  
 31 Work.  
 32

**1.2. RELATED SPECIFICATIONS**

- 33  
 34 A. Section 01 29 76 Progress Payment Procedures  
 35 B. Section 01 31 23 Project Management Web Site  
 36 C. Section 01 77 00 Closeout Procedures  
 37 D. Section 01 78 13 Completion and Correction List  
 38 E. Section 01 78 19 Maintenance Contracts  
 39 F. Section 01 78 36 Warranties  
 40 G. Section 01 79 00 Demonstration and Training  
 41 H. Other Divisions and Specifications that may address more specifically the requirements for O&M Data.  
 42

**1.3. QUALITY ASSURANCE**

- 43  
 44 A. All O&M Data shall meet the requirements identified in Section 1.4 below.  
 45 B. All contractors shall provide O&M Data for each piece of equipment, system, or finish installed during the  
 46 installation of the Work. O&M Data shall be provided to the General Contractor (GC) for verification and  
 47 submittal.  
 48 C. The GC shall be responsible for receiving all required O&M Data files from all contractors for verifying that all  
 49 files submitted meet the requirements in Section 1.4 below.  
 50

**1.4. O&M DATA REQUIREMENTS**

- 51  
 52 A. O&M Data shall be provided in digital PDF format as follows:  
 53 1. PDF files shall be complete first generation consumer useable editions of PDF documents as provided by  
 54 any of the following:  
 55 a. Product manufacturer  
 56 b. Supplier of product  
 57 c. Product manufacturer internet site  
 58 2. Acceptable PDF files shall have the following functionality:

- 1 a. Word searchable
- 2 b. Key areas are bookmarked
- 3 c. Table of Contents and/or Index linked to content is preferred whenever possible.
- 4 3. Scanned printed material, with word searchable capabilities, saved as a PDF, is not acceptable and will be
- 5 rejected without further review.
- 6 B. O&M Data shall include but not be limited to the following manufacturers' published information as appropriate
- 7 for the equipment, system, material, or finish:
- 8 1. Installation instructions
- 9 2. Parts lists, assembly diagrams, explosion diagrams
- 10 3. Wiring diagrams
- 11 4. Start-up, shut-down, troubleshooting and other related operation procedures
- 12 5. Lubrication, testing, parts replacement, and other such maintenance procedures
- 13 6. General use, care, and cleaning instructions
- 14 7. Special precautions and safety requirements
- 15 8. A list of certified equipment vendors, service companies, parts suppliers including company name,
- 16 address, and phone number
- 17 9. A list of the recommended spare parts to have on hand at all times
- 18 10. A list by type of all recommended lubes, oils, packing material, and other maintenance supplies
- 19 11. Copies of final test reports, balance reports, and other related documentation
- 20 12. Warranty information for equipment and systems
- 21

### 22 1.5. O&M DATA SUBMITTALS

- 23 A. O&M Data shall be prepared as identified in this specification and shall be submitted for review as per the
- 24 schedule identified in Specification Section 01 29 76, Progress Payment Procedures.
- 25 B. O&M Data Draft submittals will be reviewed for content, procedure, and compliance only. A general critique
- 26 with recommendations for improvement will be made but re-submittals will not be required.
- 27 C. O&M Data Final submittals will be reviewed for content, procedure, and compliance. Re-submittals will be
- 28 required until such time as each submittal is accepted.
- 29

30 *NOTE: Acceptance of O&M Data Final submittals is required to be complete prior to scheduling and conducting owner*

31 *related training and construction closeout.*

## 32 **PART 2 – PRODUCTS – THIS SECTION NOT USED**

## 33 **PART 3 - EXECUTION**

### 34 **3.1. O&M DATA PREPARATION - GENERAL**

- 35 A. All contractors shall prepare O&M Data for draft and final submission as follows:
- 36 1. Obtain digital PDF files for each piece of equipment, system, material or finish as described in Sections
- 37 1.4.A.1 and 1.4.A.2 above.
- 38 2. Verify that all information as described in Section 1.4.B above is included with the PDF file. Obtain
- 39 missing information as necessary for a complete submittal.
- 40
- 41 B. Rename each individual PDF file as follows.
- 42 1. Do not use special characters such as #, %, &, /, etc. These characters are reserved by the Project
- 43 Management Web Site software the City of Madison uses; however the under-score (or under-bar) '\_' is
- 44 an allowed character.
- 45 2. Use the following format and examples for renaming your file:
- 46 a. Format: ***Equipment name\_What\_Project name\_Contract number\_Year***
- 47 i. *Equipment Name* represents the name of any equipment, system, material or finish as
- 48 designated in the Contract Documents.
- 49 ii. *What* represents what the file is about
- 50 iii. *Project Name* represents the title of the project or contract. A shortened version of the
- 51 title may be identified by the City Project Manager to be used by all contractors.
- 52 iv. *Contract number* is the specific identification number the Work was bid under and appears
- 53 on the plan set title sheet and in each sheet title block
- 54 v. *Year* represents the year the contract will be closed out
- 55 b. Examples of file names
- 56 i. AHU 2\_Operation Manual\_Fire Admin\_1234\_2015
- 57
- 58

- 1 ii. CPT 2\_Use and Care\_MPD West\_9876\_2011  
2 C. All contractors shall submit the completed digital PDF files to the GC in sufficient time for the GC to meet the  
3 O&M Data submission deadlines as described in Specification Section 01 29 76, Progress Payment Procedures.  
4 D. O&M Data shall be submitted and reviewed as described in sections 3.2 and 3.3 below.  
5

6 **3.2. O&M DATA DRAFT SUBMITTAL**

- 7 A. All contractors shall prepare and submit the following for an O&M Data Draft review submittal:  
8 1. Prepare three (3) complete O&M Data file samples as described in section 3.1 above.  
9 2. Review all specifications within his/her Division of Work and prepare a complete O&M Data checklist  
10 listing all equipment, systems, materials, or finishes. Checklist shall be in tabular form similar to the  
11 example below and shall indicate the title (and plan identifier when applicable) of the O&M Data, the  
12 associated specification, and a column to verify the item has been turned in and completed.  
13 B. The GC shall be required to review all contractors' samples and checklists for compliance with this specification  
14 and shall return any to the originating contractor that are insufficient for re-submittal.  
15 1. When acceptable to the GC, he/she shall upload each O&M Data draft submittal file to the O&M Draft  
16 library on the Project Management Web Site.  
17 C. The Project Architect, City Project Manager, Consulting Staffs and Owner Representatives shall review the O&M  
18 Data draft submittals and checklist within fifteen 15 working days as follows:  
19 1. Provide general critique comments by Division on O&M Data samples submitted. Critique is intended to  
20 provide all contractors with information on strengths and weaknesses of their submittals.  
21 a. Re-submittal of the O&M Data samples will not be required.  
22 2. Review in detail the O&M Data Checklist for completeness. Provide comments as needed.  
23 a. Re-submittal of the O&M Checklist will be required until accepted.  
24

<u>Title</u>	<u>Specification</u>	<u>Completed</u>
Overhead Door Operator	08 36 00	
Air Handling Unit (AHU-3)	23 00 00	
Water Heater (WH-1)	22 30 00	

25

26 **3.3. O&M DATA FINAL SUBMITTAL**

- 27 A. All contractors shall prepare and submit the following for an O&M Data Final review submittal:  
28 1. Prepare complete O&M Data files as described in Section 3.1 above according to their approved checklist  
29 as described in Section 3.2 above.  
30 2. Submit completed checklist and all final O&M Data files to the GC for final submittal review.  
31 B. The GC shall be required to spot check all contractors' submittals for completeness against their checklists and  
32 for compliance with this specification and shall return any to the originating contractor that are insufficient for  
33 re-submittal.  
34 1. When acceptable to the GC, he/she shall upload each O&M Data final submittal file to the O&M Final  
35 library on the Project Management Web Site.  
36 C. The Project Architect, City Project Manager, Consulting Staffs and Owner Representatives shall review the O&M  
37 Data final submittals and checklist within fifteen (15) working days as follows:  
38 1. Review the files submitted against the checklist and request any missing files through the GC.  
39 2. Review in detail all of the O&M Data files for completeness.  
40 a. Submittals shall be accepted or rejected as individual PDF files.  
41 b. Contractors shall re-submit entire O&M submittal if any portion is rejected or incomplete.  
42

43 **3.4. CONSTRUCTION CLOSEOUT**

- 44 A. All contractors shall review Specification 01 77 00, Closeout Procedures and Specification 01 79 00  
45 Demonstration and Training.  
46 1. Acceptance of all final O&M Data submittals is required prior to scheduling Demonstration and Training  
47 Sessions.  
48 2. Completion of all Demonstration and Training Sessions is required to receive the Substantial Compliance  
49 for Occupancy Certificate, and to begin Construction Closeout procedures.  
50

51

52

53

END OF SECTION



**SECTION 01 78 36**  
**WARRANTIES**

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16

**PART 1 – GENERAL**

**1.1. SUMMARY**

- 19  
20 A. The purpose of this specification is to provide clear responsibilities and guide lines related to providing all  
21 Warranties and Guarantees related to the Work, workmanship, materials, equipment, and other such items  
22 required by the Construction Documents.  
23 B. Manufacturers’ disclaimers and limitations on product warranties do not relieve any contractor of the warranty  
24 on the Work that includes the product.  
25 C. Manufacturers’ disclaimers and limitations on product warranties do not relieve suppliers, manufacturers and  
26 any contractor required to provide special warranties under the contract documents.  
27

**1.2. RELATED SPECIFICATIONS**

- 28  
29 A. Section 01 29 76 Progress Payment Procedures  
30 B. Section 01 31 23 Project Management Web Site  
31 C. Section 01 77 00 Closeout Procedures  
32 D. Section 01 78 23 Operation and Maintenance Data  
33 E. Other Divisions and Specifications that may address more specifically the requirements for Warranties related to  
34 the installation of all items and equipment installed under the execution of the Work.  
35

**1.3. DEFINITIONS**

- 36  
37 A. See specification 01 77 00 for the definitions of the following terms that may also be used in this specification:  
38 1. Substantial Compliance  
39 2. Certificate of Occupancy  
40 3. Certificate of Substantial Completion  
41 4. Construction Closeout  
42 5. Contract Closeout  
43 B. Emergency Repair: The Owner or Owner Representative reserves the right to make emergency repairs as  
44 required to keep equipment or materials in operation or to prevent damage to property and injury to persons  
45 without voiding the contractors warranty or bond or relieving the contractor of his/her responsibilities during  
46 the warranty period.  
47 C. Installer: The company or contractor hired to install a finished product that was manufactured and supplied  
48 specifically for the Work within this contract. The Installer may or may not be the same company that supplied  
49 the product. See the definition for supplier.  
50 D. Supplier: Any company that makes a specific finished product for the Work from information within the Contract  
51 Documents. Examples of suppliers would include custom cabinets, steel stairs and railings, etc. A supplier would  
52 not be a company that distributes items manufactured by others such as an electrical or plumbing supplier.  
53 E. Warranty: A written guarantee from the manufacturer to the owner on the integrity of a product and its  
54 installation, and the manufacturers’ responsibility to repair or replace the defective product or components  
55 within a specified time from the date of ownership. Warranty may also be used interchangeably with  
56 Guarantee. The following warranty types may be part of any specification within the Work associated with the  
57 Construction Documents:

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1. Expressed Warranty: A warranty that provides specific repair or replacement for covered components of a product over a specified length of time.
  2. Implied Warranty: A warranty that is not stated explicitly by a seller or manufacturer that the product is merchantable and fit for the intended purpose.
  3. Standard Product Warranty: Preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner. Standard warranties may be for any amount of time but shall not be for anything less than one (1) year from the warranty date.
  4. Special Warranty: A written warranty required by the Contract Documents either to extend the time limit provided under a standard warranty or to provide greater rights to the Owner.
- F. Warranty Date: The effective date that begins all warranty periods required for products, installations, and work-manship associated with the execution of the Work for this contract. The Warranty Date shall be set by the CPM.
- G. Related Damages and Losses: When correcting failed or damaged Warranted Work, remove and reinstall (or replace if necessary) the construction that has been damaged as a result of the failure or the construction that must be removed and replaced to obtain access for the correction of Warranted Work.
- H. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected reinstate the warranty by a new written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation unless specifically noted otherwise in a specification.
- I. Replacement Cost: All costs that may be associated with Work being replaced under warranty including but not limited to the following:
1. Related damages and losses
  2. Labor, material and equipment
  3. Permits and inspection fees
  4. This shall be regardless of any benefit the Owner may have had from the Work through any portion of its anticipated useful service life.
- J. Replacement Work: All materials, products, required labor, and equipment necessary to replace failed or damaged warranted to an acceptable condition that complies with the requirements of the original Construction Documents.
- K. Owners Recourse: Expressed warranties made to the Owner are in addition to implied warranties and shall not limit the duties, obligations, rights, and remedies otherwise available under the law. Expressed warranty periods shall not be interpreted as limitations on the time in which the Owner can enforce such other duties, obligations, rights, and remedies.
1. Rejection of Warranties: The Owner reserves the right to reject any warranty and to limit the selection of products with warranties not in conflict with the requirements of the contract documents.
  2. Where the Contract Documents require a Special Warranty or similar commitment on the Work or product, the Owner reserves the right to refuse acceptance of the Work until the Contractor presents evidence the entities required to countersign such required commitments have done so.

#### 1.4. GENERAL CONTRACTORS RESPONSIBILITIES

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- A. The General Contractor (GC) shall be responsible to remedy, at his/her expense, any defect in the Work and any damage to City owned or controlled real or personal property when the damage is a result of:
1. The GC's failure to conform to Contract Document requirements.
    - a. Any substitutions not properly approved and authorized may be considered defective.
  2. Any defect in workmanship, materials, equipment, or design furnished by the GC or Sub-contractors.
- B. All warranties as described in this specification and these Contract Documents shall take effect on the date established by the CPM, as noted in Section 1.3F above.
1. All warranties shall remain in effect for one (1) year thereafter unless specifically stated otherwise in the Contract Documents or where standard manufacturer warranties are greater.
- C. The GC's warranty with respect to Work repaired or replaced, including restored or replaced Work due to damage, will run for one (1) year from the date of Owner Acceptance of said repair or replacement.
1. This shall be regardless of any benefit the Owner may have had from the Work through any portion of its anticipated useful service life.
- D. Warranty Response
1. See Section 3.5 of this specification.

**PART 2 – PRODUCTS - THIS SECTION NOT USED**

**PART 3 - EXECUTION**

**3.1. WARRANTY CHECKLIST**

- A. All contractors shall be responsible for reviewing the drawings and specifications within their Divisions of Work to provide a complete and comprehensive list of all Warranty Requirements to the GC.
- B. Each list shall indicate the title (and plan identifier when applicable) of the warranted item, the associated specification of the warranted item, the terms of the warranty (years), and a column to verify the item has been turned in and completed.
- C. The GC shall be responsible for all of the following:
  - 1. Consolidating all the warranty lists into one master Warranty Checklist.
    - a. The checklist shall be in a tabular data format similar to the sample below.
  - 2. Upload the completed checklist to the Submittal Library on the Project Management Web Site for review. See Specification 01 33 23 Submittals for more information on this procedure.
  - 3. Resubmit the schedule as needed after initial reviews have been completed.
- D. The GC shall work with all contractors to amend the Warranty Checklist throughout the execution of the project based on changes and modifications as necessary.

<u>Title</u>	<u>Specification</u>	<u>Terms</u>	<u>Completed</u>
Overhead Door Operator	08 36 00	MFR 2yr	
Exterior Bench and Trash Receptacles	12 93 00	MFR 3 year warranty on finish	
Kitchen Sink (SK-1)	22 42 00	MFR 5 year	
Disposal (D-1)	22 42 00	MFR 7 year parts and in-home service	
Toilet (WC-1)	22 42 00	MFR 1 year limited	

**3.2. LETTERS OF WARRANTY**

- A. All letters of warranty shall be in a typed letter format and provide the following information:
  - 1. The letter shall be on official company stationary including company name, address, and phone number.
  - 2. Indicate project name, contract number, and contract address the warranty is for on the reference line.
  - 3. Provide a description of the warranty(ies) being provided.
    - a. Include Division, Trade, or Specification information as necessary.
    - b. Only combine warranties of related Divisional Work together. Create new letters for additional Divisions as necessary.
  - 4. Indicate the effective Warranty Date. As noted in Section 1.3.F above, the Warranty Date shall be the date the Certificate of Substantial Completion was signed by the City Engineer.
  - 5. Contractor Letters of Warranty shall only be signed by a principal officer of the company.
  - 6. After signing the letter provide the GC with a high quality color scanned image in PDF format and the original signed letter.
- B. The GC shall be responsible for the Final Warranty submittal as identified in Section 3.4 below.
- C. The GC shall obtain letters of warranty from all of the following:
  - 1. The General Contractor shall provide warranty letters for all Work that was self performed under the contract documents, identify all trades or Divisions of Work.
  - 2. All Sub-contractors shall provide warranty letters for Work performed under the contract documents; identify all trades or Divisions of Work.
  - 3. Suppliers, as required by other specifications within the Construction Documents where the manufacture of a specific product unique to the Work of this contract was required.
    - a. The terms and conditions of the Supplier Letter of Warranty shall be as defined by the specifications associated with the Work but shall not be less than the industry standard of repair, or replace defective materials and workmanship within one (1) year of the warranty date.
    - b. When the supplier is also the installer a single written letter may be submitted identifying both the warranty for the manufacture of the product and the warranty for the installation of the product.
  - 4. Installers as required by other specifications within the Construction Documents where the installation of a specific product unique to the Work of this contract was required.
    - 1. The terms and conditions of the Installer Letter of Warranty shall be as defined by the specifications associated with the Work but shall not be less than the industry standard of repair,

- 1 or replace defective materials and workmanship associated with the installation of the product  
2 within one (1) year of the warranty date.  
3 5. Special Letters of Warranty shall be required from any contractor, supplier, installer or manufacturer who  
4 agrees to provide warranty services required by any Division Specification in excess of their Standard  
5 Product Warranty.  
6

7 **3.3. STANDARD PRODUCT WARRANTY**

- 8 A. All contractors shall be responsible for collecting and providing copies of all standard product warranties for  
9 commercially available products purchased and installed under this contract.  
10 B. Only one copy of the manufacturers' standard warranty needs to be submitted as representative for all  
11 quantities of the same model number used throughout the Work.  
12 C. Provide the manufacturers certificate, letter, or other standard documentation for each Standard Product  
13 Warranty submitted as follows:  
14 1. Whenever possible a PDF version of the document shall be used.  
15 a. If a PDF version is used all additional information shall be completed using simple PDF editing  
16 tools such as text boxes, highlight, etc.  
17 b. If a PDF version is not available and an original document is furnished the additional information  
18 shall be neatly hand written and highlighted on the document in such a fashion so that it does not  
19 obscure any part of the written warranty.  
20 2. Provide the following additional information on each warranty document:  
21 a. Contract warranty date.  
22 b. Provide the manufacturer name and model number of the product if not specified within the  
23 warranty.  
24 i. Where the manufacturer name and model number is specified within the warranty it shall  
25 be highlighted for visibility.  
26 c. Provide the plan identifier (LAV-1, WC-2, etc) when applicable.  
27 D. Each completed warranty shall be saved as a digital PDF. The file shall be named using the specification number  
28 and item description. I.E. 22 42 00 Toilet (WC-1).pdf  
29 a. Where an original certificate was furnished provide a high quality colored scan of the completed  
30 document with the additional information. Save the scanned image in PDF format and use the  
31 same naming convention as indicated above.  
32 E. Provide all PDF files and any original documents to the GC for final consolidation to be provided to the Owner.  
33

34 **3.4. FINAL WARRANTY SUBMITTAL**

- 35 A. The GC shall receive all required warranties (digital PDF and any original documents) from all contractors,  
36 suppliers, installers and manufacturers.  
37 B. The GC shall inventory all received warranties with the Warranty Submittal List to ensure all required warranties  
38 have been received and all warranty periods are correct according to the specifications.  
39 C. Provide with each Operation and Maintenance Manual a complete copy of any associated warranty.  
40 D. Scan all warranties into a single organized electronic PDF file as follows:  
41 1. Organize the PDF file into an orderly sequence based on the table of contents of the Specifications.  
42 2. Provide a typed Table of Contents for the entire file at the front of the document.  
43 3. Provide bookmarks and links to each individual PDF to enable quick navigation through the PDF  
44 document.  
45 E. Upload the warranty submittal to the appropriate document library on the Project Management Web Site for  
46 review by the PA and CPM.  
47 F. Correct any deficiencies or omissions and resubmit as necessary.  
48

49 **3.5. WARRANTY NOTIFICATION, RESPONSE, EXECUTION AND FOLLOW-UP**

- 50 A. Warranty Notification:  
51 1. The City of Madison, Project Management Web Site, uses an email notification system for all warranty  
52 related issues. The GC will be required to provide, and keep current during the warranty period, a  
53 minimum of two (2) email addresses and phone numbers of current employees to receive email  
54 notifications and provide response regarding Work associated with these construction documents.  
55 a. In the event a Warranty Issue is deemed by the City of Madison to be an emergency, the GC shall  
56 first receive a phone call with a follow-up email from the Project Management Web Site.  
57 b. The Contract Closeout-Warranty Issue Library on the Project Management Web Site uses a form  
58 for each warranty issue that is logged into the system.



**SECTION 01 78 39  
AS-BUILT DRAWINGS**

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18

**PART 1 – GENERAL**

**1.1. SUMMARY**

- 22 A. This specification is intended to provide clear guidelines and identify the responsibilities of all contractors as they  
23 pertain to City of Madison contract procedures regarding the accurate recording of the Work associated with the  
24 execution of this contract. This shall include but not be limited to work that will be hidden, concealed, or buried.  
25 B. Each contractor shall be responsible for maintaining an accurate record of all installations, locations, and  
26 changes to the contract documents during the execution of this contract as it may relate to their specific division  
27 or trade.  
28 C. The General Contractor (GC) shall be responsible for ensuring all contractors provide as-built record information  
29 to the Master As-Built Document Set as described in this specification.  
30

**1.2. RELATED SPECIFICATIONS**

- 32 A. 00 31 21 Survey Information  
33 B. 01 26 13 Request for Information  
34 C. 01 31 23 Construction Bulletin  
35 D. 01 32 33 Photographic Documentation  
36 E. 01 26 63 Change Orders  
37 F. 01 29 76 Progress Payment Procedures  
38 G. 01 31 23 Project Management Web Site  
39 H. 01 33 23 Submittals  
40 I. 01 77 00 Closeout Procedures  
41 J. Other Divisions and Specifications that may address more specifically the requirements for field recording the  
42 installation of all items associated with the execution of this contract by Division or Trade.  
43

**1.3. RELATED DOCUMENTS**

- 45 A. Other related documents shall include but not be limited to the following:  
46 1. Bidding documents including drawings, specifications, and addenda.  
47 2. Required regulatory documents of conditional approval.  
48 3. Field orders, verbal or written by inspectors having regulatory jurisdiction.  
49 4. Shop drawings and installation drawings.  
50

**1.4. PERFORMANCE REQUIREMENTS**

- 52 A. The GC shall be responsible for maintaining the “Master As-Built Document Set” in the job trailer at all times  
53 during the execution of this contract. This document set shall include all of the following:  
54 1. Master As-Built Plan Set  
55 2. Master As-Built Specification Set  
56 3. Other Document Sets

- 1 B. The GC shall designate one person of the GC staff to be responsible for maintaining the Master As-Built  
2 Document Set at the job trailer. This shall include, posting updates, revisions, deletions and the monitoring of all  
3 contractors posting as-built information as described in this specification.  
4 C. All contractors shall use this specification as a general guideline regarding the requirements for documenting  
5 their completed Work. Contractors shall explicitly follow additional specification requirements within their own  
6 Division of Trade as it may apply to this specification.  
7

#### 8 **1.5. QUALITY ASSURANCE**

- 9 A. The GC shall be responsible for all of the following:  
10 a. Spot checking all sub-contractors field documents to insure daily information is being recorded as  
11 work progresses.  
12 b. Discuss as-built recording to the plan set at weekly job meetings with all sub-contractors on site.  
13 c. Schedule time with sub-contractors in the job trailer for recording as-built information to the plan  
14 set.  
15 d. Insure that all sub-contractors are providing clear and accurate information to the plan set in a  
16 neat and organized manner.  
17 e. Insure sub-contractors who have completed work have finalized recording all as-built information  
18 to the plan set before releasing them from the project site.  
19 B. The Project Architect, the City Project Manager, and other design team staff will perform random checks of the  
20 Master As-Built Document Set during the execution of this contract to ensure as-built information is being  
21 recorded in a timely fashion as the Work progresses. An updated and current Master As-Built Document Set is a  
22 stipulation for approval of the progress payment.  
23

### 24 **PART 2 – PRODUCTS**

#### 25 **2.1. OFFICE SUPPLIES**

- 26 A. The GC shall provide a sufficient supply of office products in the job trailer at all times for all contractors to use in  
27 recording as-built information into the plan set. This shall include but not be limited to the following:  
28 a. Red ink pens, medium point. Pens that bleed through paper, markers, and felt tips will not be  
29 accepted.  
30 b. The use of highlighters is acceptable. Assign colors to various trades for consistency in recording  
31 information.  
32 c. Straight edges of various lengths for drawing dimension, extension and other lines.  
33 d. Civil and Architectural scales  
34 e. Clear transparent, non-yellowing, single sided tape.  
35 f. Correction tape or correction fluid for correcting small errors.  
36  
37

### 38 **PART 3 - EXECUTION**

#### 39 **3.1. FIELD DOCUMENT AS-BUILTS**

- 40 A. The GC and all Sub-contractors shall be responsible for keeping their own field set of as-built documents  
41 including plans, specifications and published changes.  
42 B. Field sets shall be kept dry and in good condition at all times.  
43 C. No Work shall be buried, covered, or hidden, by any additional Work, regardless of Contractor or Trade, until  
44 locations of all materials and equipment has been properly documented as described below.  
45 D. All contractors shall be required to record the following as-built information:  
46 a. Notes on the daily installation of materials and equipment.  
47 b. Sketches, corrections, and markups indicating final location, positioning, and arrangement of  
48 materials and equipment such as pipes, conduits, valves, cleanouts, pull boxes and other such  
49 items. Note all final locations on plan sheets, indicate dimension off identifiable building features.  
50 Riser diagrams need only be corrected for significant changes in locations, routing or  
51 configuration.  
52 i. The use of photographs in lieu of hand drawn sketches is acceptable.  
53 ii. Photos shall be taken according to Specification 01 32 33 Photographic Documentation  
54 iii. Print photo and markup with dimensions or notes as necessary.  
55 c. Identify by the use of existing plan symbology and notes the size, type, quantity, and use as  
56 applicable of materials such as pipes, valves, conduits, etc.  
57





- 1 c. The Plan Set shall be available at anytime for easy reference during progress meetings and for  
2 emergency location information of new work already completed.
- 3 2. The Master As-Built Specification Set (Spec Set) shall begin with one complete bid set of specifications  
4 and any additional specifications that were supplied by published addenda during the bidding process.  
5 The Spec Set shall be provided in three "D" ring type binders of sufficient thickness to accommodate the  
6 specification set. Multiple binders are allowed as necessary. Label the front cover and binding edge with  
7 "Master As-Built Specifications" in bold red letters. Provide other information as necessary to distinguish  
8 the contents of multi-volume sets.
  - 9 a. The Spec Set shall be kept dry, legible, and in good condition at all times.
  - 10 b. The Spec Set shall be kept up to date with new revisions within two (2) working days of  
11 supplemental drawings being issued.
  - 12 c. The Spec Set shall be available at anytime for easy reference during progress meetings.
- 13 3. Other Document Sets may be kept at the GCs option in three "D" ring type binders of sufficient thickness  
14 to accommodate the documentation. Other documentation sets may include but not be limited to RFIs,  
15 CBs, COs, etc.
- 16 C. The Land Surveyor Sub-Contractor shall be required to use digital surveying for all exterior site surveying, and  
17 provide deliverable digital as-builts as specified in Specification 00 31 21 Survey Information. As soon as practical  
18 the surveyor shall provide the GC with a preliminary copy of installed buried utilities for inclusion with the plan  
19 set in the job trailer. The surveyor shall provide final digital as builts as per section 3.2 above.
- 20 D. All contractors shall be responsible for updating the Plan Set from their field sets at least once per work week.  
21 Updates shall include but not be limited to the following procedures:
  - 22 a. All updates shall be done only in red ink. Place a "cloud" around small areas of correction to call  
23 attention to the change.
  - 24 b. Whenever possible place general work notes, field sketches, supplemental details, photos, and  
25 other such information on the reverse side of the preceding sheet. Installation notes including  
26 dates shall be kept neatly organized in chronological order as necessary.
  - 27 c. Accurately locate items on the plan set as follows:
    - 28 i. For items that are located as dimensioned provide a check mark or circle indicating the  
29 dimension was verified.
    - 30 ii. For items that are within 5 feet of the location indicated on the plans leave as shown and:
      - 31 • Provide correct dimensions to existing dimension strings or,
      - 32 • Accurately locate with new dimension strings
    - 33 iii. For items that are more than 5 feet from the location indicated on the plans
      - 34 • Accurately draw the items in the new location as installed and,
      - 35 • Accurately locate with new dimension strings and,
      - 36 • Note that the existing location is void.
  - 37 d. Include dimensioned locations for items that will be buried, concealed, or hidden in the ground,  
38 under floors, in walls or above ceilings.
    - 39 i. Dimensions shall be pulled from identifiable building features, not from centers of columns  
40 or other buried features.
    - 41 ii. When necessary pull more dimensions as needed from opposing directions to properly  
42 locate single items.

### 3.4. AS-BUILT REVIEW AND ACCEPTANCE

- 45 A. The GC shall provide the Master As-Built Plan Set to the Project Architect (PA), the City Project Manager (CPM),  
46 and other design team staff for content review prior to the Progress Payment Milestone indicated in  
47 Specification 01 29 76 Progress Payment Procedures. The submitted plan set shall include the digital survey  
48 information produced under Section 3.2 above.
  - 49 1. If the plan set is not approved:
    - 50 a. The PA and CPM shall only be required to generalize deficiencies by trade there shall be no  
51 requirement or expectation to generate a "punch list" of required corrections.
    - 52 b. The GC and Sub-contractors as necessary shall be responsible for inspecting the installation and  
53 correcting the drawings as needed.
    - 54 c. The GC shall re-submit the plan set for review.
  - 55 2. If the plan set is approved the PA shall take possession of the plan set to be used in providing the owner  
56 with digital CAD record drawings. Upon completion of transferring the information to CAD the PA shall  
57 provide the Owner with CAD record drawings, record PDFs, and the Master As-Built Plan Set.

- 1 **3.5. CHANGES AFTER ACCEPTANCE**  
2 A. No Contractor shall be responsible for making changes to the As-Built record documents after acceptance by the  
3 PA and CPM except when necessitated by changes resulting from any Work made by the Contractor as part of  
4 his/her guarantee.  
5  
6  
7

8 **END OF SECTION**

**SECTION 01 78 43  
SPARE PARTS AND EXTRA MATERIALS**

1  
2  
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17

**PART 1 – GENERAL**

**1.1. SUMMARY**

- 21 A. This specification is intended to provide clear guidelines and identify the responsibilities of all contractors as they  
22 pertain to City of Madison contract procedures regarding spare parts, special tools, special materials, and extra  
23 materials.  
24 B. Each contractor shall be responsible for knowing the specific requirements of their Division Specifications as they  
25 may relate to the general information provided in this specification.  
26 C. The General Contractor (GC) shall be responsible for ensuring all contractors provide spare parts and extra  
27 materials as described in this specification.  
28

**1.2. RELATED SPECIFICAITONS**

- 30 A. 01 29 76 Progress Payment Procedures  
31 B. 01 31 23 Project Management Web Site  
32 C. 01 77 00 Closeout Procedures  
33 D. Other Divisions and Specifications that may address more specifically how to proceed with spare parts, special  
34 tools, special materials, and extra materials.  
35

**1.3. DEFINITIONS**

- 37 A. Spare Parts: Any component of a product or assembly that comes pre-packaged or was specially ordered for the  
38 explicit use of the product or assembly. This shall include but not be limited to fastening devices, mounting  
39 brackets, replacement parts, wheels, pulleys, wiring, alternate assembly pieces, etc.  
40 B. Special Tools: Any tool of any kind that was pre-packaged or specially ordered, and is required to be used for the  
41 installation or maintenance of an installed product or assembly as part of this contract.  
42 C. Special Materials: Any oil, lubricant, glue, touch-up paint, or other such material that comes pre-packaged or  
43 was specially ordered and is required to be used for the installation or maintenance of an installed product or  
44 assembly as part of this contract.  
45 D. Extra Materials (Attic Stock): Any surplus materials in new and useable condition that was installed a part of this  
46 contract. Attic Stock shall include but not be limited to the following: ceiling tiles, paint, stain, floor coverings,  
47 ceramic tiles, light bulbs/lamps, filters, strainers, etc. Attic Stock shall include partially opened bulk items and  
48 additional unopened quantities as directed by other specifications.  
49

**1.4. PERFORMANCE REQUIREMENTS**

- 51 A. All contractors shall be responsible for consolidating spare parts, special tools, special materials, and attic stock  
52 as it pertains to the specific Work within their Division or Trade.  
53 B. All contractors shall use this specification as a general guideline regarding the requirements for turning spare  
54 parts, special tools, special materials, and attic stock over to the owner. Contractors shall explicitly follow  
55 specification requirements within their own Division of Trade.  
56

**1.5. QUALITY ASSURANCE**

- 58 A. The General Contractor (GC) shall be responsible for all of the following:

1. Coordinate the location for and the delivery of all spare parts, special tools, special materials, and attic stock being provided by all contractors under this contract to one centralized location as designated by the Owner.
2. Verify that all items being delivered are:
  - a. Clean, new, and in a usable condition.
  - b. Properly sealed, protected, and labeled
  - c. Properly documented

**PART 2 – PRODUCTS – THIS SECTION NOT USED**

**PART 3 - EXECUTION**

**3.1. PACKAGING**

- A. Whenever possible all surplus items should remain in their original packaging such as parts envelopes.
- B. Package small parts in re-sealable plastic bags (Ziploc) or envelopes with clasp fasteners. Do not use envelopes that seal with glue or tape envelopes closed. Do not leave packaging unsealed.
- C. Package like parts together for products or assemblies. I.E. keep all spare parts for flushometers together.
- D. Many small packages may be grouped together into a larger container by trade.
- E. Do not use unrelated boxes or containers for packaging spare items. I.E. do not use a light fixture box for spare breakers, or flushometers parts.

**3.2. LABELING**

- A. Whenever possible the original labeling indicating part numbers and other pertinent information shall remain on the original packaging.
- B. If original labeling is not available the contractor shall label all parts and packages using tape or labels and permanent black markers. Tape or labels being used shall absorb the permanent marker without bleeding or allowing ink to be smeared or rubbed off.
- C. Labels shall include the name of the product or equipment the item belongs to, part number and/or name, and any other information that would assist maintenance personnel in identifying the piece and related product.
- D. Labels shall include plan or specification designations (WC-1, LAV-3, DF-2, CPT-1, etc) that identify the particular product or finish material it represents.
- E. Labels for parts stored in clear re-sealable plastic bags may be placed inside the bag. Label shall face out and be able to be read from one side. Multiple bags shall be numbered individually for identification.
- F. Label the outside of large containers with the trade name (Plumbing, Electrical, etc).

**3.3. INVENTORY**

- A. All contractors shall provide the GC with complete inventories of all spare parts, special tools, special materials, and attic stock that they are providing at the end of the contract. The inventories shall be organized as follows:
  1. The cover sheet shall indicate the Contractors name, address, phone number, identify that the document is the "Spare Parts and Extra Materials Inventory", and identify the Division or Trade the inventory is for.
  2. Provide an inventory in a tabular format of all items being provided under this and other specifications. The minimum information to be provided for each item on the inventory shall be as follows:
    - a. Bag or container number, all items of one bag or container shall be grouped together on the inventory
    - b. Item description
    - c. Item size (if applicable)
    - d. Total quantity provided
    - e. Identify if item is a spare part, tool, special material, or attic stock
- B. The GC shall consolidate inventories from all sub-contractors into one tabular data sheet organized by Division or Trade of Work.
  1. Upon completing the consolidated list the GC shall upload the completed inventory to the Contract Closeout-Attic Stock Library on the Project Management Web Site.
  2. The GC shall notify the Project Architect and City Project Manager that the scans have been uploaded.
  3. Consulting Staff and Owner Staff shall review the inventories prior to Final Review to verify that minimum required quantities have been met. Deficiencies shall be noted and returned back to the GC for corrective action.

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**3.4. STORAGE**

- A. Prior to the 80% Progress Payment milestone the GC shall coordinate with the City Project Manager and Maintenance Personnel where spare parts, special tools, special materials, and attic stock shall be stored.
- B. The GC shall instruct all contractors as to the location and proper storage procedures.
- C. The GC shall be responsible for ensuring the storage area is kept neat and orderly as follows:
  - 1. Like items are stored together by material, product, or trade as necessary.
  - 2. Liquids are stored in sealable containers and the lids have been properly installed to prevent drying out, spillage, etc.
  - 3. All labels are clearly visible and provide the required information.
- D. Large items shall be stored so as not to damage other items. Do not stack heavy items or items with distinct shapes/outlines on softer items that may get crushed or imprinted.

**3.5. CLOSEOUT PROCEDURE**

- A. Prior to the 90% Progress Payment milestone the GC shall review all attic stock already stored by the contractors to ensure the following:
  - 1. Materials are stored in the proper location(s).
  - 2. All boxes, containers and items are properly labeled according to the submitted/approved inventory.
  - 3. Quantities are correct according to the submitted/approved inventory.
- B. The GC shall ensure that all deficiencies are corrected prior to conducting Demonstration and Training Sessions.
- C. The GC shall review with Maintenance Staff all inventories and labeling during the scheduled Demonstration and Training Sessions.
- D. Any discrepancies associated with Attic Stock shall be resolved and verified prior to the CPM releasing the 90% CT progress payment.

**END OF SECTION**

**SECTION 01 79 00  
DEMONSTRATION AND TRAINING**

1  
2  
3  
4 PART 1 – GENERAL ..... 1  
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13 3.4. DEMONSTRATION AND TRAINING PROGRAM PREPARATION ..... 3  
14 3.5. CONDUCTING A DEMONSTRATION AND TRAINING SESSION ..... 3  
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16

**PART 1 – GENERAL**

**1.1. SUMMARY**

- 19  
20 A. The purpose of this specification is to provide clear responsibilities and guidelines related to providing  
21 Demonstration and Training (D&T) Sessions related to general facility use, equipment, systems, finishes, and  
22 materials to City of Madison Staff (Owner, Owner Representatives, Maintenance, and Custodial Personnel) as  
23 needed.  
24 B. All D&T shall be coordinated through the General Contractor (GC), Project Architect (PA) and City Project  
25 Manager (CPM), and will be based on or customized to the needs of City of Madison Staff being trained. New  
26 equipment and systems may have complete D&T sessions as described in this specification while equipment or  
27 systems staff is familiar with may have sessions more focused on maintenance only.  
28

**1.2. RELATED SPECIFICATIONS**

- 29  
30 A. Section 01 29 76 Progress Payment Procedures  
31 B. Section 01 78 13 Completion and Correction List  
32 C. Section 01 78 19 Maintenance Contracts  
33 D. Section 01 78 23 Operation and Maintenance Data  
34 E. Section 01 78 36 Warranties  
35 F. Section 01 78 39 As-Built Drawings  
36 G. Section 01 78 43 Spare Parts and Extra Materials  
37 H. Other Divisions and Specifications that may address more specifically the requirements for D&T sessions related  
38 to the installation of all items and equipment installed under the execution of the Work.  
39

**1.3. QUALITY ASSURANCE**

- 40  
41 A. All contractors shall have the responsibility of preparing for and conducting D&T sessions as determined by this  
42 and other Division or Trade related specifications, Owner Operation and Maintenance Manuals, and other such  
43 documentation related to the Work.  
44 B. The GC shall have responsibility for:  
45 1. Ensuring that all contractors required to conduct a D&T session have successfully completed all of the  
46 following:  
47 a. Turned in all required documentation for review and documentation has been approved/accepted  
48 prior to scheduling D&T sessions.  
49 b. Other required documentation as needed is available and ready for use during the D&T session.  
50 c. All systems have been started, tested, and running as per appropriate specification and/or  
51 manufacturers recommendations prior to scheduling D&T sessions.  
52 d. All contractors are sufficiently prepared for their D&T session  
53 e. Documents the D&T session including date, time, contractor and company name, attendees and  
54 other information regarding the session  
55 2. Organizing the coordination and scheduling of all D&T sessions between all contractors and the  
56 appropriate representatives of the Owner. These representatives may include any of the following  
57 depending on the Work of the Contract:  
58 a. Owner – end users

- b. Facility Maintenance personnel
  - i. Facility general operation procedures including custodial services
  - ii. Electrical
  - iii. Mechanical
  - iv. Plumbing
  - v. Site
- c. Information Technology (IT) Department
- d. Traffic Engineering – Radio Shop
- e. Architects, Engineers and Facility Management staff as project completion overview

**PART 2 – PRODUCTS – THIS SECTION NOT USED**

**PART 3 - EXECUTION**

**3.1. GENERAL REQUIREMENTS**

- A. The GC shall develop a specific D&T plan to be scheduled and conducted as described below but no sooner than the meeting discussed in 3.2.A.2 below.
- C. The GC shall not schedule D&T sessions to preclude required personnel from attending multiple sessions.

**3.2. COORDINATING AND SCHEDULING THE TRAINING**

- A. The GC, PA, and CPM, shall review all Training and Demonstration requirements during two (2) special meetings.
  - 1. The first meeting shall be held at the 50% Contract Total Payment. During this meeting the following shall be discussed:
    - a. Preliminary schedule of training dates to be completed prior to beginning construction closeout.
    - b. List of documentation and items that need to be completed and available before and during the training session.
    - c. Who (Owner, Maintenance, etc) will be attending what training session(s).
  - 2. The second meeting shall be held at the 80% Contract Total Payment. This meeting shall review due outs that have not yet been completed for the 90% Contract Total Payment and the requirements necessary for Construction Closeout. All Demonstration and Training sessions shall be completed prior to receiving the 90% progress payment and beginning Construction Closeout Procedures (see Specification 01 77 00).
    - a. This does not include any requirement associated with off season equipment preparation and/or demonstration and Training Sessions.
- B. All of the Construction Work shall be operationally ready prior to conducting training as follows:
  - 1. All contractors shall have their As-Built Drawing Records available for reviewing locations of system components during training.
  - 2. All final and approved Operations and Maintenance Data shall be completed no less than two (2) full weeks prior to the scheduled training.
  - 3. All systems shall have been started, functionally tested, balanced, and fully operational, and all piping and equipment labeling complete at least two (2) days prior to the scheduled training.
    - a. Seasonal equipment shall not be trained out of season. Contractors having seasonal equipment shall work with the GC and CPM for coordinating additional training sessions as appropriate for seasonal equipment.
- C. Correction list items that prevent a piece of equipment or system from being fully operational for training shall be corrected prior to conducting the training.

**3.3. TRAINING OBJECTIVES**

- A. For each piece of equipment or system installed train on the following objectives/topics as applicable:
  - 1. System design, concept, and capabilities
  - 2. Review of related contractor as-built drawings
  - 3. Facility walkthrough to identify key components of the system
  - 4. System operation and programming including weekly, monthly, annual test procedures
  - 5. System maintenance requirements
  - 6. System troubleshooting procedures
  - 7. Testing, inspection, and reporting requirements associated with any regulatory requirements
  - 8. Identification of any correction list items still outstanding
  - 9. Review of system documentation including the following:
    - a. Operation and maintenance data

- 1                                   b.     Warranties
- 2                                   c.     Valve charts, tags, and pipe identification markers
- 3        B.     For each piece of specialty equipment train on the following objectives/topics as applicable:
- 4                   1.     Manufacturers operations instructions
- 5                   2.     Manufacturers use and care instructions
- 6                   3.     Manufacturers maintenance and troubleshooting instructions
- 7                   4.     System operation and programming including weekly, monthly, annual test procedures
- 8                   5.     Identification of any correction list items still outstanding
- 9                   6.     Review of system documentation including the following:
- 10                         a.     Operation and maintenance data
- 11                         b.     Warranties
- 12        C.     End User Orientation
- 13                   1.     Facility walkthrough
- 14                   2.     Security and emergency features
- 15                   3.     General facility operation procedures
- 16        D.     Facility General Use and Custodial Services – if requested
- 17                   1.     Facility walkthrough
- 18                   2.     Security and emergency features
- 19                   3.     General facility operation procedures
- 20                   4.     Care and maintenance of specialty items, finishes, etc as requested
- 21                   5.     Attic stock inventory and material designations
- 22

23        **3.4. DEMONSTRATION AND TRAINING PROGRAM PREPARATION**

- 24        A.     Each contractor having a responsibility for providing D&T sessions shall meet with the GC, CPM, and other City
- 25                   Staff as needed to review the extent of the Training Objectives in section 3.3 above needed for each piece of
- 26                   equipment, system, finish, etc. This meeting shall occur no less than four (4) weeks prior to the anticipated
- 27                   training session.
- 28        B.     The contractor shall use the information from item 3.4.A above to prepare a formal training program for each
- 29                   piece of equipment or system based on the Training Objectives in 3.3 above.
- 30                   1.     The formal training program shall include the following information:
- 31                         a.     Session title
- 32                         b.     List of systems, equipment, use, care, etc to be covered during the session
- 33                         c.     Provide the following for each systems, equipment, use, care, etc to be covered during the session
- 34                                 i.     Name and affiliation of each instructor to be used. As needed and discretion of the Owner
- 35                                 the GC to require attendance by the installing technician, installing Contractor and the
- 36                                 appropriate trade or manufacturer’s representative.
- 37                                 ii.    Qualifications of each instructor to be used. Practical building operation expertise as well
- 38                                 as in-depth knowledge of all modes of operation of the specific piece of equipment as
- 39                                 installed in this project is required by the training personnel. If Owner determines training
- 40                                 was not adequate, the training shall be repeated until acceptable to Owner.
- 41                                 iii.   A checklist of all documentation and system/equipment requirements necessary to
- 42                                 complete a successful training session and the current status of each
- 43                                 iv.   Any additional documents, training aids, video or other items to be used to complete the
- 44                                 training
- 45                                 v.   Any special requirements or needs associated with item iv above to complete the training
- 46                         d.     The intended audience for the training
- 47                         e.     The approximate duration of each objective or topic to be covered
- 48                   2.     Submit the completed training program to the GC for review and approval by the PA and CPM.
- 49        C.     The PA and CPM shall work with staff as necessary to ensure all points of anticipated training needs have been
- 50                   met. The PA and CPM will approve the program as submitted or recommend changes for re-submittal as
- 51                   necessary.
- 52

53        **3.5. CONDUCTING A DEMONSTRATION AND TRAINING SESSION**

- 54        A.     All contractors shall conduct their required D&T Sessions as follows:
- 55                   1.     Begin with a classroom session
- 56                         a.     Provide a sign in sheet indicating all training to be conducted, instructors, etc.
- 57                         b.     Provide an overview of the training to be conducted including the approximate schedule.
- 58                   2.     Conduct a general walk-through of the site.



- 1 a. Point out locations of various equipment, valves, charts, and other related items.
- 2 b. Use the Division or Trade As-Built record drawings to indicate locations of hidden or buried items.
- 3 3. Provide a demonstration of general equipment/system operation including using the O&M manual.
- 4 a. Startup and shutdown procedures.
- 5 b. Normal operational levels as depicted by any gauges, software, etc.
- 6 c. Indicate warning devices, signs etc. and demonstrate emergency shut-down procedures.
- 7 4. Provide a demonstration of all owner level maintenance using the O&M manual.
- 8 a. Indicate frequency of maintenance.
- 9 b. Provide and review all spare parts, special tools, and special materials.
- 10 5. Provide and review all spare parts, special tools, special materials, or attic stock as applicable.
- 11 6. While conducting D&T sessions:
- 12 a. Allow hands on training whenever practical.
- 13 b. Answer questions promptly
- 14 c. Repeat demonstrations and procedures as necessary.
- 15 B. Within two (2) working days of completing the D&T session the contractor responsible for the session shall turn-
- 16 in any documentation generated including the sign in roster to the GC.
- 17 C. The GC shall turn over all training documentation to the PA and CPM upon completion of D&T sessions.
- 18 D. Re-schedule any training that has been determined to be inadequate or inappropriate for any reason including
- 19 but not limited to any of the following;
- 20 1. Unqualified instructor
- 21 2. System installation incomplete or untested to the specifications
- 22 3. Equipment failure during demonstration
- 23 4. Un-expected cancellation
- 24

25 **3.6. CLOSEOUT PROCEDURE**

- 26 A. Prior to receiving the 90% Progress payment the GC shall:
- 27 1. Verify with the PA and CPM that each Demonstration and Training Session was conducted properly and
- 28 according to the submitted plan.
- 29 2. Any required "Off Season" equipment testing, balancing, and Demonstration and Training Sessions have
- 30 been tentatively scheduled with the GC, necessary sub-contractors, instructors and Owner/Owner
- 31 Representatives as necessary.
- 32
- 33
- 34

**END OF SECTION**

**LEED-NC v3.0 Project Checklist**

Madison Municipal Building (MMB)  
Madison, WI

Friday, March 24, 2017  
BID ISSUE

			RESPONSIBILITY FOR UPLOAD TO USGBC						
Yes	?	No	City	MSR	MEP	Gallina	KSD	Other	Notes
<b>21</b>	<b>2</b>	<b>3</b>	<b>Sustainable Sites</b>		26 Points				
<b>Y</b>								GC	Prereq 1 <b>Construction Activity Pollution Prevention</b> Required
<b>1</b>									Credit 1 <b>Site Selection</b> 1
<b>5</b>			X						Credit 2 <b>Development Density &amp; Community Connectivity</b> 5
<b>1</b>			X	X					Credit 3 <b>Brownfield Redevelopment</b> 1
<b>6</b>			X						Credit 4.1 <b>Alternative Transportation, Public Transportation Access</b> 6
<b>1</b>				X			X		Credit 4.2 <b>Alternative Transportation, Bicycle Storage &amp; Changing Rooms</b> 1
<b>3</b>			X						Credit 4.3 <b>Alternative Transportation, Low-Emitting and Fuel-Efficient Vehicles</b> 3
<b>2</b>			X						Credit 4.4 <b>Alternative Transportation, Parking Capacity</b> 2
		<b>1</b>							Credit 5.1 <b>Site Development, Protect or Restore Habitat</b> 1
		<b>1</b>							Credit 5.2 <b>Site Development, Maximize Open Space</b> 1
	<b>1</b>						X		Credit 6.1 <b>Stormwater Design, Quantity Control</b> 1
		<b>1</b>							Credit 6.2 <b>Stormwater Design, Quality Control</b> 1
	<b>1</b>						X		Credit 7.1 <b>Heat Island Effect, Non-Roof</b> 1
<b>1</b>									Credit 7.2 <b>Heat Island Effect, Roof</b> 1
<b>1</b>			X			X			Credit 8 <b>Light Pollution Reduction</b> 1
									<b>Notes</b> Provide ESC Plan in drawings and specification. GC to implement. Site selected prior to design process commencing. Min. density of 60k SF per acre - MSR to measure surrounding density. Site has asbestos requiring remediation. City to remediate per accepted standards. Site within 1/4 mile of at least two bus lines. Provide secure bike racks for 5% occup. and shower-change for 0.5% occup. Peak FTE occup. = 204#. New exterior bike racks = 28#. New staff bike racks = 30#. Total bike racks = 58 (Zoning Code requires 1 per 2,000 gsf, so 74,340/2,000 = 37.17 bikes). Provide and implement a low-emitting and fuel-efficient vehicle-sharing program off-site. Option 3: No new parking provided on site. Existing softscape (grass) is less than 20% of total (reduced) lot area. Not possible on reduced lot size. KSD to Confirm achievable with maximum amount sedum roof area possible on MMB at Bid. The water being intercepted by the green roof will be relatively void of any TSS, this won't be applicable on this project. KSD to confirm potential based on full MMB site assessment. More than 50% of roof area will be covered with either sedum, PV arrays, or stone mulch. <b>Option 1:</b> Reduce by 50% the input power to interior non-emergency luminaires with direct line-of-sight to envelope openings. <b>Option 2:</b> Shield envelope openings that have direct line of sight to non-emergency luminaires. This is achievable provided the non-emergency interior lights are switched OFF between 11PM and 5 AM. City confirmed acceptance of this.
<b>7</b>		<b>3</b>	<b>Water Efficiency</b>		10 Points				
<b>Y</b>									Prereq 1 <b>Water Use Reduction, 20% Reduction</b> Required
<b>4</b>			X				X		Credit 1 <b>Water Efficient Landscaping</b> 2 to 4
<b>1</b>		<b>1</b>							Credit 2 <b>Innovative Wastewater Technologies</b> 2
<b>2</b>		<b>2</b>							Credit 3 <b>Water Use Reduction</b> 2 to 4
									<b>Notes</b> Use 20% less than baseline for interior water use only. Use low flow lavs and WCs, etc. No irrigation is included in project. Use of low-flush fixtures confirmed by City. Fixtures with 30% reduction from baseline confirmed by MEP (40% reduction will achieve 4 points).
<b>20</b>	<b>2</b>	<b>13</b>	<b>Energy &amp; Atmosphere</b>		35 Points				
<b>Y</b>			X						Prereq 1 <b>Fundamental Commissioning of the Building Energy Systems</b> Required
<b>Y</b>			X		X				Prereq 2 <b>Minimum Energy Performance</b> Required
<b>Y</b>			X		X				Prereq 3 <b>Fundamental Refrigerant Management</b> Required
<b>9</b>	<b>1</b>	<b>9</b>			X	X		SEG	Credit 1 <b>Optimize Energy Performance</b> 1 to 19
<b>4</b>	<b>1</b>	<b>2</b>		X	X				Credit 2 <b>On-Site Renewable Energy</b> 1 to 7
<b>2</b>			X					SEG	Credit 3 <b>Enhanced Commissioning</b> 2
<b>2</b>					X				Credit 4 <b>Enhanced Refrigerant Management</b> 2
<b>3</b>								SEG	Credit 5 <b>Measurement &amp; Verification</b> 3
		<b>2</b>							Credit 6 <b>Green Power</b> 2
									<b>Notes</b> 5% better than ASHRAE 90.1-2007 required for Extg Buildings Per SEG Energy Model Results calculated at end of DD, dated 06-21-2016. Taking into account PV array utility cost savings, this improves performance from 17% better than baseline to 24% better than baseline design based on total utility cost of the design building of \$95,800 - \$8,520 = \$87,280. (baseline design energy costs = \$116,000.) Based on overall electrical energy use on 477,500 kWh, and PV Array electrical energy generation of 61,200 kWh (8% of annual energy utility cost based on \$0.15/kWh = \$9,180 savings per year from total energy cost per EA1 above). SEG confirmed Nov 2015. MEP confirmed: ODP, BWP, ratio of coolant charge to coolant capacity, leakage rate. SEG confirmed Nov 2015. City will not pursue "green power."
<b>9</b>	<b>2</b>	<b>3</b>	<b>Materials &amp; Resources</b>		14 Points				
<b>Y</b>								GC	Prereq 1 <b>Storage &amp; Collection of Recyclables</b> Required
<b>3</b>			X	X					Credit 1.1 <b>Building Reuse, Maintain Existing Walls, Floors &amp; Roof</b> 1 to 3
		<b>1</b>		X					Credit 1.2 <b>Building Reuse, Maintain 50% of Interior Non-Structural Elements</b> 1
<b>2</b>								GC	Credit 2 <b>Construction Waste Management</b> 1 to 2
		<b>2</b>		X					Credit 3 <b>Materials Reuse</b> 1 to 2
<b>1</b>	<b>1</b>							GC	Credit 4 <b>Recycled Content</b> 1 to 2
<b>1</b>	<b>1</b>							GC	Credit 5 <b>Regional Materials</b> 1 to 2
<b>1</b>								GC	Credit 6 <b>Rapidly Renewable Materials</b> 1
<b>1</b>								GC	Credit 7 <b>Certified Wood</b> 1
									<b>Notes</b> 95% of existing structure and envelope maintained. Unlikely achievable - most non-loadbearing partitions and extg, non-historic finishes will be removed. City/MSR to include requirements in Project Manual and monitor during CA. Not possible: salvaged material quantity will not meet the LEED cost threshold. MSR to include in Project Manual, and confirm via submittal approval process MSR to include in Project Manual, and confirm via submittal approval process MSR to include in Project Manual, and confirm via submittal approval process MSR to include in Project Manual, and confirm via submittal approval process

**LEED-NC v3.0 Project Checklist**

Madison Municipal Building (MMB)  
Madison, WI

Friday, March 24, 2017  
BID ISSUE

				RESPONSIBILITY FOR UPLOAD TO USGBC							
				City	MSR	MEP	Gallina	KSD	Other	Notes	
<b>10</b>	<b>1</b>	<b>4</b>	<b>Indoor Environmental Quality</b>							<b>15 Points</b>	
<b>Y</b>			Prereq 1 <b>Minimum IAQ Performance</b>			X					
<b>Y</b>			Prereq 2 <b>Environmental Tobacco Smoke (ETS) Control</b>	X						City to confirm: no smoking inside and within 25ft of building openings.	
<b>1</b>			Credit 1 <b>Outdoor Air Delivery Monitoring</b>			X					
		<b>1</b>	Credit 2 <b>Increased Ventilation</b>							Not preferred by the City due to HVAC system impacts.	
<b>1</b>			Credit 3.1 <b>Construction IAQ Management Plan, During Construction</b>						GC	Included in Project Manual	
<b>1</b>			Credit 3.2 <b>Construction IAQ Management Plan, Before Occupancy</b>						GC	Both options included in Project Manual	
<b>1</b>			Credit 4.1 <b>Low-Emitting Materials, Adhesives &amp; Sealants</b>						GC	Included in Project Manual, and confirm via submittal approval process	
<b>1</b>			Credit 4.2 <b>Low-Emitting Materials, Paints &amp; Coatings</b>						GC	Included in Project Manual, and confirm via submittal approval process	
<b>1</b>			Credit 4.3 <b>Low-Emitting Materials, Flooring Systems</b>						GC	Included in Project Manual, and confirm via submittal approval process	
<b>1</b>			Credit 4.4 <b>Low-Emitting Materials, Composite Wood &amp; Agrifiber Products</b>						GC	Included in Project Manual, and confirm via submittal approval process	
		<b>1</b>	Credit 5 <b>Indoor Chemical &amp; Pollutant Source Control</b>							Provide MERV 13 filtration, entry walkoff systems 10ft deep min., self-closing doors on janitor closets. May lose this point due to shrinking of MLK Blvd vestibule during DD.	
<b>1</b>			Credit 6.1 <b>Controllability of Systems, Lighting</b>						GC	Provide individual lighting control for 90% of occupants and in all shared spaces.	
		<b>1</b>	Credit 6.2 <b>Controllability of Systems, Thermal Comfort</b>							Provide individual access to control air and temp for 50% of occupants, and all shared rooms	
<b>1</b>			Credit 7.1 <b>Thermal Comfort, Design</b>			X				Design HVAC system to meet ASHRAE-55-2004 requirements.	
<b>1</b>			Credit 7.2 <b>Thermal Comfort, Verification</b>	X						City confirmed willingness to survey occupants 6-18 months post-occupancy.	
	<b>1</b>		Credit 8.1 <b>Daylight &amp; Views, Daylight 75% of Spaces</b>		X					Perform early daylight simulation modeling. Occupied spaces to achieve daylight illuminance levels of a minimum of 10 footcandles (fc) (110 lux) and a maximum of 500 fc (5,400 lux) in a clear sky condition on September 21 at 9 a.m. and 3 p.m. Provide glare control devices. Daylight simulation currently being modeled by MSR.	
		<b>1</b>	Credit 8.2 <b>Daylight &amp; Views, Views for 90% of Spaces</b>							Not achievable given Level 0 and existing building conditions.	
<b>1</b>	<b>1</b>	<b>4</b>	<b>Innovation &amp; Design Process</b>							<b>6 Points</b>	
	<b>1</b>		Credit 1.1 <b>Innovation in Design: Pursue low-emitting furnishings per LEED-CI</b>	X	X					MSR to apply to FF&E design process. Standard to achieve this point is either Greenguard IAQ Certified (Option 1), or testing protocols based on ANSI/BIFMA standards by 3rd party lab (Option 2). Option 1 recommended. The City furniture standards (HM) comply with Option 1 except for HM Meridian Storage products - use HM "Tu" product range instead. City to review/approve.	
		<b>1</b>	Credit 1.2 <b>Innovation in Design: Pursue Architecture 2030 energy performance</b>		X	X	X		SEG	Requires 70% improvement over regional baseline building of this type based on Energy Star (107kbtu/sf/yr), which may not be possible. <b>32.1 kbtu/sf/yr</b> is target to achieve this.	
		<b>1</b>	Credit 1.3 <b>Innovation in Design: On-site energy generation</b>								
		<b>1</b>	Credit 1.4 <b>Innovation in Design: Provide Specific Title</b>								
		<b>1</b>	Credit 1.5 <b>Innovation in Design: Provide Specific Title</b>								
<b>1</b>			Credit 2 <b>LEED® Accredited Professional</b>							Chris Wingate, Stephen Bellairs	
<b>4</b>			<b>Regional Priority</b>							<b>4 Points</b>	
<b>1</b>			Credit 1.1 <b>Regional Priority: Development density and community connectivity</b>	X							
<b>1</b>			Credit 1.2 <b>Regional Priority: Bicycle storage and change rooms</b>	X	X	X				City is committed to exterior, bike parking, preferably covered, and to providing changing rooms. There is also share bike parking on site (Trek B-Cycle). The city also has its own staff bike share program which is available. Bicycles to be within 200 yards of entry point. City zoning requirement for bicycle quantity exceeds LEED required number, and the higher number is provided.	
<b>1</b>			Credit 1.3 <b>Regional Priority: Water use reduction</b>	X		X				Based on achieving WE3.	
<b>1</b>			Credit 1.4 <b>Regional Priority: Parking capacity</b>	X						Based on achieving SS4.4.	
<b>72</b>	<b>8</b>	<b>30</b>	<b>Project Totals (pre-certification estimates)</b>							<b>110 Points</b>	
<p>Yes ? No Certified 40-49 points Silver 50-59 points Gold 60-79 points Platinum 80-110 points</p>											

**SECTION 01 81 13.13**  
**SUSTAINABLE DESIGN REQUIREMENTS**

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  - 1.2 [DEFINITIONS](#)
  - 1.3 [PREINSTALLATION MEETINGS](#)
  - 1.4 [ADMINISTRATIVE REQUIREMENTS](#)
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  - 1.6 [INFORMATIONAL SUBMITTALS](#)
  - 1.7 [QUALITY ASSURANCE](#)
- PART 2 – PRODUCTS
  - 2.1 [MATERIALS, GENERAL](#)
  - 2.2 [RECYCLED CONTENT OF MATERIALS](#)
  - 2.3 [REGIONAL MATERIALS](#)
  - 2.4 [LOW-EMITTING MATERIALS](#)
- PART 3 – EXECUTION
  - 3.1 [NONSMOKING BUILDING](#)
  - 3.2 [CONSTRUCTION INDOOR-AIR-QUALITY MANAGEMENT](#)
  - 3.3 [INDOOR-AIR-QUALITY ASSESSMENT](#)

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section includes general requirements and procedures for compliance with certain USGBC LEED prerequisites and credits needed for Project to obtain LEED- **Silver** certification based on USGBC's "LEED 2009 for New Construction & Major Renovations."
  - 1. Other LEED prerequisites and credits needed to obtain LEED certification depend on product selections and may not be specifically identified as LEED requirements. Compliance with requirements needed to obtain LEED prerequisites and credits may be used as one criterion to evaluate substitution requests and comparable product requests.
  - 2. A copy of LEED Project checklist is attached at the end of this Section for information only.
    - a. Some LEED prerequisites and credits needed to obtain the indicated LEED certification depend on Architect's design and other aspects of Project that are not part of the Work of the Contract.

**1.2 DEFINITIONS**

- A. LEED: USGBC's "LEED 2009 for New Construction & Major Renovations."
  - 1. Definitions that are a part of "LEED 2009 for New Construction & Major Renovations" apply to this Section.

**1.3 PREINSTALLATION MEETINGS**

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

**1.4 ADMINISTRATIVE REQUIREMENTS**

- A. Respond to questions and requests from Architect and USGBC about LEED prerequisites and credits that are the responsibility of the Contractor, that depend on product selection or product qualities, or that depend on Contractor's procedures until USGBC has made its determination on Project's LEED certification application. Document responses as informational submittals.
- B. Submit documentation to USGBC in a "ready for review" condition / format, and respond to questions and requests from USGBC about LEED prerequisites and credits that are the responsibility of the Contractor, that depend on product selection or product qualities, or that depend on Contractor's procedures until USGBC has made its determination on Project's LEED certification application.
  - 1. Document correspondence with USGBC as informational submittals.

### 1.5 ACTION SUBMITTALS

- A. Sustainable Design Documentation Submittals:
1. Credit EA 5: Product Data and wiring diagrams for sensors and data collection system used to provide continuous metering of building energy-consumption performance over time.
  2. Credit MR 4: Product Data for recycled content indicating postconsumer and preconsumer recycled content and cost.
  3. Credit MR 5: Product Data for regional materials indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include distance to Project and cost for each regional material.
  4. Credit IEQ 3.1:
    - a. Construction indoor-air-quality management plan.
    - b. Product Data for temporary filtration media.
    - c. Product Data for filtration media used during occupancy.
    - d. Construction Documentation: Six photographs at each of three different times during the construction period, along with a brief description of the SMACNA approach employed, documenting implementation of the indoor-air-quality management measures, such as protection of ducts and on-site stored or installed absorptive materials.
  5. Credit IEQ 3.2:
    - a. Signed statement describing the building air flush-out procedures including the dates when flush-out was begun and completed and statement that filtration media was replaced after flush-out.
    - b. Product Data for filtration media used during flush-out and during occupancy.
    - c. Report from testing and inspecting agency indicating results of indoor-air-quality testing and documentation showing compliance with indoor-air-quality testing procedures and requirements.
  6. Credit IEQ 4.1: Product Data for adhesives and sealants used inside the weatherproofing system indicating VOC content of each product used.
  7. Credit IEQ 4.2: Product Data for paints and coatings used inside the weatherproofing system indicating VOC content of each product used.
  8. Credit IEQ 4.4: Product Data for products containing composite wood or agrifiber products or wood glues indicating that they do not contain urea-formaldehyde resin.

### 1.6 INFORMATIONAL SUBMITTALS

- A. Project Materials Cost Data: Provide statement indicating total cost for materials used for Project. Costs exclude labor, overhead, and profit. Include breakout of costs for the following categories of items:
1. Furniture.
  2. Plumbing.
  3. Mechanical.
  4. Electrical.
  5. Specialty items such as elevators and equipment.
  6. Wood-based construction materials.
- B. Sustainable Design Action Plans: Provide preliminary submittals within **14** days of date established for **the Notice to Proceed** indicating how the following requirements will be met:
1. Credit MR 4: List of proposed materials with recycled content. Indicate cost, postconsumer recycled content, and preconsumer recycled content for each product having recycled content.
  2. Credit MR 5: List of proposed regional materials. Identify each regional material, including its source, cost, and the fraction by weight that is considered regional.
  3. Credit IEQ 3.1: Construction indoor-air-quality management plan.
- C. Sustainable Design Progress Reports: Concurrent with each Application for Payment, submit reports comparing actual construction and purchasing activities with sustainable design action plans.

### 1.7 QUALITY ASSURANCE

- A. LEED Coordinator: Engage an experienced LEED-Accredited Professional to coordinate LEED requirements. LEED coordinator may also serve as waste management coordinator.

**PART 2 - PRODUCTS**

**2.1 MATERIALS, GENERAL**

- A. Provide products and procedures necessary to obtain LEED credits required in this Section. Although other Sections may specify some requirements that contribute to these LEED credits, Contractor shall provide additional materials and procedures necessary to obtain LEED credits indicated.

**2.2 RECYCLED CONTENT OF MATERIALS**

- A. Credit MR 4: Building materials shall have recycled content such that postconsumer recycled content plus one-half of preconsumer recycled content for Project constitutes a minimum of **10** percent of cost of materials used for Project.
1. Cost of postconsumer recycled content plus one-half of preconsumer recycled content of an item shall be determined by dividing weight of postconsumer recycled content plus one-half of preconsumer recycled content in the item by total weight of the item and multiplying by cost of the item.
  2. Do not include **furniture**, plumbing, mechanical and electrical components, and specialty items such as elevators and equipment in the calculation.

**2.3 REGIONAL MATERIALS**

- A. Credit MR 5: Not less than **10** percent of building materials (by cost) shall be regional materials.

**2.4 LOW-EMITTING MATERIALS**

- A. Credit IEQ 4.1: For field applications that are inside the weatherproofing system, adhesives and sealants shall comply with VOC content limits of authorities having jurisdiction and the following VOC content limits:
1. Wood Glues: 30 g/L.
  2. Metal-to-Metal Adhesives: 30 g/L.
  3. Adhesives for Porous Materials (except Wood): 50 g/L.
  4. Subfloor Adhesives: 50 g/L.
  5. Plastic Foam Adhesives: 50 g/L.
  6. Carpet Adhesives: 50 g/L.
  7. Carpet Pad Adhesives: 50 g/L.
  8. VCT and Asphalt Tile Adhesives: 50 g/L.
  9. Cove Base Adhesives: 50 g/L.
  10. Gypsum Board and Panel Adhesives: 50 g/L.
  11. Rubber Floor Adhesives: 60 g/L.
  12. Ceramic Tile Adhesives: 65 g/L.
  13. Multipurpose Construction Adhesives: 70 g/L.
  14. Fiberglass Adhesives: 80 g/L.
  15. Contact Adhesive: 80 g/L.
  16. Structural Glazing Adhesives: 100 g/L.
  17. Wood Flooring Adhesive: 100 g/L.
  18. Structural Wood Member Adhesive: 140 g/L.
  19. Single-Ply Roof Membrane Adhesive: 250 g/L.
  20. Special-Purpose Contact Adhesive (Contact Adhesive That Is Used to Bond Melamine-Covered Board, Metal, Unsupported Vinyl, Rubber, or Wood Veneer 1/16 Inch or Less in Thickness to Any Surface): 250 g/L.
  21. Top and Trim Adhesive: 250 g/L.
  22. Plastic Cement Welding Compounds: 250 g/L.
  23. ABS Welding Compounds: 325 g/L.
  24. CPVC Welding Compounds: 490 g/L.
  25. PVC Welding Compounds: 510 g/L.
  26. Adhesive Primer for Plastic: 550 g/L.
  27. Sheet-Applied Rubber Lining Adhesive: 850 g/L.
  28. Aerosol Adhesive, General-Purpose Mist Spray: 65 percent by weight.
  29. Aerosol Adhesive, General-Purpose Web Spray: 55 percent by weight.
  30. Special-Purpose Aerosol Adhesive (All Types): 70 percent by weight.
  31. Other Adhesives: 250 g/L.
  32. Architectural Sealants: 250 g/L.
  33. Nonmembrane Roof Sealants: 300 g/L.

34. Single-Ply Roof Membrane Sealants: 450 g/L.
  35. Other Sealants: 420 g/L.
  36. Sealant Primers for Nonporous Substrates: 250 g/L.
  37. Sealant Primers for Porous Substrates: 775 g/L.
  38. Modified Bituminous Sealant Primers: 500 g/L.
  39. Other Sealant Primers: 750 g/L.
- B. Credit IEQ 4.2: For field applications that are inside the weatherproofing system, paints and coatings shall comply with VOC content limits of authorities having jurisdiction and the following VOC content limits:
1. Flat Paints and Coatings: VOC not more than 50 g/L.
  2. Nonflat Paints and Coatings: VOC not more than 150 g/L.
  3. Dry-Fog Coatings: VOC not more than 400 g/L.
  4. Primers, Sealers, and Undercoaters: VOC not more than 200 g/L.
  5. Anticorrosive and Antirust Paints Applied to Ferrous Metals: VOC not more than 250 g/L.
  6. Zinc-Rich Industrial Maintenance Primers: VOC not more than 340 g/L.
  7. Pretreatment Wash Primers: VOC not more than 420 g/L.
  8. Clear Wood Finishes, Varnishes: VOC not more than 350 g/L.
  9. Clear Wood Finishes, Lacquers: VOC not more than 550 g/L.
  10. Floor Coatings: VOC not more than 100 g/L.
  11. Shellacs, Clear: VOC not more than 730 g/L.
  12. Shellacs, Pigmented: VOC not more than 550 g/L.
  13. Stains: VOC not more than 250 g/L.
- C. Credit IEQ 4.4: Composite wood, agrifiber products, and adhesives shall not contain urea-formaldehyde resin.

### **PART 3 - EXECUTION**

#### **3.1 NONSMOKING BUILDING**

- A. Smoking is not permitted within the building or within 25 feet of entrances, operable windows, or outdoor-air intakes.

#### **3.2 CONSTRUCTION INDOOR-AIR-QUALITY MANAGEMENT**

- A. Credit IEQ 3.1: Comply with SMACNA's "SMACNA IAQ Guideline for Occupied Buildings under Construction."
1. If Owner authorizes use of permanent heating, cooling, and ventilating systems during construction period as specified in Section 01 50 00 "Temporary Facilities and Controls," install filter media having a MERV 8 according to ASHRAE 52.2 at each return-air inlet for the air-handling system used during construction.
  2. Replace air filters immediately prior to occupancy.

#### **3.3 INDOOR-AIR-QUALITY ASSESSMENT: General Contractor can choose to carry out either 3.3A (Flush-Out) or 3.3B (Air-Quality Testing)**

- A. Flush-Out:
1. After construction ends, prior to occupancy and with all interior finishes installed, perform a building flush-out by supplying a total volume of 14,000 cu. ft. (4 300 000 L) of outdoor air per sq. ft. (sq. m) of floor area while maintaining an internal temperature of at least 60 deg F (16 deg C) and a relative humidity no higher than 60 percent. Per the Mechanical Engineer, time required for this flush out is 18 days at 24 hours a day.
  2. If occupancy is desired prior to flush-out completion, the space may be occupied following delivery of a minimum of 3500 cu. ft. of outdoor air per sq. ft. of floor area to the space. Once a space is occupied, it shall be ventilated at a minimum rate of 0.30 cfm per sq. ft. of outside air or the design minimum outside air rate determined in Prerequisite IEQ 1, whichever is greater. During each day of the flush-out period, ventilation shall begin a minimum of three hours prior to occupancy and continue during occupancy. These conditions shall be maintained until a total of 14,000 cu. ft./sq. ft. of outside air has been delivered to the space. Per the Mechanical Engineer, time required for this flush out is dependent on the size of the space to be occupied (assuming the entire building is not occupied).
    - a. For IAQ requirements refer to Mechanical Specification 230593.

- B. Air-Quality Testing: **General Contractor will engage and pay for** testing agency to perform the following:
1. Conduct baseline indoor-air-quality testing, after construction ends and prior to occupancy, using testing protocols consistent with the EPA's "Compendium of Methods for the Determination of Air Pollutants in Indoor Air," and as additionally detailed in USGBC's "Green Building Design and Construction Reference Guide."
  2. Demonstrate that the contaminant maximum concentrations listed below are not exceeded:
    - a. Formaldehyde: 27 ppb.
    - b. Particulates (PM10): 50 mcg/cu. m.
    - c. Total Volatile Organic Compounds (TVOC): 500 mcg/cu. m.
    - d. 4-Phenylcyclohexene (4-PH): 6.5 mcg/cu. m.
    - e. Carbon Monoxide: 9 ppm and no greater than 2 ppm above outdoor levels.
  3. For each sampling point where the maximum concentration limits are exceeded, conduct additional flush-out with outside air and retest the specific parameter(s) exceeded to indicate the requirements are achieved. Repeat procedure until all requirements have been met. When retesting noncomplying building areas, take samples from same locations as in the first test.
  4. Air-sample testing shall be conducted as follows:
    - a. All measurements shall be conducted prior to occupancy but during normal occupied hours, and with building ventilation system starting at the normal daily start time and operated at the minimum outside airflow rate for the occupied mode throughout the duration of the air testing.
    - b. Building shall have all interior finishes installed including, but not limited to, millwork, doors, paint, carpet, and acoustic tiles. Nonfixed furnishings such as workstations and partitions are encouraged, but not required, to be in place for the testing.
    - c. Number of sampling locations varies depending on the size of building and number of ventilation systems. For each portion of building served by a separate ventilation system, the number of sampling points shall not be less than one per 25,000 sq. ft. or for each contiguous floor area, whichever is larger, and shall include areas with the least ventilation and greatest presumed source strength.
    - d. Air samples shall be collected between 3 and 6 feet from the floor to represent the breathing zone of occupants, and over a minimum four-hour period.

**END OF SECTION**



**SECTION 01 91 00  
COMMISSIONING**

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**PART 1 - GENERAL**

21  
22  
23  
24 1.1 **SUMMARY**  
25 A. Purpose: Define the responsibilities of the parties involved and the procedures related to the commissioning  
26 process.  
27  
28 1.2 **RELATED SECTIONS**  
29 A. 01 31 13 Project Management and Coordination  
30 B. 01 31 19 Project Meetings  
31 C. 01 31 23 Project Management  
32 D. 01 32 26 Construction Progress Reporting  
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34 F. 01 45 16 Field Quality Control  
35 G. 01 77 00 Closeout Procedures  
36 H. 01 78 23 Operation and Maintenance Data  
37 I. 01 78 39 As-Built Drawings  
38 J. 01 79 00 Demonstration and Training  
39 K. 01 81 13.13 Sustainable Design Requirements  
40 L. 01 95 00 Measurement & Verification  
41 M. 23 05 93 Testing, Adjusting, and Balancing for HVAC  
42 N. 23 09 00 Instrumentation and Control for HVAC  
43 O. 23 09 23 Direct Digital Control (DDC) System for HVAC  
44 P. 23 09 93.11 Sequence of Operations for HVAC DDC  
45  
46 1.3 **REFERENCES**  
47 A. ASHRAE Guideline 1.1-2007, "HVAC&R Technical Requirements for The Commissioning Process".  
48 B. ASHRAE Guideline 0-2005, "The Commissioning Process".  
49 C. NEBB – Procedural Standards for Building Systems Commissioning.  
50  
51 1.4 **DEFINITIONS**  
52 A. Acceptance Phase - phase of construction after startup and initial checkout when functional performance tests  
53 are performed.  
54 B. Commissioning Authority (CxA) - an independent entity, not otherwise associated with the A/E team members or  
55 the Contractor and reporting directly to the Owner. The CxA directs and coordinates the commissioning  
56 activities.  
57 C. Commissioning Plan (Cx Plan) - an overall plan, developed before or after bidding, that provides the structure,  
58 schedule and coordination planning for the commissioning process. The Cx Plan is included in the bid documents  
59 and is to be reviewed by all contractors before submitting their bid.

- 1 D. Contract Documents - the documents binding on parties involved in the construction of this project (drawings,  
2 specifications, change orders, amendments, contracts, Cx Plan, etc.).  
3 E. Construction Checklist (CC) - a list of items to inspect and test equipment and components to verify proper  
4 installation of equipment. The CCs are provided by the CxA to the Sub.  
5 F. Datalogging - monitoring flows, currents, status, pressures, etc. of equipment using stand-alone dataloggers  
6 separate from the control system.  
7 G. Deferred System Performance Tests – SPT’s that are performed later, after substantial completion, due to partial  
8 occupancy, equipment, seasonal requirements, design or other site conditions that prevent the tests from being  
9 performed earlier.  
10 H. Deficiency - a condition in the installation or function of a component, piece of equipment or system that is not  
11 in compliance with the Contract Documents (that is, does not perform properly or is not complying with the  
12 Owner’s Project Requirements).  
13 I. Factory Testing - testing of equipment on-site or at the factory by factory personnel with an Owner’s  
14 representative present.  
15 J. Indirect Indicators - indicators of a response or condition, such as a reading from a control system screen  
16 reporting a damper to be 100% closed.  
17 K. Manual Test - using hand-held instruments, immediate control system readouts or direct observation to verify  
18 performance (contrasted to analyzing monitored data taken over time to make the “observation”).  
19 L. Monitoring - the recording of parameters (flow, current, status, pressure, etc.) of equipment operation using  
20 dataloggers or the trending capabilities of control systems.  
21 M. Over-written Value - writing over a sensor value in the control system to see the response of a system (e.g.,  
22 changing the outside air temperature value from 75F to 50F to verify economizer operation). See also  
23 “Simulated Signal.”  
24 N. Owner’s Project Requirements (OPR) – A document that describes what the Owner and stakeholders want to  
25 achieve with this project and what expectations they have of the completed project.  
26 O. Sampling - reviewing or testing only a fraction of the total number of identical or near identical pieces of  
27 equipment.  
28 P. Seasonal Performance Tests – SPT’s that are deferred until the system(s) will experience conditions closer to  
29 their design conditions.  
30 Q. Simulated Condition - condition that is created for the purpose of testing the response of a system (e.g., applying  
31 a hair blower to a space sensor to see the response in a VAV box).  
32 R. Simulated Signal - disconnecting a sensor and using a signal generator to send an amperage, resistance or  
33 pressure to the transducer and DDC system to simulate a sensor value.  
34 S. System Performance Test (SPT) - Dynamic testing of entire systems (rather than just components of the system)  
35 under full operation.  
36 T. Trending - monitoring using the building automation system.

37  
38 **1.5 DESCRIPTION**

- 39 A. General: Commissioning (Cx) is a systematic process of verifying that all building systems perform interactively  
40 to meet the Owner’s Project Requirements (OPR). This is achieved by beginning in the planning phase with  
41 documenting the OPR and continuing through design, construction, acceptance, and the warranty period with  
42 verification of performance. The Cx process shall encompass and coordinate the traditionally separate functions  
43 of system documentation, equipment startup, control system calibration, testing and balancing, performance  
44 testing and training. Cx during the construction phase is intended to achieve the following specific objectives  
45 according to the Contract Documents:  
46 1. Verify that applicable equipment and systems are installed according to the manufacturer’s  
47 recommendations and to industry accepted minimum standards and that they receive adequate  
48 operational checkout by installing contractors.  
49 2. Verify and document proper performance of equipment and systems.  
50 3. Verify that O&M documentation is complete.  
51 4. Verify that the Owner’s operating personnel are adequately trained.  
52 B. The Cx process does not take away from or reduce the responsibility of the system designers or installing  
53 contractors to provide a finished and fully functioning product.  
54 C. The commissioning authority (CxA) has no authority to change, modify or direct any work. The CxA can only  
55 provide comments and suggestions.  
56 D. Commissioning Plan. The Cx Plan provides guidance in the execution of the Cx process. The CxA will update the  
57 Cx Plan regularly as the project progresses. The Drawings and Specifications will take precedence over the Cx  
58 Plan.  
59

1.6 **RESPONSIBILITIES**

A. General Contractor (GC) and Subcontractors (Subs)

1. Construction and Acceptance Phase

- a. Provide assistance to the Construction Manager CM in the coordination of the Cx work by the CxA, and with the CM and CxA ensure that Cx activities are being scheduled into the master schedule.
- b. Provide an updated construction schedule to the CxA any time the schedule changes.
- c. Include the Cx activities in the contract.
- d. Furnish a copy of all submittals and shop drawings pertaining to the commissioned systems for review concurrently with the Architect and Engineers.
- e. Furnish a copy of all construction meeting agendas and minutes to the CxA.
- f. In each purchase order or subcontract written, include requirements for submittal data, O&M data, Cx tasks and training.
- g. GC will ensure that all Subs execute their Cx responsibilities according to the Contract Documents and schedule.
- h. A representative from the GC and each sub associated with the Cx process shall attend the Cx pre-construction meeting and the regular Cx meetings scheduled by the CxA to facilitate the Cx process.
- i. Coordinate and execute the training of Owner personnel.
- j. Prepare O&M manuals, according to the Contract Documents, including clarifying and updating the original sequences of operation to as-built conditions.
- k. Prepare and submit draft forms, including but not limited to start-up procedures, Testing and Balancing (TAB) forms, calibration forms, etc. for review by the CxA before execution.
- l. Submit test reports to the CxA of all tests performed on components and equipment to be commissioned that are not included as part of the Construction Checklist and SPT procedures.
- m. Complete all construction checklist and functional performance test forms as required by the Cx process.
- n. Support the CxA with verification of the completion of construction checklist and functional performance tests as outlined in Part3.
- o. Complete and inspect all installations. Certify that all components and systems are operating as intended per Contract Documents.
- p. Remedy all deficiencies immediately as they are identified throughout construction.
- q. Demonstrate functionality of all systems and equipment.
- r. Maintain an updated set of record drawings (on a daily basis) on the construction site.
- s. Provide support and instrumentation to verify TAB reports, start-up reports, calibration reports, and any other report pertinent to the commissioned equipment and systems.
- t. Notify the CxA no less than 21 days before all testing, start-up, and training.
- u. Update the CxA on a weekly basis on the progress of the Cx activities.
- v. Submit trend data in electronic format or allow access to trending data by internet connection as requested by the CxA.
- w. Install access points by every sensor such that the sensor can be calibrated without removal (P/T plugs, plugged holes in ducts etc.).

2. Warranty Period

- a. Execute seasonal or deferred functional performance testing, witnessed by the CxA, according to the specifications.
- b. Correct deficiencies and make necessary adjustments to O&M manuals and record drawings for applicable issues identified in any seasonal testing.

B. Equipment Suppliers

1. Provide all requested submittal data, including detailed start-up procedures and specific responsibilities of the Owner to keep warranties in force.
2. Assist in equipment testing per agreements with Subs.
3. Include all special tools and instruments (only available from vendor, specific to a piece of equipment) required for testing equipment according to these Contract Documents in the base bid price to the Contractor, except for stand-alone data logging equipment that may be used by the CxA.
4. Provide information requested by CxA regarding equipment sequence of operation and testing procedures.
5. Review test procedures for equipment installed by factory representatives.

1 1.7 **SYSTEMS TO BE COMMISSIONED**

- 2 A. The entire Heating, Ventilation and Air Conditioning (HVAC) system (boilers, chillers, pumps, piping and air  
3 distribution systems)  
4 B. Building Automation System (BAS) for the HVAC system  
5 C. Domestic Hot Water  
6 D. Building envelope and roofing system as it pertains to HVAC  
7 E. Lighting and Lighting Controls  
8 F. Solar electric (PV) System  
9

10 **PART 2 - PRODUCTS**

11  
12 2.1 **TEST INFORMATION**

- 13 A. All instruments needed to verify sensor readings, component performance, and system performance will be  
14 provided by GC and Subs and be available to the CxA. These instruments will not be beyond what the  
15 contractors need to complete the work specified in these construction documents. Any data logging equipment  
16 required in addition to the BAS will be provided by the CxA.  
17 B. All instruments shall be of sufficient quality and accuracy to test and/or measure system performance with the  
18 tolerances specified in the Contract Documents. Refer to specification section 23 05 93- Testing, Adjusting, and  
19 Balancing for required instrument tolerances.  
20

21 **PART 3 - EXECUTION**

22  
23 3.1 **COMMISSIONING TEAM**

- 24 A. The members of the commissioning team consist of the Commissioning Authority (CxA), the Owner's Project  
25 Manager (PM), the designated representative of the Owner's Construction Management firm (CM), the General  
26 Contractor (GC or Contractor), the architect and design engineers, the Mechanical Contractor, the Electrical  
27 Contractor, the TAB Contractor, the Controls Contractor, any other installing subcontractors or suppliers of  
28 equipment.  
29 B. Each Cx Team member shall designate one person who is responsible for coordinating the commissioning efforts  
30 with the CxA.  
31

32 3.2 **SCHEDULING AND MEETINGS**

- 33 A. Scheduling: The CxA will work with the other members of the Cx Team according to established protocols to  
34 schedule the Cx activities. The CxA will provide sufficient notice to the Cx Team for scheduling Cx activities. The  
35 GC will integrate all Cx activities into the master schedule. All parties will address scheduling problems and make  
36 necessary notifications in a timely manner in order to expedite the Cx process.  
37 B. The CxA will provide the initial schedule of primary Cx events at the Cx pre-construction meeting. The Cx Plan  
38 provides a format for this schedule. As construction progresses more detailed schedules are developed by the  
39 CxA. The Cx Plan also provides a format for detailed schedules.  
40 C. Pre-Construction Meeting. Within 60 days of selection of the GC, the CxA will schedule, plan, and conduct a Cx  
41 pre-construction meeting with the entire Cx team in attendance. Meeting minutes will be distributed to all  
42 parties by the CxA. Information gathered from this meeting will allow the CxA to revise the Cx Plan which will  
43 also be distributed to all parties.  
44 D. Meetings: The Cx meetings will be scheduled approximately once a month during construction. These meetings  
45 will be scheduled directly before or after the regular construction meetings if practical. These meetings will  
46 cover coordination, deficiency resolution and planning issues with particular Subs. The CxA will plan these  
47 meetings and will minimize unnecessary time being spent by Subs  
48

49 3.3 **REPORTING**

- 50 A. The CxA will provide regular reports to the Owner as construction and Cx progresses. Standard forms are  
51 provided and referenced in the Cx Plan.  
52 B. The CxA will regularly communicate with all members of the Cx team, keeping them apprised of Cx progress and  
53 scheduling changes through memos, progress reports, etc.  
54 C. Testing or review approvals and non-conformance and deficiency reports are made regularly with the review and  
55 testing as described in later sections.  
56  
57  
58

1 3.4 **RECORD DRAWINGS**

- 2 A. The CxA will verify that the record drawings are updated throughout the construction. If a discrepancy is found  
3 between the record drawings and the installations, the CxA will notify the GC immediately. It is the GC and  
4 subcontractors responsibility to then inspect the installations and immediately and completely update the record  
5 drawings such that they accurately reflect the installation.  
6

7 3.5 **CONSTRUCTION COMMISSIONING PROCEDURES**

- 8 A. The following procedures apply to all equipment to be commissioned.  
9
- 10 B. General. Construction checklists are important to ensure that the equipment and systems are hooked up and  
11 operational. It ensures that system performance testing (in-depth system checkout) may proceed without  
12 unnecessary delays. Each piece of equipment receives full checkout. No sampling strategies are used. All  
13 construction checklists for a given system must be successfully completed prior to formal system performance  
14 testing of equipment or subsystems of the given system.
- 15 C. Construction Checklists.
- 16 1. The primary purpose of the construction checklists is to provide the individual workers with the key criteria  
17 for a successful installation. The secondary purpose is to track the progress of the delivery and installation.
  - 18 2. The CxA will develop construction checklists for all commissioned equipment and distribute these to the  
19 responsible contractor. The GC and Subs will review the construction checklists for each equipment type  
20 and provide comments to the CxA. The CxA will then print and distribute the construction checklist for  
21 each individual component.
  - 22 3. The GC and Subs are responsible for all requirements in the specification, not only the requirements listed  
23 on the checklists.
  - 24 4. The checklists answer format will be to circle yes /no or provide a brief answer such as providing the  
25 model or serial numbers.
  - 26 5. These checklists are provided by the CxA to the GC. The GC determines which trade is responsible for  
27 executing and documenting each of the line item tasks and notes that trade on the form. Each form may  
28 have more than one trade responsible for its execution. A sample checklist for a VAV box is provided at  
29 the end of this specification section.
  - 30 6. The construction checklists shall be completed as delivery is completed and the installation progresses.
  - 31 7. Only individuals who have direct knowledge and witnessed that a line item task on the construction  
32 checklist was actually performed shall initial or check that item off. It is not acceptable for supervisors  
33 without direct knowledge or who have not witnessed the line item task on the construction checklist to fill  
34 out these forms.
  - 35 8. Any negative response shall immediately be brought to the attention of the CxA. All negative replies shall  
36 be explained in detail on the construction checklist.
  - 37 9. The GC and Subs are responsible for recording the completion of the checklists. Checklists shall be  
38 submitted electronically to SharePoint in .pdf format in separate files by Division. Each file shall be  
39 bookmarked by checklist tag.
  - 40 10. Non-itemized installations such as wiring, ductwork, piping etc. will not have checklists to be completed,  
41 but the GC and Subs will be provided the key criteria for successful installation.
  - 42 11. The CxA will verify the construction checklist completion by a sampling of the delivered and installed  
43 equipment. The sampling process will be described in the Cx Plan.
- 44 D. Sensor Calibration. Calibration of all sensors shall be included as part of the construction checklists performed  
45 by the Contractors. Calibration information is provided in specification Section 23 09 23 - Direct Digital Control  
46 System for HVAC
- 47 E. Deficiencies, Non-Conformance and Approval in Checklists and Startup.
- 48 1. The Subs shall clearly list any outstanding items of the construction checklist that were not completed  
49 successfully, at the bottom of the procedures form or on an attached sheet. The procedures form and any  
50 outstanding deficiencies are provided to the CxA within two days of task completion.
  - 51 2. The CxA reviews the report and submits either a non-compliance report or an approval form to the Sub or  
52 CM. The CxA shall work with the Subs and vendors to correct deficiencies or uncompleted items. The CxA  
53 will involve the CM and others as necessary. The installing Subs or vendors shall correct all areas that are  
54 deficient or incomplete in the checklists and tests in a timely manner, and shall notify the CxA as soon as  
55 outstanding items have been corrected and include a Statement of Correction on the original non-  
56 compliance report. When satisfactorily completed, the CxA recommends approval of the completion of  
57 the checklists to the CM using a standard form.
  - 58 3. Items left incomplete, which later cause deficiencies or delays during functional testing may result in back  
59 charges to the responsible party.

- 1 F. System Performance Tests (SPT). SPTs shall be performed to demonstrate that each system is operating  
2 according to the documented OPR and Contract Documents. System testing differs to the tests required in the  
3 Construction Checklist in that they facilitate bringing all the individual components together to verify that they  
4 operate collectively on a system level to provide the required design conditions.  
5 1. Development of Test Procedures. The CxA shall prepare the SPT forms and procedures in accordance with  
6 the criteria defined in the Cx Plan. The GC and Subs shall assist the CxA in the preparation of these  
7 procedures by answering queries and forwarding site-specific information. A sample System Performance  
8 Test form is provided at the end of this specification section.  
9 2. Participation: The GC and the Subs are responsible for testing all systems to be commissioned such that  
10 they function as described in the contract documents. The CxA will verify the performance of the systems.  
11 The CxA will direct, witness and document the SPT verification and GC and Subs will execute the  
12 verification tests.  
13 G. Problem Solving. The CxA will recommend solutions to problems found, however the burden of responsibility to  
14 solve, correct and retest problems is with the GC, Subs and A/E.  
15 H. Seasonal Testing. During the warranty period, seasonal testing (tests delayed until weather conditions are closer  
16 to the system's design) shall be completed as part of this contract. The CxA shall coordinate this activity. Tests  
17 will be executed, documented and deficiencies corrected by the appropriate Subs, with facilities staff and the  
18 CxA witnessing. Any final adjustments to the O&M manuals and record documents due to the testing will be  
19 made.  
20 I. Unforeseen Deferred Tests. If any check or test cannot be completed due to the building structure, required  
21 occupancy condition or other deficiency, execution of checklists and functional testing may be delayed upon  
22 approval of the PM. These tests will be conducted in the same manner as the seasonal tests.  
23

24 **3.6 SENSOR AND ACTUATOR CALIBRATION**

- 25 A. Calibrate all field-installed temperature, relative humidity, carbon monoxide, carbon dioxide, and pressure  
26 sensors and gages, and all actuators (dampers and valves) on this piece of equipment shall be calibrated. Sensors  
27 installed in the unit at the factory with calibration certification provided need not be field calibrated.  
28 B. Calibrate using the methods described below; alternate methods may be used, if approved by Owner  
29 beforehand. See PART 2 for test instrument requirements. Record methods used on the relevant Construction  
30 Checklist or other suitable forms, documenting initial, intermediate and final results.  
31 C. All Sensors:  
32 1. Verify that sensor location is appropriate and away from potential causes of erratic operation.  
33 2. Verify that sensors with shielded cable are grounded only at one end.  
34 3. For sensor pairs that are used to determine a temperature or pressure difference, for temperature make  
35 sure they are reading within 0.2 degree F (0.1 degree C) of each other, and for pressure, within tolerance  
36 equal to 2 percent of the reading, of each other.  
37 4. Tolerances for critical applications may be tighter.  
38 D. Sensors without Transmitters - Standard Application:  
39 1. Make a reading with a calibrated test instrument within 6 inches (150 mm) of the site sensor.  
40 2. Verify that the sensor reading, via the permanent thermostat, gage or building automation system, is  
41 within the tolerances in the table below of the instrument-measured value.  
42 3. If not, install offset, calibrate or replace sensor.  
43 E. Sensors with Transmitters - Standard Application.  
44 1. Disconnect sensor.  
45 2. Connect a signal generator in place of sensor.  
46 3. Connect ammeter in series between transmitter and building automation system control panel.  
47 4. Using manufacturer's resistance-temperature data, simulate minimum desired temperature.  
48 5. Adjust transmitter potentiometer zero until 4 mA is read by the ammeter.  
49 6. Repeat for the maximum temperature matching 20 mA to the potentiometer span or maximum and verify  
50 at the building automation system.  
51 7. Record all values and recalibrate controller as necessary to conform with specified control ramps, reset  
52 schedules, proportional relationship, reset relationship and P/I reaction.  
53 8. Reconnect sensor.  
54 9. Make a reading with a calibrated test instrument within 6 inches (150 mm) of the site sensor.  
55 10. Verify that the sensor reading, via the permanent thermostat, gage or building automation system, is  
56 within the tolerances in the table below of the instrument-measured value.  
57 11. If not, replace sensor and repeat.  
58 12. For pressure sensors, perform a similar process with a suitable signal generator.  
59 F. Sensor Tolerances for Standard Applications: Plus/minus the following maximums:

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1. Watthour, Voltage, Amperage: 1 percent of design.
  2. Pressure, Air, Water, Gas: 3 percent of design.
  3. Air Temperatures (Outside Air, Space Air, Duct Air): 0.4 degrees F (0.2 degree C).
  4. Relative Humidity: 4 percent of design.
  5. Barometric Pressure: 0.1 inch of Hg ( 340 Pa).
  6. Flow Rate, Air: 10 percent of design.
  7. Flow Rate, Water: 4 percent of design.
  8. Flow Rate, Steam: 3 percent of design.
  9. AHU Wet Bulb and Dew Point: 2.0 degrees F (1.1 degrees C).
  10. Hot Water Coil and Boiler Water Temperature: 1.5 degrees F (0.8 degrees C).
  11. Cooling Coil, Chilled and Condenser Water Temperatures: 0.4 degrees F (0.2 degree C).
  12. Combustion Flue Temperature: 5.0 degrees F (2.8 degrees C).
  13. Oxygen and CO2 Monitors: 0.1 percentage points.
  14. CO Monitor: 0.01 percentage points.
  15. Natural Gas and Oil Flow Rate: 1 percent of design.
- G. Critical Applications: For some applications more rigorous calibration techniques may be required for selected sensors. Describe any such methods used on an attached sheet.
- H. Valve/Damper Stroke Setup and Check:
1. For all valve/damper actuator positions checked, verify the actual position against the control system readout.
  2. Set pump/fan to normal operating mode.
  3. Command valve/damper closed; visually verify that valve/damper is closed and adjust output zero signal as required.
  4. Command valve/damper to open; verify position is full open and adjust output signal as required.
  5. Command valve/damper to a few intermediate positions.
  6. If actual valve/damper position does not reasonably correspond, replace actuator
- I. Isolation Valve or System Valve Leak Check: For valves not associated with coils.
1. With full pressure in the system, command valve closed.
  2. Use an ultra-sonic flow meter to detect flow or leakage.
- 3.7 **NON-CONFORMANCE**
- A. All deficiencies or non-conformance issues shall be noted and reported by the GC to the CM on a standard non-compliance form.
  - B. Corrections of minor deficiencies identified may be made during the tests at the discretion of the CxA. In such cases the deficiency and resolution will be documented on the procedure form.
  - C. Every effort will be made to expedite the testing process and minimize unnecessary delays, while not compromising the integrity of the procedures. However, the CxA will not be pressured into overlooking deficient work or loosening acceptance criteria to satisfy scheduling or cost issues, unless there is an overriding reason to do so at the request of the CM and the Owner.
  - D. As tests progress and a deficiency is identified, the CxA discusses the issue with the executing contractor.
    1. When there is no dispute on the deficiency and the Sub accepts responsibility to correct it:
      - a. The CxA documents the deficiency and the Sub's response and intentions and they go on to another test or sequence. After the day's work, the CxA submits the non-compliance reports to the CM for signature, if required. A copy is provided to the Sub and CxA. The Sub corrects the deficiency, signs the statement of correction at the bottom of the non-compliance form certifying that the equipment is ready to be retested and sends it back to the CxA.
      - b. The CxA reschedules the test and the test is repeated.
    2. If there is a dispute about a deficiency, regarding whether it is a deficiency or who is responsible:
      - a. The deficiency shall be documented on the non-compliance form with the Sub's response and a copy given to the CM and to the Sub representative assumed to be responsible.
      - b. Resolutions are made at the lowest management level possible. Other parties are brought into the discussions as needed. Final interpretive authority is with the A/E. Final acceptance authority is with the Project Manager.
      - c. The CxA documents the resolution process.
      - d. Once the interpretation and resolution have been decided, the appropriate party corrects the deficiency, signs the statement of correction on the non-compliance form and provides it to the CxA. The CxA reschedules the test and the test is repeated until satisfactory performance is achieved.
    3. Cost of Retesting.

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- a. The cost incurred by the Subs to retest a construction checklist item or functional test, if they are responsible for the deficiency, shall be theirs. If they are not responsible, any cost recovery for retesting costs shall be negotiated with the GC.
  - b. For a deficiency identified, not related to any construction checklist or start-up fault, the following shall apply: The CxA and CM will direct the retesting of the equipment once at no “charge” to the GC for their time. However, the CxA’s and CM’s time for a second retest will be charged to the GC, who may choose to recover costs from the responsible Sub.
  - c. The time for the CxA and CM to direct any retesting required because a specific construction checklist or start-up test item, reported to have been successfully completed, but determined during functional testing to be faulty, will be backcharged to the GC, who may choose to recover costs from the party responsible for executing the faulty installation or test.
  - d. The Contractor shall respond in writing to the CxA and CM at least as often as Cx meetings are being scheduled concerning the status of each apparent outstanding discrepancy identified during Cx. Discussion shall cover explanations of any disagreements and proposals for their resolution.
  - e. The CxA retains the original non-conformance forms until the end of the project.
  - f. Failure Due to Manufacturer Defect. If 10%, or three, whichever is greater, of identical pieces (size alone does not constitute a difference) of equipment fail to perform to the Contract Documents (mechanically or substantively) due to manufacturing defect, not allowing it to meet its submitted performance spec, all identical units may be considered unacceptable by the CM or PM. In such case, the Contractor shall provide the Owner with the following:
    - g. Within one week of notification from the CM or PM, the Contractor or manufacturer’s representative shall examine all other identical units making a record of the findings. The findings shall be provided to the CM or PM within two weeks of the original notice.
    - h. Within two weeks of the original notification, the Contractor or manufacturer shall provide a signed and dated, written explanation of the problem, cause of failures, etc. and all proposed solutions which shall include full equipment submittals. The proposed solutions shall not significantly exceed the specification requirements of the original installation. The CM or PM will determine whether a replacement of all identical units or a repair is acceptable.
    - i. Two examples of the proposed solution will be installed by the Contractor and the CM will be allowed to test the installations for up to one week, upon which the CM or PM will decide whether to accept the solution.
    - j. Upon acceptance, the Contractor and/or manufacturer shall replace or repair all identical items, at their expense and extend the warranty accordingly, if the original equipment warranty had begun. The replacement/repair work shall proceed with reasonable speed beginning within one week from when parts can be obtained.
  - E. Approval. The CxA notes each satisfactorily demonstrated function on the test form. Formal approval of the functional test is made later after review by the CxA and by the CM, if necessary. The CxA recommends acceptance of each test to the CM using a standard form. The CM gives final approval on each test using the same form, providing a signed copy to the CxA and the Contractor.

41 **3.8 SAMPLE DOCUMENTS**

- 42 A. The two documents after this section (Sample Construction Checklist and Sample System Performance Test) are  
43 included to demonstrate the level of effort and quality expected of the contractors. These documents will be  
44 revised as necessary as the project progresses.  
45

46 **END OF SECTION**



## Sample Variable Air Volume Box Construction Checklist

<b>TAG ID:</b>	<b>VAV 1-1</b>
----------------	----------------

**Instructions:**

1. Lead contractor to assure that subcontractors are aware of the checklists while installing the equipment and systems.
2. Subcontractors are to be given these checklists to complete.
  - a. Check Yes or No for each checklist item.
  - b. Explain all discrepancies or negative responses.
  - c. Sign and date the completed checklists.

Checklist items are to be completed as part of startup & initial checkout, prior to performing functional testing.

- The checklist items have been checked off only by parties having direct knowledge of the event, as marked below, respective to each responsible contractor.
- This checklist does not take the place of the manufacturer’s recommended checkout and startup procedures or report.
- Contractors who are assigned responsibility for sections of the checklist shall be responsible to see that checklist items by their subcontractors are completed and checked off.

<b>DELIVERY CHECK</b>			
<i>Performed by: Mechanical Contractor</i>			
<i>Fill in the “DELIVERED” product information. Provide information on any discrepancies in “Comments” section.</i>			
	SUBMITTAL	DELIVERED	COMMENTS
Manufacturer			
Model #			
Min. / Max. Airflow (CFM)	/	/	
Total static pressure (in. W.C.) (including reheat coil)			
Inlet size (inches)			
Re-heat Coil Rating (MBH/GPM)	/	/	
Re-heat Coil # rows			
<b>DELIVERY CHECK</b>			
<b>Performed by: Mechanical Contractor</b>			Date
Print Name:			
Signature:			

**PHYSICAL CHECK**

*Performed by: Mechanical Contractor*  
 Check the following items prior to installing the unit. Check YES or NO for each item. Each NO response **MUST** be explained in the "Comments" section below.

Check "YES" if Acceptable; Provide comment if unacceptable	YES	NO	Comments
All unit and location identifiers are correct	<input type="checkbox"/>	<input type="checkbox"/>	
Unit nameplate clearly visible and easy to read	<input type="checkbox"/>	<input type="checkbox"/>	
No physical damage to the unit	<input type="checkbox"/>	<input type="checkbox"/>	
No signs of water damage	<input type="checkbox"/>	<input type="checkbox"/>	
Duct openings are tightly sealed and not breached	<input type="checkbox"/>	<input type="checkbox"/>	
Pipe connections are sealed and not breached	<input type="checkbox"/>	<input type="checkbox"/>	
Airflow station is secure and ends of sampling tubes are properly covered	<input type="checkbox"/>	<input type="checkbox"/>	
Re-heat coil is secure and fins are not damaged	<input type="checkbox"/>	<input type="checkbox"/>	
Electrical control panel labeling is clear and appropriate for rated voltage	<input type="checkbox"/>	<input type="checkbox"/>	
The DDC control enclosure is secure and accessible	<input type="checkbox"/>	<input type="checkbox"/>	
Installation and startup instructions included with unit	<input type="checkbox"/>	<input type="checkbox"/>	

<b>PHYSICAL CHECK</b> <b>Performed by: Mechanical Contractor</b>	Date
Print Name:	
Signature:	

**INSTALLATION CHECK**

*Performed by: Mechanical Contractor*  
 Check the following items after mounting the unit in place and **before** pipe and electrical connections are made. Check YES or NO for each item. Each NO response **MUST** be explained in the "Comments" section below.

Check "YES" if Acceptable; Provide comment if unacceptable	YES	NO	Comments
Unit identifier is correct and clearly visible from below	<input type="checkbox"/>	<input type="checkbox"/>	
Unit nameplate is clearly visible and easy to read	<input type="checkbox"/>	<input type="checkbox"/>	
Unit is properly mounted and supported according to the specifications and Detail X	<input type="checkbox"/>	<input type="checkbox"/>	
Service and maintenance clearances are according to the specifications and Detail X	<input type="checkbox"/>	<input type="checkbox"/>	
Covering over duct and pipe openings are secure and not breached	<input type="checkbox"/>	<input type="checkbox"/>	

<b>INSTALLATION CHECK</b> <b>Performed by: Mechanical Contractor</b>	Date
Print Name:	
Signature:	

<b>HOT WATER PIPING CHECK</b>			
<i>Performed by: Mechanical Piping Contractor</i>			
<i>Check the following items after piping has been connected to the unit but before TAB tests are performed. Check YES or NO for each item. Each NO response <b>MUST</b> be explained in the "Comments" section below.</i>			
Check "YES" if Acceptable; Provide comment if unacceptable	YES	NO	Comments
Hot water return piped to top and hot water supply piped to bottom of coil	<input type="checkbox"/>	<input type="checkbox"/>	
Piping installation allows for easy reheat coil removal.	<input type="checkbox"/>	<input type="checkbox"/>	
Control valve, balancing valve, isolating valve, strainers and all other piping components are installed per Detail X	<input type="checkbox"/>	<input type="checkbox"/>	
Piping does not obstruct access and maintenance clearances	<input type="checkbox"/>	<input type="checkbox"/>	
Manual air vent provided at top of coil per Detail X	<input type="checkbox"/>	<input type="checkbox"/>	
Valves are tagged	<input type="checkbox"/>	<input type="checkbox"/>	
Piping is insulated per contract documents	<input type="checkbox"/>	<input type="checkbox"/>	
<b>HOT WATER PIPING CHECK</b>			Date
<b>Performed by: Mechanical Contractor</b>			
Print Name:			
Signature:			

<b>DUCTWORK CHECK</b>			
<i>Performed by: Mechanical Contractor</i>			
<i>Check the following items after ducts have been connected to the unit but before TAB tests are performed. Check YES or NO for each item. Each NO response <b>MUST</b> be explained in the "Comments" section below.</i>			
Check "YES" if Acceptable; Provide comment if unacceptable	YES	NO	Comments
Straight duct length at inlet to VAV box minimum 1.5-duct diameters	<input type="checkbox"/>	<input type="checkbox"/>	
Minimum of 48" straight duct is provided from the discharge of the unit prior to any take-offs or transitions	<input type="checkbox"/>	<input type="checkbox"/>	
Duct does not obstruct access and maintenance clearances	<input type="checkbox"/>	<input type="checkbox"/>	
Access panel to reheat coil is provided per submittals	<input type="checkbox"/>	<input type="checkbox"/>	
<b>DUCTWORK CHECK</b>			Date
<b>Performed by: Mechanical Contractor</b>			
Print Name:			
Signature:			

<b>ELECTRICAL CHECK</b>			
<i>Performed by: Electrical Contractor</i>			
<i>Check the following items after ducts and piping have been connected and electrical wiring is completed. Check YES or NO for each item. Each NO response <b>MUST</b> be explained in the "Comments" section below.</i>			
Check "YES" if Acceptable; Provide comment if unacceptable	YES	NO	Comments

Electrical and control wiring is properly installed	<input type="checkbox"/>	<input type="checkbox"/>	
All wire sizes are correct per the Specifications	<input type="checkbox"/>	<input type="checkbox"/>	
All electrical connections are properly grounded	<input type="checkbox"/>	<input type="checkbox"/>	
Control transformer is properly installed and wired	<input type="checkbox"/>	<input type="checkbox"/>	

<b>ELECTRICAL CHECK</b>		Date
<b>Performed by:</b> Electrical Contractor		
Print Name:		
Signature:		

<b>CONTROLS CHECK</b>			
<i>Performed by: Controls Contractor</i>			
<i>Check the following items after ducts and piping have been connected and control and electrical wiring is completed. Check YES or NO for each item. Each NO response <b>MUST</b> be explained in the "Comments" section.</i>			

Check "YES" if Acceptable; Provide comment if unacceptable	YES	NO	Comments
VAV box points are successfully linked to Building Automation System (BAS)	<input type="checkbox"/>	<input type="checkbox"/>	
Graphical display representative of system configuration	<input type="checkbox"/>	<input type="checkbox"/>	
Space temperature sensor calibrated and interfaced with the BAS	<input type="checkbox"/>	<input type="checkbox"/>	
Airflow sensor calibrated and interfaced with the BAS	<input type="checkbox"/>	<input type="checkbox"/>	
Confirm at both operator workstation and physically at unit that heating control valve operates through its full range of motion – fully open to fully closed	<input type="checkbox"/>	<input type="checkbox"/>	
Confirm at both operator workstation and physically at unit that air valve operates through its full range of motion – fully open to fully closed	<input type="checkbox"/>	<input type="checkbox"/>	

<b>CONTROLS CHECK</b>		Date
<b>Performed by:</b> Controls Contractor		
Print Name:		
Signature:		

**MECHANICAL STARTUP CHECK**

**Performed by:** Controls Contractor

Check the following items before TAB tests are performed. Check YES or NO for each item. Each NO response **MUST** be explained in the "Comments" section below.

Check "YES" if Acceptable; Provide comment if unacceptable	YES	NO	Comments
Coils are clean and undamaged	<input type="checkbox"/>	<input type="checkbox"/>	
VAV box airflow (CFM) as per submittal	<input type="checkbox"/>	<input type="checkbox"/>	
Heating coil water flow (GPM) as per submittal	<input type="checkbox"/>	<input type="checkbox"/>	
Heating coil entering and leaving water temperatures (°F) as per submittal	<input type="checkbox"/>	<input type="checkbox"/>	
Heating coil entering and leaving air temperatures (°F) as per submittal	<input type="checkbox"/>	<input type="checkbox"/>	
Heating coil air and water pressure drops as per submittal	<input type="checkbox"/>	<input type="checkbox"/>	

<b>MECHANICAL STARTUP CHECK</b>		Date
<b>Performed by:</b> Controls Contractor		
Print Name:		
Signature:		

**Approvals:** This completed checklist has been reviewed. Its completion is approved with the exceptions noted below.

Commissioning Authority	Date	Owner's Representative	Date

<b>Notes:</b>

## SAMPLE SYSTEM PERFORMANCE TEST

COM MMB

### Air Distribution Served by AHU-1

DATE \_\_\_\_\_

#### COMMISSIONING PARTICIPANTS:

	<u>Test Duty</u>	<u>Name</u>	<u>Company</u>
Commissioning Authority	Direct	_____	SEG
Control Contractor	Perform	_____	X
Mechanical Contractor	Standby	_____	X
Plumbing Contractor	Standby	_____	X
Electrical Contractor	Standby	_____	X
TAB Contractor	Standby	_____	X

**Direct** means that the Commissioning Authority will witness the tests and show the controls contractor which tests to execute.

**Perform** means that the contractor will be the one actually executing the test under the CxA directions

**Standby** means that the contractor is available to assist with operating equipment during the test if required.

The following system performance tests relate to air distribution system served by air handling units at Standing Rock High School. The equipment to be tested includes the air handling units, exhaust fans, the building fire alarm system, and all related dampers, valves, and assemblies.

The contractors need to complete these tests on all equipment prior to verification by the CxA to ensure that the systems are functioning as required, and to ensure that the contractor is able to demonstrate the functionality of the systems as described in this document under the direction of the CxA without excessive time spent on determining how to perform the test procedures. The CxA will verify the performance on selected system(s) and modes. If the systems are not able to perform as required, retest will be required on the contractors' expense. **Verification of performance should not be considered a "troubleshooting" session, only a few minor corrections (implementation less than 15 mins each occurrence, 1 hr accumulated) will be allowed during testing.**

#### 1. SYSTEM PERFORMANCE TEST RESULTS:

After performing all the system performance tests included in this document the test results are rated as:

- Successful, No Comments
- Successful, Comments as Noted
- Deferred Seasonal Test Recommended
- Complete Retest Recommended
- Retest Recommended only on Noted Sections

Notes:

## 2. COMPLETED CONSTRUCTION CHECKLISTS

Confirm that the following construction checklists have been submitted and reviewed and that the equipment has been approved for system performance testing by checking the appropriate box.

<b>Equipment</b>	<b>Tag ID</b>	<b>Delivery Check</b>	<b>Physical Check</b>	<b>Installation Check</b>	<b>Ductwork Check</b>	<b>Piping &amp; Valve Check</b>	<b>Gas Piping Check</b>	<b>Electrical Check</b>	<b>Mech. Start-up Check</b>	<b>Controls Check</b>
Air Handling Unit	AHU-1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
VAV Boxes	VAV 1-X	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Exhaust Fan	EF-X	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Notes:

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**5. CURRENT CONDITIONS**

Record the following set-point and scheduling information as provided by the BAS for the air handling unit. All of these values will be returned to their pre-test value unless noted otherwise.

ITEM	PRE-TEST VALUE	END TEST VALUE	NOTES
Space temperature setpoint (heating, occupied)			
Space temperature setpoint (cooling, occupied)			
Space temperature setpoint (heating, unoccupied)			
Space temperature setpoint (cooling unoccupied)			
Minimum outside air damper setpoint. Ensure this value was obtained by the TAB Contractor			
Economizer enable setpoint			
CO level alarm setpoint			

**Schedule:**

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Occupied							
Unoccupied							

**Holidays:** \_\_\_\_\_

**Notes:**  
 \_\_\_\_\_  
 \_\_\_\_\_

## 6. DEVICE CALIBRATION CHECK

Check calibration of devices such as valves, dampers, actuators, etc. Verify that the reading at the BAS matches actual physical condition.

Device or Actuator & Location	Procedure / State	BAS Value	Control Reading	Site Observation	Pass Y/N
Outside air damper	Command damper to fully open position and observe	100%			
	Command damper to fully closed position and observe	0%			
Return air damper	Command damper to fully open position and observe	100%			
	Command damper to fully closed position and observe	0%			
Relief air damper (RH-1)	Command damper to fully open position and observe	100%			
	Command damper to fully closed position and observe	0%			
Heating Coil Control Valve	Command valve to fully open position and observe	100%			
	Command valve to fully closed position and observe	0%			
Supply air temperature sensor	Compare measured value to reading				
Return air temperature sensor	Compare measured value to reading				
Mixed air temperature sensor	Compare measured value to reading				
Zone CO Sensor Serving AHU-1	Compare measured value to reading				
Zone temperature sensor serving AHU-1	Compare measured value to reading				

## 7. BAS DATA TRENDING

Prior to starting the system performance tests begin the collection of data as shown below using trend logs on the BAS. The purpose of collecting this data is to record the results of the tests and to verify the BAS performance, i.e. speed of response to step changes, no oscillations, etc. To do this we need a short sampling interval on all points that can change rapidly. A longer interval is acceptable for points that will not change quickly. For simplicity it may be easier to select the same sampling interval for all points (i.e. 1 min.).

**Controls contractor must set up these trends before test and provide the data electronically no later than 1 week after test.** The trends should be set up for the following points:

Start Date: \_\_\_\_\_

Start Time: \_\_\_\_\_

BAS TRENDING			
POINT ID	DESCRIPTION	MINIMUM SAMPLING INTERVAL	Y/N
	Outside air temperature	10 min	
	Supply Fan Status	COV	
	Relief air damper position	1 min	
	Heating coil control valve position	1 min	
	HW Circulating Pump Status	COV	
	Return air damper position	1 min	
	Outside air damper position	1 min	
	Filter status	30 min	
	Supply air temperature	1 min	
	Return air temperature	1 min	
	Mixed air temperature	1 min	
	Zone temperature	1 min	
	Zone CO level	1 min	
	Exhaust fan status (EF-1, 2, 29, & 34)	COV	

Notes:

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## 8. GENERAL CONDITIONS OF TEST

The testing of the air distribution system served by the air handling unit shall verify that the system operates as per the control sequences detailed in Specification Section 23 0993. The tests shall demonstrate that the following functions are working correctly:

- Emergency conditions (smoke alarm, power failure)
- Failure and alarm conditions (freezestat control alarm, CO concentration alarm)
- Off / On modes
- Unoccupied mode
- Occupied mode (heating)
- Economizer mode
- Optimum start with morning warm-up or cool-down mode
- Room conditions

Make sure that the fire department is notified and/or that the no false alarms will be sent to the fire department when doing any of the failure and alarm tests.

## 9. ALARM AND FAILURE TESTING PROCEDURES AND RECORD

<b>9a. SMOKE ALARM</b>					
Make sure that the fire department is notified and/or that the no false alarms will be sent to the fire department when performing the smoke alarm test.					
STEP	ACTION	VERIFICATION	SUCCESS		COMMENT
			Yes	No	
1.	Verify that the AHU is on. Then initiate a smoke alarm	AHU supply fan turns off			
		EF-34 turns off (interlocked with AHU-1)			
		Alarm is present at BAS			
		Outside air damper closes			
		Relief air damper closes (RH-1)			
		Return air damper opens			
		Heating control valve is open			
	Reset alarm	Systems return to normal operation			
2.	Clear alarm at BAS	Verify alarm clears at fire alarm panel and BAS			

9b. POWER FAILURE					
STEP	ACTION	VERIFICATION	SUCCESS		COMMENT
			Yes	No	
1.	Cut power to AHU and control panel	AHU outside air damper closes			
		AHU return air damper opens			
		AHU relief air damper closes (RH-1)			
		Supply fan is off			
		EF-34 is off (interlocked with AHU-1)			
		Heating coil control valve opens			
2.	Return power to AHU and control panel	AHU starts up and returns to correct mode.			

9c. ZONE CO CONCENTRATION ALARM					
STEP	ACTION	VERIFICATION	SUCCESS		COMMENT
			Yes	No	
1.	Record current zone CO level	The CO level recorded by the BAS matches the measured CO level in the zone			
2.	Use the BAS to change the CO setpoint to 2 ppm less than the current reading <b>OR</b> Use the BAS to change the CO level to 11 ppm	Alarm is present at BAS			
		EF-2 damper opens			
		EF-2 energizes and runs for a minimum of 5 minutes or until the CO level is 5 ppm or less			
		Zone temperatures remain unchanged			
3.	Reset the CO setpoint to specified value.	Alarm clears at BAS			

<b>9d. FREEZE CONTROL ALARM</b>					
STEP	ACTION	VERIFICATION	SUCCESS		COMMENT
			Yes	No	
1.	Put the AHU into occupied mode. Trip the freezestat physically at the unit  OR  Use ice to freeze a 1 foot section of the low-temperature limit sensor located downstream of the heating coil	AHU supply fan turns off			
		EF-34 turns off (interlocked with AHU-1)			
		AHU outside air damper closes			
		AHU return air damper opens			
		AHU relief air damper closes (RH-1)			
		AHU heating valve opens			
		HW coil pump is energized			
		Alarm is present at BAS			
2.	If necessary, reset low limit discharge air temperature setpoint to specified value.  Manually reset freezestat	Alarm clears at BAS			
		System starts up and returns to correct mode			Manual reset device

<b>9e. FILTER ALARM</b>					
STEP	ACTION	VERIFICATION	SUCCESS		COMMENT
			Yes	No	
1.	Initiate a dirty filter alarm by changing the setpoints or manually tripping the differential pressure sensor.	Dirty filter alarm message is generated by BAS			
2.	Return settings to original values.	Alarm clears and system returns to normal operation.			

**10. SYSTEM TESTING PROCEDURES AND RECORD**

10a. SYSTEM OFF / ON MODES					
STEP	ACTION	VERIFICATION	SUCCESS		COMMENT
			Yes	No	
1.	Verify that AHU is in occupied mode. Use the BAS to send an OFF command to AHU	Supply fan is off			
		Outside air damper is closed			
		Return air damper is open			
		Relief air damper is closed (RH-1)			
		Heating coil control valve is open			
		EF-34 is off (interlocked with AHU-1)			
2.	Use the BAS to send an ON command to AHU	Supply fan is on			
		Outside air damper opens to its minimum position if unit is not in economizer mode.			
		Return air damper closes proportionally as the outside air damper opens			
		Relief air damper opens proportionally as the outside air damper opens			
		EF-34 is on (interlocked with AHU-1)			
		Unit maintains discharge air temperature setpoint			

10b. UNOCCUPIED MODE					
STEP	ACTION	VERIFICATION	SUCCESS		COMMENT
			Yes	No	
1.	Use the BAS to put the unit into Unoccupied Mode	Outside air and relief air dampers remain closed			
		AHU supply fan is off (unless space temperatures are outside the unoccupied temperature setpoint)			
		EF-34 is off during AHU-1 unoccupied mode			
		If the outside air temperature is below the low temperature protection setpoint (20°F) the coil pump is energized. Otherwise the coil pump is off.			
2.	Use the BAS to change the unoccupied heating space temperature setpoint 3-5 °F higher than the lowest space sensor reading.	Outside air and relief air dampers remain closed if unit is not in economizer mode			
		AHU supply fan energizes when the lowest space temperature drops below the unoccupied heating space temperature setpoint			
		EF-34 remains off			
		AHU control valve modulates as necessary to maintain the unoccupied supply air temperature setpoint (95°F).			
		AHU supply fan turns off when the space temperature is above the unoccupied setpoint plus differential. Differential = _____			
3.	Reset the unoccupied setback temperature to initial value and if necessary, put system back into occupied mode	System returns to normal operation			



**10c. OCCUPIED MODE - HEATING**

This test procedure is written for ambient conditions being such that heating mode can be achieved. This test may need to be completed at a later date when the ambient conditions are fit for the heating mode.

This test requires that the outside air temperature is about 40°F or lower to make sure the economizer cycle is disabled.

STEP	ACTION	VERIFICATION	SUCCESS		COMMENT
			Yes	No	
1.	Verify that the system is in occupied mode. Set room setpoint temp associated with this AHU to 3-5°F above current space temperature.	AHU supply fan is on			
		EF-34 is on (interlocked with AHU-1)			
		Return air damper modulates			
		AHU outside air damper opens to minimum position.			
		Relief air damper opens to minimum position (RH-1)			
		AHU supply air temperature reaches setpoint			
		Coil pump is off in occupied mode regardless of OA temperature			
2.	Reset room temperatures back to original values	System returns to normal operation			

**10d. OCCUPIED MODE - ECONOMIZER**

This test procedure is written for ambient conditions being such that economizer mode can be achieved which require the Outside Air Temp 40-75F. This test may need to be completed at a later date when the ambient conditions are fit for the economizer mode.

STEP	ACTION	VERIFICATION	SUCCESS		COMMENT
			Yes	No	
1.	Verify that there is a call for cooling and the OA temperature is less than the return air temperature	Return air temperature is greater than outside air temperature			
		AHU fan is on			
		EF-34 is on (interlocked with AHU-1)			
		AHU outside air damper modulates			
		Relief air damper modulates (RH-1)			
		Return air damper modulates			
		Zone temperature setpoint is maintained without mechanical cooling.			
		Unit heaters located in the same area are off when this AHU is in economizer mode.			

**10e. COOLING / HEATING OPTIMUM START WITH WARM-UP & COOL-DOWN MODES**

This test may need to be completed at a later date when the air handling unit has been in operation long enough to have sufficient startup trend data available for both the warm-up and cool-down modes.

STEP	ACTION	VERIFICATION	SUCCESS		COMMENT
			Yes	No	
1.	Access AHU startup trends and outside air damper position trends	Trends show the AHU achieves occupied zone temperature setpoint within $\pm 1^{\circ}\text{F}$ no more than 30 minutes prior to scheduled start of occupied period.			
		Trends show that outside air damper remains closed during warm-up and cool-down modes.			

**10f. VERIFICATION OF ROOM CONDITIONS**

This test procedure should be done at different ambient conditions when the system is in different modes, i.e. heating (winter), economizer (spring/fall), cooling (summer) Up to three sample spaces will be evaluated:

Space 1: \_\_\_\_\_ Space 2: \_\_\_\_\_ Space 3: \_\_\_\_\_

STEP	ACTION	VERIFICATION	SUCCESS		COMMENT
			Yes	No	
1.	Current condition	The room temperature at the thermostat is within $\pm 1.0$ °F of the setpoint temperature in less than 0.5 hr without oscillations or offsets outside 1.0°F of the setpoint.			
		So as to avoid “too hot” or “too cold” spots the temperature distribution within the occupied zone does not exceed -3 and +2 °F from the setpoint temperature			
2.	Set the room temperature setpoint to 5 °F higher than the initial setpoint temperature.	The room temperature at the thermostat is within $\pm 1.0$ °F of the setpoint temperature in less than 0.5 hr without oscillations or offsets outside 1.0°F of the setpoint.			
		So as to avoid “too hot” or “too cold” spots the temperature distribution within the occupied zone does not exceed -3 and +2 °F from the setpoint temperature			
3.	Set the room temperature back to the initial setpoint temperature	There is no noticeable drafts in the occupied zone while the system is cooling to reach the setpoint temperature			
		The noise level in the room is within the requirement for that particular space during cooling.			
		The room temperature at the thermostat is within $\pm 1.0$ °F of the setpoint temperature in less than 0.5 hr without oscillations or offsets outside 1.0°F of the setpoint.			
		So as to avoid “too hot” or “too cold” spots the temperature distribution within the occupied zone does not exceed -3 and +2 °F from the setpoint temperature			

Return all changed control parameters and conditions to their pre-test values

Record permanently changed parameter values and submit changes to Owner.

**- END OF TESTING -**

1		SECTION 01 95 00	
2		MEASUREMENT & VERIFICATION	
3	PART 1 - GENERAL		1
4	1.1	SUMMARY	1
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13	3.1	Meter	2
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**PART 1 - GENERAL**

**1.1 SUMMARY**

A. Purpose: This section includes general requirements that apply to implementation of measurement and verification.

B. RELATED WORK AND REQUIREMENTS

1. 01 31 13 Project Coordination
2. 01 31 19 Project Meetings
3. 01 31 23 Project Management Web Site
4. 01 91 00 Commissioning
5. 23 09 00 Instrumentation and Control for HVAC
6. 23 09 23 Direct Digital Control (DDC) System for HVAC
7. 23 09 93.11 Sequence of Operations for HVAC DDC
8. 26 24 13 Switchboards
9. 26 24 16 Panelboards

**1.2 DEFINITIONS**

- A. BAS - Building Automation System
- B. DHW - Domestic Hot Water
- C. M&V - Measurement and Verification
- D. kW - Electric power read from utility meter
- E. KWh - Electric energy consumption read from utility meter
- F. Plug Loads – Electric power and consumption from wall receptacles

**1.3 MECHANICAL CONTRACTOR RESPONSIBILITIES**

- A. Contractor shall assign representatives with expertise and authority to act on its behalf and shall schedule them to participate in and perform M&V activities including, but not limited to, the following:
1. Follow activities identified in the M&V Plan.
  2. Coordinate connection of gas and DHW monitoring equipment with BAS.
  3. Cooperate with the M&V Provider and Controls Contractor for resolution of issues related to data collection.
  4. Attend team meetings during construction and post-construction M&V period (1 year).

**1.4 ELECTRICAL CONTRACTOR RESPONSIBILITIES**

- A. Contractor shall assign representatives with expertise and authority to act on its behalf and shall schedule them to participate in and perform M&V activities including, but not limited to, the following:
1. Follow activities identified in the M&V Plan.
  2. Coordinate connection of electrical monitoring equipment with BAS
  3. Cooperate with the M&V Provider and Controls Contractor for resolution of issues related to data collection.

- 1                   4. Attend team meetings during construction and post-construction M&V period (1 year).  
2

3 **1.5 CONTROLS CONTRACTOR RESPONSIBILITIES**

- 4       A. Contractor shall assign representatives with expertise and authority to act on its behalf and shall schedule them  
5       to participate in and perform M&V activities including, but not limited to, the following:  
6           1. Follow activities identified in the M&V Plan.  
7           2. Coordinate connection of electrical, gas, and DHW monitoring equipment with BAS  
8           3. Cooperate with the M&V Provider Mechanical Contractor and Electrical Contractor for resolution of  
9       issues related to establishing connection between BAS and monitoring meters and equipment.  
10          4. Attend team meetings during construction and post-construction M&V period (1 year).  
11

12 **1.6 M&V PROVIDERS RESPONSIBILITIES**

- 13       A. Providers responsibilities include:  
14           1. Organize and lead the M&V team.  
15           2. Provide M&V plan.  
16           3. Convene M&V meetings as needed.  
17           4. Cooperate with the Mechanical Contractor, Electrical Contractor, and Controls Contractor for resolution  
18       of issues related to establishing connection between BAS and monitoring meters and equipment.  
19           5. Provide an M&V report at 1 year post construction.  
20

21 **PART 2 - PRODUCTS**

22 **2.1 Meters and Sub-Meters**

- 23       A. Monitoring meters and sub-meters, both gas and electric, to have the ability to connect to the BAS and provide  
24       data to BAS at a minimum of 15 minute intervals. It is acceptable to use the utility for this purpose if allowable  
25       by utility company.  
26

27 **PART 3 - EXECUTION**

28 **3.1 Meter**

- 29       A. Provide real-time monitoring of the whole building electricity kW and kWh use by using a signal from the  
30       building utility meter serving the HVAC, lighting, and plug loads and provide the data input to the Building  
31       Automation System (BAS). The BAS must be capable of trending this kW and kWh data. Data is to be collected  
32       in 15 minute intervals. Storage of at least 3 months of 15 minute data is required on the BAS. Data older than 3  
33       months is to be automatically saved and archived on the BAS computer without being overwritten. Data older  
34       than 5 years can be overwritten. It is the responsibility of the electrical contractor to coordinate this work.  
35

36 **3.2 Sub-Meters**

- 37       A. Provide real-time monitoring of the building electricity kW and kWh use by using a signal from the building  
38       panel sub-meters at each floor and provide the data input to the BAS. The BAS must be capable of trending this  
39       kW and kWh data. Data is to be collected in 15 minute intervals. Storage of at least 3 months of 15 minute data  
40       is required on the BAS. Data older than 3 months is to be automatically saved and archived on the BAS  
41       computer without being overwritten. Data older than 5 years can be overwritten. It is the responsibility of the  
42       electrical contractor to coordinate this work.  
43

44 **3.3 Natural Gas**

- 45       A. Provide real-time monitoring of whole building natural gas consumption by using a signal from the building  
46       utility meter to provide the data input to the BAS. The BAS must be capable of trending gas consumption. Data  
47       is to be collected in 15 minute intervals. Storage of at least 3 months of 15 minute data is required on the BAS.  
48       Data older than 3 months is to be automatically saved and archived on the BAS computer without being  
49       overwritten. Data older than 5 years can be overwritten. It is the responsibility of the mechanical contractor to  
50       coordinate this work.  
51

52 **3.4 Domestic Hot Water**

- 53       A. Provide real-time monitoring of the domestic hot water (DHW) system by measuring water flow to DHW heater  
54       and DHW supply and return temperatures and providing data input to the BAS. The BAS must be capable of  
55       trending gas consumption. Data is to be collected in 15 minute intervals. Storage of at least 3 months of 15  
56       minute data is required on the BAS. Data older than 3 months is to be automatically saved and archived on the  
57       BAS computer without being overwritten. Data older than 5 years can be overwritten. It is the responsibility of  
58       the mechanical contractor to coordinate this work.  
59

- 1 **3.5 Temporary Monitoring**  
2 A. Provide easy access to allow for the temporary installation of split-core current sensors and voltage sensors for  
3 the electrical measurement and datalogging on the following systems:  
4 1. Lighting  
5 2. Plug loads  
6 3. HVAC equipment including chillers, fans, circulation pumps, and air handling units  
7 4. DHW equipment  
8

- 9 **3.6 DDC Trends**  
10 A. The Controls Contractor is to provide provision for remote access to BAS to view status of building and the  
11 ability to download trendable points.  
12  
13

**End of Section**

SECTION 02 41 19  
SELECTIVE DEMOLITION

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22 **PART 1 - GENERAL**

23 **1.1 SUMMARY**

- 24 A. Section Includes:
- 25 1. Demolition and removal of selected portions of building or structure.
  - 26 2. Demolition and removal of selected site elements.
  - 27 3. Salvage of existing items to be reused or recycled.
- 28 B. Related Work:
- 29 1. Owner will remove "Annex" structure. Refer to Section 02 41 50 – Historic Selective Demolition
  - 30 /Deconstruction for removal and patching of exposed wall surfaces.

31 **1.2 MATERIALS OWNERSHIP**

- 32 A. Unless otherwise indicated, demolition waste becomes property of Contractor.
- 33 B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their
- 34 contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be
- 35 uncovered during demolition remain the property of Owner.
- 36 1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

37 **1.3 PREINSTALLATION MEETINGS**

- 38 A. Pre-demolition Conference: Conduct conference at Project site.

39 **1.4 INFORMATIONAL SUBMITTALS**

- 40 A. Engineering Survey: Submit engineering survey of condition of building.
- 41 B. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed
- 42 for protecting individuals and property, for environmental protection, for dust control and for noise control.
- 43 Indicate proposed locations and construction of barriers.
- 44 C. Protection of indicated and identified historic materials. Submit proposed protection measures and
- 45 procedures to protect historic materials during construction.
- 46 D. Schedule of selective demolition activities with starting and ending dates for each activity.
- 47 E. Statement of Refrigerant Recovery:

48 **1.5 CLOSEOUT SUBMITTALS**

- 49 A. Inventory of items that have been removed and salvaged.

50 **1.6 QUALITY ASSURANCE**

- 51 A. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.
- 52

- 1 **1.7 FIELD CONDITIONS**
- 2 A. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- 3 1. Before selective demolition, Owner will remove the following items:
- 4 a. All loose interior furnishings and office equipment, art work, maintenance equipment, tools
- 5 and parts.
- 6 b. Fire extinguishers, AED, air compressors and glass display cases.
- 7 B. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective
- 8 demolition.
- 9 C. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
- 10 1. Hazardous materials will be removed by Owner.
- 11 2. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and
- 12 Owner. Hazardous materials will be removed by Owner under a separate contract.
- 13 D. Storage or sale of removed items or materials on-site is not permitted.
- 14 E. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage
- 15 during selective demolition operations.
- 16 F. Arrange selective demolition schedule so as not to interfere with Owner's operations.
- 17 **1.8 WARRANTY**
- 18 A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during
- 19 selective demolition, by methods and with materials and using approved contractors so as not to void existing
- 20 warranties.

21 **PART 2 - PRODUCTS**

22 **2.1 PERFORMANCE REQUIREMENTS**

- 23 A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective
- 24 demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- 25 B. Standards: Comply with ASSE A10.6 and NFPA 241.
- 26 C. Sustainable Design Requirements for Building Reuse:
- 27 1. Maintain existing building structure (including structural floor and roof decking) and envelope (exterior
- 28 skin and framing, excluding window assemblies and nonstructural roofing material) not indicated to
- 29 be demolished; do not demolish such existing construction beyond indicated limits.
- 30 2. Maintain existing interior nonstructural elements (interior walls, doors, floor coverings, and ceiling
- 31 systems) not indicated to be demolished; do not demolish such existing construction beyond
- 32 indicated limits.
- 33 3. Maintain existing nonshell, nonstructural components (walls, flooring, and ceilings) not indicated to
- 34 be demolished; do not demolish such existing construction beyond indicated limits.

35 **2.2 SELECTIVE DEMOLITION**

- 36 A. Scope of selective demolition, salvage and building elements to remain protected are indicated by demolition
- 37 tags with definitions on the Material Tag List. Refer to Demolition Drawings.
- 38 B. Refer to Material Tag Index for list of Drawing Tags for selective demolition.

39 **2.3 ROOF DECK**

- 40 A. Roof Deck Boards: Salvage roof deck boards from lower roof demolition (roof of second floor) for re-use at
- 41 deck repair and infill at upper roof.
- 42 1. Clean and stack for re-use.

43 **PART 3 - EXECUTION**

44 **3.1 EXAMINATION**

- 45 A. Verify that utilities have been disconnected and capped before starting selective demolition operations.
- 46 B. Perform an engineering survey of condition of building to determine whether removing any element might
- 47 result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during
- 48 selective building demolition operations.
- 49 C. Inventory and record the condition of items to be removed and salvaged.



- 1 **3.2 PREPARATION**  
2 A. Refrigerant: Before starting demolition, remove refrigerant from mechanical equipment according to  
3 40 CFR 82 and regulations of authorities having jurisdiction.
- 4 **3.3 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS**  
5 A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them  
6 against damage.  
7 1. City will maintain the wireless access points and service in the existing building.  
8 B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal  
9 or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.  
10 1. Owner will arrange to shut off indicated services/systems when requested by Contractor.  
11 2. Arrange to shut off utilities with utility companies.  
12 3. If services/systems are required to be removed, relocated, or abandoned, provide temporary  
13 services/systems that bypass area of selective demolition and that maintain continuity of  
14 services/systems to other parts of building.  
15 4. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems,  
16 equipment, and components indicated on Drawings to be removed.  
17 a. Piping to Be Removed: Remove piping indicated. Remove abandoned conduit and ductwork,  
18 including above ceilings. Remove back to source of supply where possible, otherwise cap  
19 stub and tag with identification.  
20 b. Piping to Be Abandoned in Place: Abandon piping, conduit and ductwork in place only if  
21 removal would disturb existing material and construction to remain. Drain piping and cap or  
22 plug piping with same or compatible piping material and leave in place.  
23 c. Equipment to Be Removed: Disconnect and cap services and remove equipment.  
24 d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean,  
25 and store equipment; when appropriate, reinstall, reconnect, and make equipment  
26 operational.  
27 e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove  
28 equipment and deliver to Owner.  
29 f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining  
30 ducts with same or compatible ductwork material.  
31 g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork  
32 material and leave in place.
- 33 **3.4 PROTECTION**  
34 A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to  
35 people and damage to adjacent buildings and facilities to remain.  
36 B. Temporary Shoring: Design, provide, and maintain shoring, bracing, and structural supports as required to  
37 preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and  
38 to prevent unexpected or uncontrolled movement or collapse of construction being demolished.  
39 C. Remove temporary barricades and protections where hazards no longer exist.  
40

1 **3.5 SELECTIVE DEMOLITION**

- 2 A. General: Demolish and remove existing construction only to the extent required by new construction and as  
3 indicated. Use methods required to complete the Work within limitations of governing regulations and as  
4 follows:  
5 1. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods  
6 least likely to damage construction to remain or adjoining construction. Use hand tools or small power  
7 tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to  
8 remain.  
9 2. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing  
10 finished surfaces.  
11 3. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces,  
12 such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-  
13 cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.  
14 4. Maintain fire watch during and for at least 2 hours after flame-cutting operations.  
15 5. Locate selective demolition equipment and remove debris and materials so as not to impose  
16 excessive loads on supporting walls, floors, or framing.  
17 6. Dispose of demolished items and materials promptly. Comply with requirements in Section 01 74 19  
18 "Construction Waste Management and Disposal."  
19 7. Existing elevator shall not be used for construction activities.  
20 B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure  
21 minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.  
22 C. Removed and Salvaged Items:  
23 1. Clean salvaged items.  
24 2. Pack or crate items after cleaning. Identify contents of containers.  
25 3. Store items in a secure area until delivery to Owner.  
26 4. Prepare items for Owner's storage area.  
27 D. Removed and Reinstalled Items:  
28 1. Clean and repair items to functional condition adequate for intended reuse.  
29 2. Pack or crate items after cleaning and repairing. Identify contents of containers.  
30 3. Protect items from damage during transport and storage.  
31 E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during  
32 selective demolition.

33 **3.6 CLEANING**

- 34 A. Remove demolition waste materials from Project site and recycle or dispose of them according to  
35 Section 01 74 19 "Construction Waste Management and Disposal."  
36 1. Do not allow demolished materials to accumulate on-site.  
37 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.  
38 3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey  
39 debris to grade level in a controlled descent.  
40 4. Comply with requirements specified in Section 01 74 19 "Construction Waste Management and  
41 Disposal."  
42 B. Burning: Do not burn demolished materials.  
43 C. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition  
44 operations. Return adjacent areas to condition existing before selective demolition operations began.

45 **END OF SECTION**

SECTION 02 41 50

HISTORIC SELECTIVE DEMOLITION/DECONSTRUCTION

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PART 1 – GENERAL

- 1.1 WORK INCLUDED
- 1.2 RELATED SECTIONS
- 1.3 REGULATORY REQUIREMENTS
- 1.4 PROTECTION
- 1.5 OCCUPANCY
- 1.6 DUST CONTROL

PART 2 – PRODUCTS

- 2.1 NOT USED

PART 3 – EXECUTION

- 3.1 LIMESTONE, MASONRY, STRUCTURAL STEEL, CONCRETE AND ASSOCIATED DEMOLITION
- 3.2 DISPOSAL OF MATERIALS

**PART 1 – GENERAL**

**1.1 WORK INCLUDED**

- A. Provide all labor, materials, services and incidentals necessary to perform the following work:
  - 1. Carefully remove and store existing limestone slated for future reinstallation.
  - 2. Remove and dispose of existing limestone, masonry, and structural steel to the extent shown on the Drawings.
  - 3. Remove and dispose of existing collateral material associated with the above.
- B. It is the intent of this project to preserve as much of the existing building material as possible. All demolition of existing masonry materials shall not be executed without the consent of the Architect and/or Owner.

**1.2 RELATED SECTIONS**

- A. Refer to Section 04 01 40 Historic Limestone Preservation/Restoration for all partial demolition information.
- B. Refer to Section 04 01 20.63 Historic Brick Masonry Preservation/Restoration.

**1.3 REGULATORY REQUIREMENTS**

- A. The following regulatory requirements shall be followed:
  - 1. Local, State and Regional Building Codes
  - 2. Occupational Safety and Health Administration (OSHA).
  - 3. United States Department of Transportation (US DOT).
  - 4. Environmental Protection Agency (EPA).
  - 5. National Emission Standards for Hazardous Air Pollutants (NESHAP).
- B. The Architect is not an advisor of asbestos-related issues. The Contractor shall consult the Owner's Asbestos Personnel for clarifications.

**1.4 PROTECTION**

- A. When Work involves removal of masonry materials; the following minimum requirements shall be enforced:
  - 1. The Contractor shall exercise extreme caution and take all necessary precautions to limit exposing his workmen or bystanders to any dangerous conditions.
  - 2. Protect all existing utilities against damage. Maintain existing utilities during demolition operations.
  - 3. Protect passageways and maintain all exit ways to facilitate the safe passage of persons around the area of demolition. Do not modify the facilities code compliant status in any way that is not specifically addressed in this Project Manual.
  - 4. Provide interior and exterior shoring, bracing, or support as required to prevent movement, settlement, or collapse of adjacent construction scheduled to remain.
  - 5. Protect all remaining portions of the building, landscaping and other property not scheduled for demolition. These areas shall be completely protected during demolition and removal of debris. **Any resulting damage shall be repaired or replaced to like-new condition by the Contractor responsible under the direction and approval of the Owner and Architect.**

- 1                   6.       Protect area designated by the Owner and the Architect with necessary framing, plastic  
2 sheet, or similar materials to prevent visible dust and debris from entering the building.  
3 Remove dust and debris protection materials upon job completion.  
4                   7.       When the Work involves removal of building materials containing asbestos, notify the  
5 Owner's Asbestos Consultant immediately.  
6

7 **1.5 OCCUPANCY**

- 8       A.       The Owner will not occupy the building during demolition and construction and the facility will not  
9 remain operational.  
10       B.       Coordinate all Work in advance with the Owner, the Owner's on site personnel and the Architect.  
11

12 **1.6 DUST CONTROL**

- 13       A.       The following **minimum** requirements will be enforced:  
14            1.       It is imperative that construction related dust be kept to a minimum during removal of the  
15 limestone, masonry, structural steel, or any other building material identified herein.  
16

17 **PART 2 - PRODUCTS**

18  
19 **2.1 NOT USED**  
20

21 **PART 3 - EXECUTION**

22  
23 **3.1 LIMESTONE, MASONRY, STRUCTURAL STEEL, CONCRETE AND ASSOCIATED DEMOLITION**

- 24       A.       Remove existing construction as required to complete the preservation and restoration Work as  
25 shown or specified. Refer to the Drawings for the extent of the existing construction that is to be  
26 removed.  
27       B.       Salvage: No masonry materials may be demolished and disposed of without the Owner's written  
28 acceptance. It is the intent of this Project to salvage all existing masonry for reuse. Refer to  
29 subsequent specifications for historic limestone and brick masonry.  
30       C.       Do not start demolition of existing materials when inclement weather is expected.  
31       D.       Refer to this section for requirements relating to protection of existing structure and property.  
32       E.       If, during the course of the demolition Work, portions of the existing structure are opened to the  
33 weather, it shall be the Contractor's responsibility to close such openings as required in a  
34 weathertight manner at the end of each workday.  
35

36 **3.2 DISPOSAL OF MATERIALS**

- 37       A.       The Contractor shall remove all demolition material (that is not scheduled for reuse) from the  
38 Owner's site.  
39            1.       Limestone and brick materials removed and not scheduled for reinstallation shall be  
40 reserved and stored for use during this Project for the creation of replacement pieces.  
41            2.       No prolonged accumulation of debris will be allowed. Debris shall be removed as it  
42 accumulates.  
43            3.       Sale of removed items on the site will not be allowed.  
44            4.       Debris shall be transported on covered dumpsters or trucks.  
45            5.       The site is to be broomed clean at the end of each working day.  
46       B.       No burning on site will be permitted.  
47  
48

**END OF SECTION**

**SECTION 03 10 00  
CONCRETE FORMWORK**

- 1
- 2
- 3
- 4 PART 1 – GENERAL
- 5 1.1 DESCRIPTION
- 6 1.2 QUALITY ASSURANCE
- 7 1.3 TESTING AND INSPECTION
- 8 1.4 SUBMITTALS
- 9 1.5 DESIGN REQUIREMENTS
- 10 PART 2 – PRODUCTS
- 11 2.1 MATERIALS AND ACCESSORIES
- 12 2.2 FORM FINISHES
- 13 2.3 FABRICATION AND MANUFACTURE
- 14 PART 3 – EXECUTION
- 15 3.1 CONSTRUCTION OF TEMPORARY FORMWORK
- 16 3.2 COORDINATION
- 17 3.3 INSTALLATION OF EMBEDDED ITEMS
- 18 3.4 REMOVAL OF FORMS
- 19 3.5 FASTENER REMOVAL
- 20 3.6 REMOVING AND REUSING FORMS

21 **PART 1 - GENERAL**

22 **1.1 DESCRIPTION**

- 23 A. The General and Supplementary Conditions of the Construction Contract and Division 1 - General
- 24 Requirements apply to the work specified in this section.
  
- 25 B. This section includes the design, construction and treatment of formwork and related accessories to
- 26 confine and shape concrete to the required dimensions.
  
- 27 C. This section also includes the installation of embedded items such as waterstops, dovetail anchors,
- 28 flashing reglets, shelf angles, and PVC weeps.
  
- 29 D. Structural notes indicated on the drawings regarding concrete formwork shall be considered a part
- 30 of this specification.

31 **1.2 QUALITY ASSURANCE**

- 32 A. Codes and Standards: Comply with the provisions of the following codes, specifications, and
- 33 standards except where more stringent requirements are shown or specified.
  
- 34 1. ACI 117 – Standard Specification for Tolerances for Concrete Construction and Materials.
- 35 2. ACI 301 – Standard Specification for Structural Concrete.
- 36 3. ACI 318 – Building Code Requirements for Structural Concrete.
- 37 4. ASTM C31 – Standard Specification for Making and Curing Concrete Test Specimens in
- 38 the Field.
- 39 5. ASTM C39 – Standard Test Method for Compressive Strength of Cylindrical Concrete Test
- 40 Specimens.
  
- 41 B. Where provisions of the pertinent Codes and Standards conflict with this specification, the more
- 42 stringent provision shall govern.

1 C. Forest Certification: For the following wood products, provide materials produced from wood  
2 obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-  
3 001, "FSC Principles and Criteria for Forest Stewardship."

4 1. Non-rented temporary concrete formwork

5 **1.3 TESTING AND INSPECTION**

6 A. Inspection and Testing:

7 1. The Owner shall employ an Inspection Agency to perform the duties and responsibilities  
8 specified below.

9 2. Refer to architectural, civil, mechanical, and electrical specifications for testing and  
10 inspection requirements of non-structural components.

11 3. Work performed on the premises of a fabricator approved by the building official need not  
12 be tested and inspected per the table below. The fabricator shall submit a certificate of  
13 compliance that the work has been performed in accordance with the approved plans and  
14 specification to the building official and the Architect and Engineer of Record.

15 4. Duties of the Inspection Agency:

16 a. Perform all testing and inspection required per the Testing and Inspection  
17 Schedule indicated below.

18 b. Furnish inspection reports to the building official, the Owner, the Architect, the  
19 Engineer of Record, and the General Contractor. The reports shall be completed  
20 and furnished within 48 hours of inspected work.

21 c. Submit a final signed report stating whether the work requiring special inspection  
22 was, to the best of the Special Inspection Agency's knowledge in conformance  
23 with the approved plans and specifications.

24 5. Structural Component Testing and Inspection Schedule for Section 03 10 00 is as follows:

	Continuous	Periodic	
Concrete and Concrete Placement			Referenced Standard
Inspect formwork for shape, location and dimensions of the concrete member being formed.		X	ACI 318: 6.1.1

25 **1.4 SUBMITTALS**

26 A. Formwork Release Agent: Submit data on the formwork release agent proposed for use with each  
27 form surface to be used for acceptance unless otherwise specified in the Contract Documents.  
28 Include certification that agent is compatible with finish.

29 B. Product Data: Submit manufacturer's product data for all waterstop profiles supplied for the concrete  
30 construction.

31 C. Testing for Formwork Removal: When methods other than cylinder tests are proposed for  
32 determining time for formwork removal, submit data on methods for approval.

- 1 D. Pour Sequence: Submit sequence of concrete operations for supported structural slab.
- 2 E. Shoring: Submit proposed schedule and sequence of stripping formwork and shoring removal.
- 3 F. Construction Joints: Submit layout of construction joints and details of construction joints.
- 4 G. LEED Certification: Submit manufacturer's certification for formwork including the following:
- 5 1. LEED Credit MRc 4.1/4.2 – Recycled content including percentage of pre-consumer (post-  
6 industrial) and post-consumer recycled content. Also provide manufacturer's name and  
7 product cost.
- 8 2. LEED Credit MRc 5.1/5.2 – Location of manufacturing plant, manufacturer's name, product  
9 cost and location of extraction or harvest of raw materials.
- 10 3. LEED Credit MRc 7 – Chain-of-custody certificates certifying that wood used for formwork  
11 complies with forest certification requirements. Include evidence that manufacturer is  
12 certified for chain-of-custody by an FSC-accredited certification body.
- 13 a. Include statement indicating costs for each certified wood product.

14 **1.5 DESIGN REQUIREMENTS**

- 15 A. Design and Engineering of formwork is the responsibility of the Contractor. Design and construct  
16 formwork, shoring and bracing to conform to Contract Documents and building code requirements.  
17 Design for construction loads, lateral pressure, and requirements of the applicable building code.  
18 Contractor is responsible for formwork camber calculations.
- 19 B. Drawings show the design requirements and dimensions for structural strength, but structural  
20 drawings do not show all detail dimensions to fit intricate Architectural and mechanical detail.  
21 Contractor shall so construct the concrete work that it will conform to the clearance required by the  
22 Architectural, Mechanical and Electrical design.
- 23 C. Maximum deflection of facing materials forming concrete surfaces exposed to view shall be 1/240 of  
24 the center-to-center span between structural members of the formwork.

25 **PART 2 - PRODUCTS**

26 **2.1 MATERIALS AND ACCESSORIES**

- 27 A. Formwork Accessories: Use commercially manufactured accessories for formwork accessories that  
28 are partially or completely embedded in concrete, including ties and hangers.
- 29 B. Formwork Release Agent: Use commercially manufactured form release agents that will prevent  
30 formwork absorption of moisture, prevent bond with concrete, and will not stain the concrete surface.  
31 Formwork release agent shall be compatible with paint or any other finish applied to the concrete;  
32 submit data indicating compatibility.
- 33 C. Waterstops: Waterstops shall be a flexible butyl rubber and bentonite clay compound that swells  
34 upon contact with water. Acceptable manufacturer's and products:
- 35 1. CETCO – Waterstop RX  
36 2. Greenstreak – Swellstop  
37 3. J.P. Specialties – Earth Shield (Type 20 & 23) Waterstop
- 38 D. Form Material:
- 39 1. No aluminum shall be allowed in the concrete work unless coated to prevent aluminum-  
40 concrete reaction.

- 1 2. Concrete form materials must be used in a manner so as to provide the surface finish  
2 specified.
- 3 3. Design formwork in accordance with the provisions of the building code or the following  
4 standards if not covered in the building code:
- 5 a. Wood - AF & PA "National Design Specification".  
6 b. Plywood - American Plywood Association "Plywood Design Specification".  
7 c. Steel - AISC "Manual of Steel Construction - Allowable Stress Design".  
8 d. Cold-formed Steel - AISI "Cold-Formed Steel Design Manual".  
9 e. Aluminum - Aluminum Association "Aluminum Construction Manual".  
10 f. Concrete - ACI 318.  
11 g. Other materials - as directed by manufacturer.

12 E. Chamfer Strips:

- 13 1. Chamfer strips shall be 3/4 inch by 3/4 inch strips. Verify material finish with Architect.

14 **2.2 FORM FINISHES**

15 A. Rough Form Finish:

- 16 1. Concrete surfaces not exposed to view in the finished work shall have a rough-form finish.  
17 No form-facing material is specified for rough-form finish.
- 18 2. Set and maintain forms so finished concrete dimensions shall conform to the tolerances.  
19 Rough form finish is Designated Surface Finish-1.0 from ACI 301, except that surface  
20 tolerance Class C is required as specified in ACI 117.

21 B. Smooth Form Finish:

- 22 1. Concrete surfaces exposed to view in the finished work or surfaces to receive finishes of  
23 any type (paint, textured paint, etc.) shall have a smooth form finish. Form-facing material  
24 shall be plywood, tempered concrete-form-grade hardboard, metal, plastic, paper, or other  
25 acceptable material capable of producing the desired finish. Form-facing material shall  
26 produce a smooth, uniform texture on the concrete. Do not use form facing material with  
27 raised grain, torn surfaces, worn edges, patches, dents, or other defects that might impair  
28 the texture of the concrete surfaces.
- 29 2. Set and maintain forms so finished concrete dimensions shall conform to the tolerances.  
30 Smooth form finish is Designated Surface Finish-3.0 from ACI 301, including surface  
31 tolerance Class A as specified in ACI 117.

32 C. Patching and repairing concrete finishes are specified under Section 03 30 00.

33 **2.3 FABRICATION AND MANUFACTURE**

34 A. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties  
35 designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on  
36 removal.

- 37 1. Furnish units that will leave no corrodible metal closer than 1 inch to the plane of the  
38 exposed concrete surface.
- 39 2. Furnish ties that, when removed, will leave holes not larger than 1 inch in diameter in  
40 concrete surface.
- 41 3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or  
42 waterproofing.



- 1           B.       Waterstops: Fabricate pieces of premolded waterstop with a maximum practicable length to hold the  
2                   number of end joints to a minimum. Fabricate joints in waterstops in accordance with manufacturer's  
3                   recommendations.

4    **PART 3 - EXECUTION**

5    **3.1     CONSTRUCTION OF TEMPORARY FORMWORK**

- 6           A.       Design, erect, shore, brace, and maintain formwork to support vertical, lateral, static, and dynamic  
7                   loads, and construction loads that might be applied, until concrete structure can support such loads.
- 8           B.       At construction joints, lap contact surface of the form sheathing for flush surfaces exposed to view  
9                   over the hardened concrete in the previous placement by not more than 1 inch. Ensure formwork is  
10                  held firmly against hardened concrete to prevent offsets or loss of mortar at construction joints and  
11                  to maintain a true surface.
- 12          C.       Provide watertight formwork when Architectural exposed concrete is specified.
- 13          D.       Unless specified in the Contract Documents, construct formwork so concrete surfaces conform to  
14                   tolerance limits. The class of surface for offset between adjacent pieces of formwork facing material  
15                   shall be Class C, unless specified otherwise.
- 16          E.       Provide positive means of adjustment (wedges or jacks) of shores and struts. Do not make  
17                   adjustments in the formwork after concrete has taken its initial set. Brace formwork securely against  
18                   lateral deflection and lateral instability.
- 19          F.       To maintain specified tolerances, camber formwork to compensate for anticipated deflections in  
20                   formwork prior to hardening of concrete. Formwork camber calculations are the responsibility of the  
21                   formwork designer. Set formwork and intermediate screed strips for slabs accurately to produce  
22                   designated elevations and contours of the finished surface prior to removal of formwork. Ensure that  
23                   edge forms and screed strips are sufficiently strong to support vibrating screeds or roller pipe screeds  
24                   when the finish specified requires the use of such equipment.
- 25          G.       When formwork is cambered, set screeds to a like camber to maintain required concrete thickness.
- 26          H.       Fasten form wedges in place after final adjustment of forms and prior to concrete placement.
- 27          I.       Anchor formwork to shores, supporting surfaces, or members to prevent upward or lateral movement  
28                   of the formwork system during concrete placement.
- 29          J.       Securely brace and shore forms to prevent displacement and to safely support construction loads.
- 30          K.       Construct formwork for wall openings to facilitate removal and to counteract swelling of wood  
31                   formwork. Keep wood forms wet as necessary to prevent shrinkage.
- 32          L.       Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide  
33                   crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for  
34                   inclined surfaces steeper than 1.5 horizontal to 1 vertical. Chamfer wood inserts for forming keyways,  
35                   reglets, recesses, and the like, for easy removal.
- 36          M.       Do not use rust-stained steel form-facing material.
- 37          N.       Provide temporary openings at the base of column and wall formwork and at other points where  
38                   necessary to facilitate cleaning and inspection.
- 39          O.       Unless noted otherwise, all footings shall be centered under walls, piers or columns.
- 40          P.       Provide runways for moving equipment and support runways directly on formwork or structural  
41                   member without resting on the reinforcing steel.

- 1 Q. Place sleeves, inserts, anchors, and embedded items required for adjoining work or for support of  
2 adjoining work prior to concrete placement.
- 3 R. Position and support expansion joint material and other embedded items to prevent displacement.  
4 Fill voids in sleeves, inserts, and anchor slots temporarily with readily removable material to prevent  
5 entry of concrete into voids.
- 6 S. Projecting corners of beams, walls and columns shall be formed with a 3/4 inch chamfer. Unless  
7 noted otherwise on Architectural drawings.
- 8 T. Clean surfaces of formwork and embedded materials of mortar, grout, and foreign material before  
9 concrete is placed.
- 10 U. Cover surfaces of formwork with acceptable formwork release agent. Apply form release agent  
11 before placing reinforcing steel and concrete according to manufacturer's written instructions. Do  
12 not allow formwork release agent to puddle in forms. Do not allow formwork release agent to contact  
13 reinforcing steel or hardened concrete against which fresh concrete is to be placed
- 14 V. Clean and inspect formwork immediately before concrete is placed.
- 15 W. Provide forms for concrete work adjacent to earth banks including sides of footings, except where  
16 footing excavation is vertical rock cut.
- 17 X. Construct forms plumb and straight to conform to slopes, lines and dimensions shown.
- 18 Y. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations  
19 and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use  
20 strike-off templates or compacting-type screeds.

21 **3.2 COORDINATION**

- 22 A. Install all required pipe sleeves, cavities or slots. Notify appropriate trades in due time so that they  
23 may furnish information and make necessary installations. Check sizes, location and alignment of  
24 all openings, frames and other work, which are to be built-in including electrical boxes and conduit.
- 25 B. Layout the run of partitions and establish location of openings so that other trades may properly  
26 locate their work.
- 27 C. Core drilling concrete is not permitted unless noted otherwise or approved in writing by the Architect.  
28 Notify the Architect in advance of conditions not shown on the drawings.

29 **3.3 INSTALLATION OF EMBEDDED ITEMS**

- 30 A. Built-In Items:
- 31 1. Confirm with Architect that all materials to be embedded are suitable for embedment in  
32 concrete.
- 33 2. Build in anchors, inserts, and other devices indicated or required for various portions of  
34 work.
- 35 3. Build in sleeves, thimbles, and other items furnished or set in place by other trades.
- 36 4. Accurately position and support all embedded items prior to concrete placement. Secure  
37 embedded items against displacement during concrete placement operations.
- 38 5. Fill voids with readily removable material to prevent entry of concrete into voids.
- 39 6. Mechanical and electrical shall provide and set required sleeves.

- 1                   7.       Coordinate setting of all embedded items.
- 2            B.       Waterstops:
- 3                   1.       Locate waterstops in joints where indicated on the Drawings.
- 4                   2.       Build in waterstops using longest unbroken lengths possible to hold the number of end  
5                   splices to a minimum.
- 6                   3.       Form splices and intersections strictly according to the manufacturer's instructions so that  
7                   waterstops are continuous and develop effective watertight joint.
- 8                   4.       Locate waterstops as shown on the Drawings. In general, waterstops should be located  
9                   just behind outermost layer of reinforcing. Do not place waterstops closer than 2" from face  
10                  of concrete.

11   **3.4   REMOVAL OF FORMS**

- 12           A.       When removal of formwork is based on concrete reaching a specified compressive strength, concrete  
13           will be presumed to have reached this strength when either of the following requirements has been  
14           met:
- 15                   1.       Test cylinders, molded and cured under the same conditions for moisture and temperature  
16                   as used for the concrete they represent, have reached the specified compressive strength.
- 17                   2.       Concrete has been cured in accordance with the specifications for the same length of time  
18                   as laboratory-cured cylinders, which have reached the specified strength. Determine the  
19                   length of time concrete has been cured in the structure by the cumulative number of days  
20                   or fractions thereof, not necessarily consecutive, during which the temperature of the air in  
21                   contact with the concrete is above 50 degrees and the concrete has been damp or  
22                   thoroughly sealed from evaporation and loss of moisture.
- 23           B.       Forms shall remain in place for the following periods of time. These periods represent cumulative  
24           number days or hours, not necessarily consecutive, during which the temperature of the air  
25           surrounding the concrete is above 50 F:
- 26                   1.       Walls and footings: 50% specified compressive strength or minimum 24 hours.
- 27                   2.       One-way floor slabs: 75% specified compressive strength.
- 28           C.       When finishing is required, remove forms as soon as removal operations will not damage concrete.
- 29           D.       Remove top forms on sloping surfaces of concrete as soon as removal will not allow concrete to sag.  
30           Perform needed repairs or treatment required at once and follows immediately with specified curing.
- 31           E.       Loosen wood formwork for wall openings when this can be accomplished without causing damage  
32           to concrete.
- 33           F.       Do not allow removal of formwork to damage the fresh concrete for columns, walls, sides of beams,  
34           and other parts supporting the weight of the concrete. Perform needed repair and treatment required  
35           on vertical surfaces at once and follow immediately with specified curing.

36   **3.5   FASTENER REMOVAL**

- 37           A.       Remove all protruding fasteners left as a result of securing inserts to forms by Contractor responsible  
38           for insert.
- 39           B.       Cutting flush with surface is not acceptable.
- 40           C.       Patch exposed concrete surfaces if damaged during fastener removal process.



SECTION 03 20 00  
CONCRETE REINFORCEMENT

- 1
- 2
- 3
- 4 PART 1 – GENERAL
- 5 1.1 DESCRIPTION
- 6 1.2 QUALITY ASSURANCE
- 7 1.3 TESTING AND INSPECTION
- 8 1.4 SUBMITTALS
- 9 1.5 COORDINATION
- 10 1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING
- 11 PART 2 – PRODUCTS
- 12 2.1 MATERIALS
- 13 2.2 FABRICATION
- 14 2.3 LEED CREDIT
- 15 PART 3 – EXECUTION
- 16 3.1 PLACING

17 **PART 1 - GENERAL**

18 **1.1 DESCRIPTION**

- 19 A. The General and Supplementary Conditions of the Construction Contract and Division 1 - General
- 20 Requirements apply to the work specified in this section.
- 21 B. This section includes the fabrication and placement of reinforcing steel for concrete, and all related
- 22 accessories.
- 23 C. Reinforcing steel for use in bond beams, masonry columns, and lintels is specified in Division 4 and
- 24 is not a part of the work in this section.
- 25 D. Structural notes indicated on the drawings regarding concrete reinforcement shall be considered a
- 26 part of this specification.

27 **1.2 QUALITY ASSURANCE**

- 28 A. Codes and Standards: Comply with the provisions of the following codes, specifications and
- 29 standards, except where more stringent requirements are shown or specified.
- 30 1. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials.
- 31 2. ACI 301 - Standard Specification for Structural Concrete.
- 32 3. ACI 318 - Building Code Requirements for Structural Concrete.
- 33 4. ACI 315 - Details and Detailing of Concrete Reinforcement.
- 34 5. ASTM A82 - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
- 35 6. ASTM A185 - Standard Specification for Steel Welded Wire Reinforcement, Plain, for
- 36 Concrete.
- 37 7. ASTM A615 - Standard Specification for Deformed and Plain Carbon-Steel Bars for
- 38 Concrete Reinforcement.
- 39 8. AWS D1.4 - Structural Welding Code - Reinforcing Steel.
- 40 9. CRSI - Manual of Standard Practice.
- 41 B. Where provisions of other pertinent codes and standards conflict with this specification, the more
- 42 stringent provision shall govern.

1 **1.3 TESTING AND INSPECTION**

2 A. Inspection and Testing:

3 1. The Owner shall employ an Inspection Agency to perform the duties and responsibilities  
4 specified below.

5 2. Refer to architectural, civil, mechanical, and electrical specifications for testing and  
6 inspection requirements of non-structural components.

7 3. Work performed on the premises of a fabricator approved by the building official need not  
8 be tested and inspected per the table below. The fabricator shall submit a certificate of  
9 compliance that the work has been performed in accordance with the approved plans and  
10 specification to the building official and the Architect and Engineer of Record.

11 4. Duties of the Inspection Agency:

12 a. Perform all testing and inspection required per the Testing and Inspection  
13 Schedule indicated below.

14 b. Furnish inspection reports to the building official, the Owner, the Architect, the  
15 Engineer of Record, and the General Contractor. The reports shall be completed  
16 and furnished within 48 hours of inspected work.

17 c. Submit a final signed report stating whether the work requiring special inspection  
18 was, to the best of the Inspection Agency's knowledge in conformance with the  
19 approved plans and specifications.

20 5. Structural Component Testing and Inspection Schedule for Section 03 20 00 is as follows:

	Continuous	Periodic	
Concrete and Concrete Placement			Referenced Standard
Inspection of fabricators and during fabrication.		X	
Inspection of reinforcing steel and placement.		X	ACI 318: 3.5, 7.1-7.7

21 **1.4 SUBMITTALS**

22 A. Placing Drawings: Submit placing drawings showing fabrication dimensions and locations for  
23 placement of reinforcement and reinforcement accessories. Indicate bar sizes, spacing, locations,  
24 and quantities of reinforcing steel, bending and cutting diagrams, and supporting and spacing  
25 devices. Dowels shall be shown in placing drawings for the element that is to be placed first.  
26 Reinforcing steel descriptions or shop drawings shall be inch-pound sizes.

27 B. Manufacturer's Certificate: Submit mill certifications at time of delivery.

28 C. Splices: Submit request for splices not indicated in the Contract Documents. Request shall indicate  
29 locations, types, and lengths of splices for approval.

30 D. Field Bending: Submit requests and procedure for field bending or straightening of reinforcement  
31 partially embedded in concrete not described in the Contract Documents.

32 E. Reinforcement Relocation: Submit requests to adjust reinforcement spacing necessitated by conflicts  
33 with other reinforcement, conduits, etc. for approval.

- 1 F. LEED Certification: Submit manufacturer's certification for reinforcement including the following:
- 2 1. LEED Credit MRc 4.1/4.2 – Recycled content, including percentage of pre-consumer (post-
- 3 industrial) and post-consumer recycled content. Also provide manufacturer's name, product
- 4 cost, and steel processing furnace type.
- 5 2. LEED Credit MRc 5.1/5.2 – Location of manufacturing plant, manufacturer's name, product
- 6 cost and location of extraction or harvest of raw materials.

7 **1.5 COORDINATION**

- 8 A. Coordinate reinforcement installation with the placement of formwork and other embedded items
- 9 such as inserts, conduit, pipe sleeves, drains, metal supports, anchor rods, etc.

10 **1.6 PRODUCT DELIVERY, STORAGE AND HANDLING**

- 11 A. Deliver reinforcement to the jobsite in bundles sorted and labeled with durable tags indicating bar
- 12 size, length, and shop drawing mark.
- 13 B. Store elevated clear of ground and protect at all times from contamination and deterioration.
- 14 C. Prevent bending, coating with earth, oil, or other material, or otherwise damaging the reinforcement.

15 **PART 2 - PRODUCTS**

16 **2.1 MATERIALS**

- 17 A. Bar Deformations: Bars used for reinforcement shall be deformed except column spirals and welded
- 18 wire reinforcement, which may be plain.
- 19 B. Reinforcing Steel: Reinforcing steel shall conform to the ASTM standard and grade indicated in the
- 20 General Notes on the Drawings.
- 21 C. Welded Wire Reinforcement: Welded wire reinforcement shall conform to the ASTM standard
- 22 indicated in the General Notes on the Drawings.
- 23 D. Joint Dowel Bars: Plain-steel bars. Cut bars true to length with square ends and free of burrs.
- 24 E. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening
- 25 reinforcing bars and welded wire reinforcement in place. Manufacture bar supports according to
- 26 CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete or fiber-reinforced
- 27 concrete of greater compressive strength than concrete, and as follows:
- 28 1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use
- 29 CRSI Class 1 plastic-protected or CRSI Class 2 stainless-steel bar supports.
- 30 2. Concrete cast against earth: Bars may be supported by precast concrete bricks or approved
- 31 prefabricated wire bar supports with footpads large enough to support the weight of the bars
- 32 and construction traffic without being pushed into underlying grade. Precast concrete blocks
- 33 shall have a minimum compressive strength of 6,000 psi.
- 34 F. Epoxy Anchoring System: Epoxy anchoring shall consist of a reinforcing dowel and the epoxy
- 35 adhesive cartridge.
- 36 1. Reinforcing shall be as specified earlier in this Section.
- 37 2. Epoxy injection gel shall consist of a two-component structural epoxy adhesive applied in a
- 38 dual cartridge dispensing system, which properly mixes the components at the point of
- 39 application. Refer to General Notes for acceptable epoxy anchoring systems.

1    **2.2    FABRICATION**

- 2           A.       Fabrication Tolerances: Reinforcing steel shall be shop fabricated within tolerances to conform in  
3                   size, shape, quantity, dimensions, etc. to the Construction Drawings and approved Shop Drawings.
- 4           B.       Bar Condition: Bars shall be free from mill scale, excessive rust and other coatings, which would  
5                   reduce or destroy the bond with the concrete.
- 6           C.       Bars Bending: Bars shall be bent cold, and no method of fabrication shall be used which would be  
7                   injurious to the material. Heating of bars for bending is not permitted.
- 8           D.       Identification: After fabrication, bars shall be sorted, bundled and tagged with metal tags bearing the  
9                   bar mark before delivery to the jobsite.
- 10          E.       Corner Bars: Provide corner bars to make reinforcing continuous at all times, including intersections  
11                   at footings, walls, beams or caps. Such bars shall be the same size and spacing as the horizontal  
12                   reinforcing and each leg shall have a length of at least 30 inches.
- 13          F.       Continuous reinforcing in slabs shall be lapped as follows unless noted otherwise:
- 14                   1.       Top bars                    Midspan
- 15                   2.       Bottom bars                 Directly over support
- 16          G.       Where slabs are simple span, top bars shall be continuous for full length and hooked down at each  
17                   end.
- 18          H.       Reinforcing for continuous footings shall extend into spread footings a minimum of 2'-0".
- 19          I.       Dowels between footings and walls or columns shall be the same grade, size and spacing or number  
20                   as the vertical reinforcing respectively, unless noted otherwise.

21    **2.3    LEED CREDIT**

- 22          A.       LEED Credit MRc 4.1/4.2:
- 23                   1.       Provide steel products made using an Electric Arc Furnace having a minimum recycled  
24                   content of 80%, including at least 40% post-consumer recycled content and 30% post-  
25                   industrial recycled content.
- 26                   2.       Provide steel products made using a Basic Oxygen Furnace having a minimum recycled  
27                   content of 25%, including at least 20% post-consumer recycled content and 5% post-  
28                   industrial recycled content.
- 29          B.       LEED Credit MRc 5.1/5.2:
- 30                   1.       Steel products shall be manufactured within 500 miles of project site. Recycled steel  
31                   products shall be procured from within 500 miles of the project site.

32    **PART 3 - EXECUTION**

33    **3.1    PLACING**

- 34          A.       Reinforcement Relocation: When necessary to move reinforcement beyond the specified spacing to  
35                   avoid interference with other reinforcement, or embedded items, submit resulting arrangement of  
36                   reinforcement to Engineer for approval.
- 37          B.       Reinforcement Cutting: Cutting of reinforcement which conflicts with embedded objects is not  
38                   acceptable.



- 1 C. Welded Wire Reinforcement: Extend welded wire reinforcement to within 1 inch of the concrete edge.  
2 Lap edges and ends of fabric sheets a minimum of one full mesh square plus 2". Support welded  
3 wire reinforcement during placing of concrete to assure required positioning in the slab. Do not place  
4 wire reinforcement on grade or metal deck and raise into position in freshly-placed concrete.
- 5 D. Wire Tie Orientation: Set wire ties so that ends are directed away from concrete surface.
- 6 E. Slab on Grade Reinforcement Placement: Place shrinkage and temperature reinforcement 2 inches  
7 from the top surface of the slabs on grade unless noted otherwise on the Drawings.
- 8 F. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing  
9 concrete.
- 10 G. Support for Reinforcement: Unless noted otherwise, supports for reinforcement shall have Class 2  
11 protection as defined in the CRSI Manual of Standard Practice. Submit data on supports indicating  
12 class of protection at all different locations for approval.
- 13 H. Support for Bars in Concrete Cast on Ground: Bar supports for slabs on grade, grade beams,  
14 footings, and all other concrete cast directly onto grade shall be supported at an average spacing of  
15 4 feet or less in each direction.
- 16 I. Securing Reinforcing Bars: All bars must be placed, spaced, secured and supported prior to casting  
17 concrete. Bars embedded in hardened or partially hardened concrete shall not be bent unless  
18 approved in writing prior to placement by the Engineer of Record.
- 19 J. Foot Traffic: Restrict foot traffic over the slab on grade reinforcing after it has been properly  
20 positioned.
- 21 K. Reinforcement at Expansion Joints: Do not continue reinforcement or other embedded metal items  
22 bonded to concrete through expansion joints. Dowels bonded on only one side of a joint and  
23 waterstops may extend through joint.
- 24 L. Pumping Concrete: When using a pump to place concrete, pump hose shall be supported directly on  
25 forms. Do not allow hose to rest on reinforcing bars if doing so could cause displacement of bars.

26

**END OF SECTION**

**SECTION 03 30 00**  
**CAST-IN-PLACE CONCRETE**

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- 23 3.6 CONCRETE SLAB FINISHES AND TOLERANCES
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- 25 3.8 SLAB CURING
- 26 3.9 PENETRATING LIQUID FLOOR TREATMENTS
- 27 3.10 JOINT FILLING
- 28 3.11 APPLICATION OF FLOOR SEALER – FINISH COAT
- 29 3.12 COLD WEATHER CONCRETING
- 30 3.13 HOT WEATHER PROTECTION
- 31 3.14 FIELD QUALITY ASSURANCE
- 32 3.15 REPAIR OF DEFECTIVE AREAS
- 33 3.16 CLEANING

34 **PART 1 - GENERAL**

35 **1.1 DESCRIPTION**

- 36 A. The General and Supplementary Conditions of the Construction Contract and Division 1 - General
- 37 Requirements apply to the work specified in this section.
  
- 38 B. The work includes all items required for executing and completing the cast-in-place concrete work
- 39 and related work shown on the drawings or specified herein. Work shall include installation of items
- 40 furnished in other sections of these specifications.
  
- 41 C. Concrete paving, walks and curbs are specified in Division 3 or 32.
  
- 42 D. Structural notes indicated on the drawings regarding Cast-In-Place concrete shall be considered a
- 43 part of this specification.

44 **1.2 QUALITY ASSURANCE**

- 45 A. Codes and Standards: Comply with the provisions of the following codes, specifications, and
- 46 standards, except where more stringent requirements are shown or specified herein:
  
- 47 1. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials.
- 48 2. ACI 301 - Standard Specifications for Structural Concrete
- 49 3. ACI 303.1 - Standard Specification for Cast-in-Place Architectural Concrete

- 1 4. ACI 305.1 - Specification for Hot Weather Concreting
- 2 5. ACI 306.1 - Standard Specification for Cold-Weather Concrete
- 3 6. ACI 318 - Building Code Requirements for Reinforced Concrete.
- 4 7. ASTM C31 - Standard Practice for Making and Curing Concrete Test Specimens in the  
5 Field.
- 6 8. ASTM C33 - Standard Specification for Concrete Aggregates.
- 7 9. ASTM C39 - Standard Test Method for Compressive Strength of Cylindrical Concrete  
8 Specimens.
- 9 10. ASTM C42 - Standard Test Method for Obtaining and Testing Drilled Cores and Sawed  
10 Beams of Concrete.
- 11 11. ASTM C94 - Standard Specification for Ready-Mixed Concrete.
- 12 12. ASTM C143 - Standard Test Method for Slump of Hydraulic Cement Concrete.
- 13 13. ASTM C150 - Standard Specification for Portland Cement.
- 14 14. ASTM C157 - Standard Test Method for Length Change of Hardened Hydraulic-Cement  
15 Mortar and Concrete
- 16 15. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete.
- 17 16. ASTM C172 - Standard Practice for Sampling Freshly Mixed Concrete.
- 18 17. ASTM C173 - Standard Test Method for Air Content of Freshly Mixed Concrete by the  
19 Volumetric Method.
- 20 18. ASTM C231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the  
21 Pressure Method.
- 22 19. ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete.
- 23 20. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing  
24 Concrete.
- 25 21. ASTM C494 - Standard Specification for Chemical Admixtures for Concrete.
- 26 22. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural  
27 Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete.
- 28 23. ASTM C1017 - Standard Specification for Chemical Admixtures for Use in Producing  
29 Flowing Concrete.
- 30 24. ASTM C1064 - Standard Test Method for Temperature of Freshly Mixed Portland Cement  
31 Concrete.
- 32 25. ASTM C1077 - Standard Practice for Laboratories Testing Concrete and Concrete  
33 Aggregates for Use in Construction and Criteria for Laboratory Evaluation.
- 34 26. ASTM D1751 - Standard Specification for Preformed Expansion Joint Fillers for Concrete  
35 Paving and Structural Construction (Non-extruding and Resilient Bituminous Types).
- 36 27. ASTM E154 - Standard Test Method for Water Vapor Retarders Used in Contact with Earth  
37 Under Concrete Slabs, on Walls, or as Ground Cover.

- 1 28. ASTM E329 –Standard Specification for Agencies Engaged in Testing and/or Inspection of  
2 Material Used in Construction
- 3 29. Concrete Reinforcing Steel Institute (CRSI) - Manual of Standard Practice.
- 4 B. Comply with all local building code requirements which are more stringent than those listed above.  
5 All referenced codes or standards shall be the most currently adopted as of the date for Receipt of  
6 Proposal.
- 7 C. Where any provision of other pertinent codes and standards conflict with this specification, the more  
8 stringent provision shall govern.
- 9 D. Maintain records verifying materials used are of the specified and accepted types and sizes and are  
10 in conformance with the requirements of the Contract Documents.
- 11 E. Use of testing services will not relieve the Contractor of the responsibility to furnish materials and  
12 construction in full compliance with the Contract Documents.

13 **1.3 TESTING AND INSPECTION**

- 14 A. Inspection and Testing:
- 15 1. The Owner shall employ an Inspection Agency to perform the duties and responsibilities  
16 specified below.
- 17 2. Refer to architectural, civil, mechanical, and electrical specifications for testing and  
18 inspection requirements of non-structural components.
- 19 3. Work performed on the premises of a fabricator approved by the building official need not  
20 be tested and inspected per the table below. The fabricator shall submit a certificate of  
21 compliance that the work has been performed in accordance with the approved plans and  
22 specification to the building official and the Architect and Engineer of Record.
- 23 4. Duties of the Inspection Agency:
- 24 a. Perform all testing and inspection required per the Testing and Inspection  
25 Schedule indicated below.
- 26 b. Furnish inspection reports to the building official, the Owner, the Architect, the  
27 Engineer of Record, and the General Contractor. The reports shall be completed  
28 and furnished within 48 hours of inspected work.
- 29 c. Submit a final signed report stating whether the work requiring Inspection was, to  
30 the best of the Inspection Agency’s knowledge in conformance with the approved  
31 plans and specifications.
- 32 5. Structural Component Testing and Inspection Schedule for Section 03 30 00 is as follows:

	Continuous	Periodic	Referenced Standard
Concrete and Concrete Placement			
Review of proposed mix design and supporting test results		X	
Inspect bolts to be installed in concrete prior to and during placement of concrete where allowable loads have been increased or where strength design is used.	X		ACI 318: 8.1.3, 21.2.8

Concrete and Concrete Placement	Continuous	Periodic	Referenced Standard
Inspection of anchors installed in hardened concrete.		X	ACI 318: 3.8.6, 8.1.3, 21.1.8
Verifying use of required design mix		X	ACI 318: Ch. 4, 5.2-5.4
At the time fresh concrete is sampled to fabricate specimens for strength tests, perform slump and air content tests, and determine the temperature of the concrete.	X		ASTM C172, ASTM C31, ACI 318: 5.6, 5.8
Inspection of concrete placement for proper application techniques	X		ACI 318: 5.9, 5.10
Inspection for maintenance of specified curing temperature and techniques.		X	ACI 318: 5.11 - 5.13
Verification of in-situ concrete strength, prior to removal of shores and forms from beams and structural slabs		X	ACI 318: 6.2

- 1           B.       Sampling and testing requirements:
- 2                   1.       Take samples of fresh concrete at the job site for each mix design placed each day.
- 3                                Sampling and testing shall be done after the final addition and proper mixing of any water
- 4                                or admixtures that are added on site.
- 5                                a.       Personnel and testing equipment shall meet the requirements of ASTM E329.
- 6                                b.       Testing Frequency: Obtain at least one composite sample for each 150 cu. yd. or
- 7                                       5,000 sq ft. of surface area, whichever is less or fraction thereof of each concrete
- 8                                       mixture placed each day.
- 9                                       1)       On a given project, if the total volume of concrete is such that the
- 10   frequency of testing required above would provide less than five strength
- 11   tests for a given class of concrete, tests shall be made from at least five
- 12   randomly selected batches or from each batch if fewer than five batches
- 13   are used.
- 14                                c.       A strength test shall be the average of the strengths of two cylinders made from
- 15                                       the same sample of concrete and tested at 28 days.
- 16                   2.       For each sample of fresh concrete, perform the following duties:
- 17                                a.       Measure and record slump in accordance with ASTM C143.
- 18                                b.       Measure and record temperature in accordance with ASTM C1064.
- 19                                       1)       Provide one test hourly when air temperature is 40°F (4.4°C) and below
- 20   and when 80°F (27°C) and above, and one test for each composite
- 21   sample.

- 1 c. Measure and record air content by volume in accordance with either ASTM C231  
2 or ASTM C173.
- 3 d. Mold three cylinders (laboratory cylinders) in accordance with ASTM C31 to be  
4 laboratory-cured. Protect from moisture loss and maintain at 60°F to 80°F for 24  
5 to 48 hours before moving. Deliver cylinders to testing laboratory for curing and  
6 testing.
- 7 e. Mold one cylinder (field cylinder) in accordance with ASTM C31 to be field-cured.  
8 Field cylinder shall be placed as near as possible to the in-place concrete from  
9 which it was taken, protected, and cured in the same manner. Deliver field-cured  
10 cylinder to testing laboratory, and measure and record compressive strength in  
11 accordance with ASTM C39. Field cylinder shall be used to determine if concrete  
12 footings, walls, or piers have reached the required compressive strength for steel  
13 erection to begin.
- 14 3. Measure and record compressive strength in accordance with ASTM C39 for laboratory  
15 cylinders. Test one laboratory cylinder at 7 days and all other cylinders at 28 days.  
16 Acceptance is based on the average of the two laboratory cured 28-day tests. Notify  
17 Architect in the event strength levels do not meet the acceptance requirements of ACI 318.
- 18 a. Any additional cylinders molded for Contractor to have a compressive strength test  
19 done before seven days shall be at the Contractor's expense.
- 20 4. Prepare and submit test reports to the Architect, Engineer, Contractor, and Supplier.  
21 Reports shall be completed and furnished within 48 hours of testing. Refer to description in  
22 Submittals.
- 23 5. When strength of field-cured cylinders is less than 85 percent of companion laboratory-  
24 cured cylinders, Contractor shall evaluate operations and provide corrective procedures for  
25 protecting and curing in-place concrete.

26 **1.4 SUBMITTALS**

- 27 A. Concrete Materials: Submit information on concrete materials as listed below.
- 28 1. Cementitious materials: Submit type, class, producer name, and certification not more than  
29 90 days old of compliance with applicable ASTM standard.
- 30 2. Aggregates: Submit type, pit or quarry location, producer name, gradations, specific gravity,  
31 water content, and certification not more than 90 days old.
- 32 3. Admixtures: Submit product data sheet. Product data shall include: dosages and  
33 performance data, brand names, producers, chloride ion concentrations, and certifications  
34 of compliance with applicable ASTM standard. Certifications shall not be more than 90 days  
35 old.
- 36 4. Water: Submit name of source.
- 37 B. Product Data: Prepare and submit product and performance data for materials and accessories,  
38 including patching compounds, waterstops, joint systems, curing compounds, finish materials and  
39 other concrete related items.
- 40 C. Testing Agency Qualifications: When requested, the proposed testing agencies shall submit data on  
41 qualifications for acceptance.
- 42 D. Concrete Mix Design:
- 43 1. Concrete mix design submittals shall be submitted at least 14 days prior to placing concrete.

- 1                    2.            Submit concrete mixture proportions and characteristics for each concrete mix. Include  
2                    standard deviation analysis or trial batch data with mix design. Submit historical field test  
3                    data to demonstrate the average compressive strength for approval. Concrete mix  
4                    proportions, materials, and handling methods for field test data or trial batches shall be the  
5                    same as used for the work. Include the following information for each mix design:
- 6                    a.            Water/cementitious materials ratio.  
7                    b.            Slump per ASTM C143  
8                    c.            Air content per ASTM C231 or ASTM C173  
9                    d.            Unit weight of concrete per ASTM C138  
10                   e.            Compressive strength at 28 days per ASTM C39
- 11                   3.            If trial batches are used, submit representative samples of each proposed ingredient to  
12                   independent testing laboratory for use in preparation of mix design.
- 13                   4.            Include alternate mix designs when characteristics of materials, project conditions, weather,  
14                   test results, or other circumstances warrant adjustments. Indicate amounts of mix water to  
15                   be withheld for later addition at Project site.
- 16                   5.            Provide a record copy of the final mix designs and test results to the testing agency prior to  
17                   commencement of the concrete work.
- 18                   E.            LEED Certification: Submit manufacturer's certification for each concrete product including the  
19                   following:
- 20                   1.            LEED Credit MRc 4.1/4.2 – Recycled content, including percentage by weight of  
21                   pre-consumer (post-industrial) and post-consumer recycled content. Also provide  
22                   manufacturer's name and product cost.
- 23                   2.            LEED Credit MRc 5.1/5.2 – Location of manufacturing plant, manufacturer's name, product  
24                   cost and location of extraction or harvest of raw materials.
- 25                   F.            Concrete Finish Shop Drawings: Submit drawings indicating type of finish to be used at each location.
- 26                   G.            Slab-on-Grade Joint Layout: Submit drawings for proposed slab-on-grade control joint and  
27                   construction joint layout for approval.
- 28                   H.            Test Reports: Submit laboratory test reports for concrete materials, mix design, compressive  
29                   strength, slump, air content, and temperature. Each report shall indicate date of sampling, date of  
30                   test, mix design, and location of concrete in structure.
- 31                   I.            Repair Methods: When stains, rust, efflorescence, and surface deposits must be removed, submit  
32                   the proposed method of removal.
- 33                   J.            Certificates: Submit written certification regarding the design mix from the ready-mix supplier and  
34                   the admixture manufacturer stating all concrete and admixtures do not contain chloride ions in excess  
35                   of concentrations specified herein.
- 36                   K.            Placement Notification: Notify the Architect at least 24 hours in advance of concrete placement.
- 37                   L.            Adjustments: Submit any adjustments to mixture proportions or changes in materials, suppliers, or  
38                   sources along with supporting documentation during the course of the work.
- 39                   M.            Cold Weather Procedure Submittal: Refer to Cold Weather Concreting article in Part 3 for more  
40                   information.
- 41                   **1.5            MATERIAL DELIVERY, STORAGE, AND HANDLING**
- 42                   A.            Cementitious materials: Store cementitious materials in dry weather tight buildings, bins, or silos that  
43                   exclude contaminants.

- 1 B. Aggregates: Store and handle aggregate in a manner that will avoid segregation and prevent  
2 contamination with other materials or other sizes of aggregates. Store aggregates so as to drain  
3 freely.
- 4 C. Admixtures: Protect stored admixtures against contamination, evaporation, or damage. Protect liquid  
5 admixtures from freezing and temperature changes, which would adversely affect their performance.  
6 Handle chemical admixtures in accordance with manufacturer's instructions.

7 **PART 2 - PRODUCTS**

8 **2.1 CONCRETE MATERIALS**

- 9 A. Portland Cement: Portland cement shall conform to ASTM C150, Type I Normal, and be a standard  
10 brand of Portland cement. Use one brand of cement throughout project, unless approved in writing  
11 by the Engineer. Cement, which conforms to ASTM C150 Type II, may be used if it also meets the  
12 requirements of ASTM C150 Type I. Cement used in concrete shall be of the same brand and type  
13 as the cement used in the concrete represented by the submitted field test data or used in the trial  
14 mixtures. Maintain consistent cement color throughout project unless directed otherwise by  
15 architectural requirements.
- 16 1. Total replacement of Portland cement by supplementary cementitious materials in design  
17 mixture shall not exceed 50% (by weight).
- 18 B. Supplementary Cementitious Materials
- 19 1. Fly Ash: Fly ash shall conform to ASTM C618, Class C or Class F. Replacement of Portland  
20 cement by fly ash shall not exceed the following (percentages are by weight):
- 21 a. Concrete Flatwork: 15 percent.  
22 b. Mass Concrete (more than two feet thick): 50 percent.  
23 c. All other concrete: 25 percent.  
24 d. Concrete to be placed in cold weather as defined herein: No fly ash allowed unless  
25 the cold weather procedure submitted has compensated for the increased setting  
26 time and decreased rate of strength gain due to cold weather and fly ash.
- 27 2. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
- 28 a. Ground Granulated Blast-Furnace Slab Limit: 50% by weight of total cementitious  
29 materials.
- 30 b. In mass concrete more than 2 feet thick, the usage rate may be 80% by weight of  
31 total cementitious materials.
- 32 3. Combined Fly Ash and Ground Granulated Blast-Furnace Slag:
- 33 a. Supplementary Cementitious Materials Limit: 50% with fly ash not exceeding 25%  
34 by weight of total cementitious materials.
- 35 b. In mass concrete more than 2 feet thick: 80% with fly ash not exceeding 50% by  
36 weight of total cementitious materials.
- 37 C. Blended Hydraulic Cements
- 38 1. Portland Blast-Furnace Slag Cement: ASTM C 595, Type IS.
- 39 a. Blast-Furnace Slag Content: 25% to 50% by weight of total cementitious materials.
- 40 2. Portland-Pozzolan Cement: ASTM C 595, Type IP.
- 41 a. Pozzolan Content: 15% to 40% by weight of Pozzolan total cementitious materials.



- 1 3. Pozzolan-Modified Portland Cement: ASTM C 595, Type I (PM).  
 2 a. Pozzolan Content: 0% to 15% by weight of total cementitious materials.  
 3 4. Slag-Modified Portland Cement: ASTM C 595, Type I (SM).  
 4 a. Blast-Furnace Slag Content: 0% to 25% by weight of total cementitious materials.  
 5 D. Coarse Aggregate for Normal Weight Concrete: Comply with ASTM C33. Provide coarse aggregate  
 6 from a single source for exposed concrete. Gradations shall be similar to that described in the  
 7 following table:

COARSE AGGREGATE GRADATIONS							
SIEVE SIZE - PERCENT PASSING							
Grade No.	1-1/2"	1"	3/4"	1/2"	3/8"	No. 4	No. 16
4	90-100 Note 1	20-55	0-15	---	0-5		---
57	100	95-100	---	25-60	0-10	0-10	---
67		100	90-100	---	20-55	0-10	---
89	---	---	---	100	90-100	20-55	0-10

- 8 1. Shall be 100 percent passing the 2" sieve.  
 9 2. A maximum of 30% of coarse aggregate may be recycled aggregate for footing and grade  
 10 beam concrete.  
 11 E. Fine Aggregate for Normal Weight Concrete: Comply with ASTM C33. Provide fine aggregate from  
 12 a single source for exposed concrete. Fine aggregate shall consist of washed sand. Gradations shall  
 13 be similar to that described in the following table:

FINE AGGREGATE GRADATIONS							
SIEVE SIZE - PERCENT PASSING							
Grade No.	3/8	No. 4	No. 8	No. 16	No. 50	No. 80	No. 100
FA	100	95-100	80-100	50-85	5-30	---	0-10

- 14 1. A maximum of 10% of fine aggregate may be recycled aggregate for footing and grade  
 15 beam concrete.  
 16 F. Do not use aggregates containing deleterious substances that could cause spalling on any exterior  
 17 exposed surface. These include, but are not limited to the following:  
 18 1. Organic impurities.  
 19 2. Ferrous metals.  
 20 3. Soluble salts.  
 21 4. Coal, lignite, or other lightweight materials.  
 22 5. Soft particles.  
 23 6. Clay lumps and friable particles.  
 24 7. Cherts of less than 2.40 specific gravity.

1 G. Water: Mixing water for concrete shall meet the requirements of ASTM C94. Water shall be clean  
2 and free from injurious amounts of acids, alkalies, organic materials, chloride ions and oils deleterious  
3 to concrete or reinforcing steel.

4 H. Testing agency shall be given access to plants and stockpiles to obtain samples for testing for  
5 compliance with the Contract Documents.

6 **2.2 ADMIXTURES**

7 A. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other  
8 admixtures. Calcium chloride thiocyanates or admixtures containing more than 0.05 percent chloride  
9 ions by weight are not permitted.

10 B. Water Reducing Admixture: Material shall comply with ASTM C494, Type A. Acceptable  
11 manufacturers and products include:

- 12 1. Euclid Chemical Company - Eucon WR Series.
- 13 2. Sika Chemical Corp. - Plastocrete 161.
- 14 3. GRT – Polychem 400 NC.
- 15 4. Grace Construction Products - WRDA 82.

16 C. High Range Water Reducing Admixture (superplasticizer): Material shall comply with ASTM C494,  
17 Type F or Type G. Acceptable manufacturers and products include:

- 18 1. Euclid Chemical Company - Eucon 37 or Plastol Series.
- 19 2. Sika – ViscoCrete 2100.
- 20 3. GRT – Melchem.
- 21 4. Grace Construction Products - Mira 110.

22 D. High Range Water Reducing, Slump Retaining Admixture: Material shall comply with ASTM C494,  
23 Type F or Type G. Acceptable manufacturers and products include:

- 24 1. Euclid Chemical Company - Eucon 537, Eucon 1037, or Plastol Series.
- 25 2. Sika – Sikament 686.
- 26 3. GRT – Melchem – M.
- 27 4. Grace Construction Products – ADVA FLEX.

28 E. Non-Chloride Accelerator: Material shall comply with ASTM C494, Type C or Type E, and not contain  
29 a higher chloride ion concentration than municipal drinking water. Acceptable manufacturers and  
30 products include:

- 31 1. Euclid Chemical Company - Accelguard Series.
- 32 2. Sika Chemical Corp. - Sika Rapid-1.
- 33 3. GRT – Polychem HE.
- 34 4. Grace Construction Products – Lubricon NCA.

35 F. Air Entraining Admixture: Air entraining admixture shall comply with ASTM C260, and be certified by  
36 the manufacturer to be compatible with other admixtures to be used. Acceptable manufacturers and  
37 products include:

- 38 1. Euclid Chemical Company - Air-Mix or AEA Series.
- 39 2. Sika Chemical Corporation - Sika-Aer.
- 40 3. GRT – Polychem VR.
- 41 4. Grace Construction Products - Darex II or Daravair 1000.

42 G. Set Accelerating Corrosion-Inhibiting Admixture: Admixture shall contain at least 30% calcium nitrite,  
43 while meeting the requirements of ASTM C494 as a Type C admixture. Acceptable manufacturers  
44 and products include:

- 45 1. Euclid Chemical Company - Eucon CIA.
- 46 2. Grace Construction Products - DCI.

1 H. Admixtures used in concrete shall be the same brand, type, and dosage used in concrete represented  
2 by field test data or used in trial mixes.

3 **2.3 CURING PRODUCTS**

4 A. Moisture Retaining Cover

5 1. Plastic Film: Use 6 mil polyethylene film sheet materials that meet the requirements of  
6 ASTM C171.

7 2. White burlap-polyethylene sheet meeting ASTM C171.

8 3. Reinforced Curing Paper complying with ASTM C171.

9 4. Moisture Retaining Fabric: A naturally colored, non-woven, polypropylene fabric with a 4-  
10 mil, non-perforated reflective (white) polyethylene coating containing stabilizers to resist  
11 degradation from ultraviolet light. Fabric shall exhibit low permeability and high moisture  
12 retention. Acceptable manufacturers and products include:

13 a. PNA Construction Technologies, Inc: Hydracure M15.

14 b. Reef Industries Incorporated: Transguard 4000.

15 B. Dissipating Resin Curing Compound: Clear, waterborne, membrane-forming curing compound  
16 complying with ASTM C309, Type 1, Class B shall be composed of hydrocarbon resins and  
17 dissipating agents that begin to break down upon exposure to ultraviolet light and traffic  
18 approximately 4 to 6 weeks after application, providing a film that is removable with standard  
19 degreasing agents, and mechanized scrubbing actions so as to not impair the later addition of applied  
20 finishes.

21 1. Curing compounds used on interior enclosed environments shall be a water-borne product  
22 and VOC compliant as required by the U.S. EPA Architectural Coating Rule.

23 C. Non-dissipating Curing Compound: Clear, membrane-forming curing compound complying with  
24 ASTM C309, Type 1, Class B.

25 1. Curing compounds used on interior enclosed environments shall be a water-borne product  
26 and VOC compliant as required by the U.S. EPA Architectural Coating Rule.

27 D. Curing and Sealing Compound: Clear, membrane-forming curing and sealing compound complying  
28 with ASTM C309, Type 1, and ASTM C1315, Type 1, Class A. Compound shall dry to a clear finish,  
29 resist yellowing due to ultraviolet degradation and provide a long lasting finish that has high  
30 resistance to chemicals, oil, grease, deicing salts, and abrasion.

31 1. Curing and sealing compounds used on interior enclosed environments shall be a water-  
32 borne product and VOC compliant as required by the U.S. EPA Architectural Coating Rule.

33 **2.4 MISCELLANEOUS MATERIALS**

34 A. Patching Mortar: Non-shrink, non-slump, non-metallic, quick setting. Acceptable manufacturers and  
35 products:

36 1. Euclid Chemical Company - Eucospeed.

37 2. BASF - Thorite.

38 3. Adhesive Technologies. - Hard Rok Vertipatch.

39 4. W.R. Meadows - Speed Crete (Red Line).

40 5. Dayton Superior – Re-Crete 20 minute.

41 6. SpecChem - Precast Patch.

42 B. Expansion Joint Material: Preformed, resilient, non-extruding asphalt impregnated resilient fiber  
43 conforming to ASTM D1751. Thickness of expansion joint material shall be 1/2" unless noted  
44 otherwise on the drawings.

- 1 C. Magnesium phosphate patching cement specially designed for cold weather grouting and anchoring.  
2 Acceptable Manufacturer:
- 3 1. BASF - Set-45.  
4 2. Euclid Chemical Company - Eucospeed MP.
- 5 D. Vapor Retarder: ASTM E 1745, Class A, not less than 10 mils (0.25 mm) thick. Acceptable  
6 manufacturers and products:
- 7 1. Stego Industries, LLC - Stego Wrap.  
8 2. W.R. Meadows, Inc. - Perminator.  
9 3. Raven Industries - Vapor Block  
10 4. Insulation Solutions - Viper VaporCheck II.
- 11 E. Penetrating Liquid Floor Treatment: Chemically reactive, waterborne solution of inorganic silicate or  
12 silicate materials and proprietary components; odorless; colorless; that penetrates, hardens, and  
13 densifies concrete surfaces. Acceptable manufacturers and products:
- 14 1. Conspec Marketing & Manufacturing Co., Inc. - Intraseal  
15 2. Curecrete Chemical Co., Inc. - Ashford Formula  
16 3. Dayton Superior Corporation - Day-Chem Sure Hard (J-17)  
17 4. Euclid Chemical Company - Eucosil  
18 5. L&M Construction Chemicals, Inc. - Seal Hard  
19 6. Vexcon Chemicals, Inc - Vexcon Starseal PS  
20 7. SpecChem - SpecHard
- 21 F. Corrosion-Inhibiting Admixture: Commercially formulated, anodic inhibitor or mixed cathodic and  
22 anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel  
23 reinforcement in concrete. Acceptable manufacturers and products:
- 24 1. Axim Concrete Technologies - Catexol 1000CL  
25 2. Cortec Corporation - MCI 2000 or MCI 2005  
26 3. W. R. Grace & Co - DCI or DCI-S  
27 4. Master Builders, Inc. - Rheocrete 222  
28 5. Sika Corporation - FerroGard-901  
29 6. Euclid Chemical Company - Eucon CIA
- 30 G. Control Joint Filler: Flexible, single-component polyurethane sealant with backer rod compliant with  
31 ASTM C 920, Type S, Grade P, Class 25. Apply sealant per manufacturers written  
32 recommendations. Acceptable manufacturers and products:
- 33 1. Dayton Superior – Perma 230 SL.  
34 2. Euclid Chemical Company – Eucolastic I.  
35 3. Sonneborn – Sonolastic SL 1.
- 36 H. Slip-Resistive Aggregate Finish: Factory-graded, packaged, rustproof, nonglazing, abrasive  
37 aggregate of fused aluminum-oxide granules or crushed emery with emery aggregate containing not  
38 less than 50 percent aluminum oxide and not less than 25 percent ferric oxide; unaffected by freezing,  
39 moisture, and cleaning materials.

40 **2.5 STRENGTH AND PROPERTIES**

- 41 A. Concrete Mix Designs: Refer to Drawings for specified compressive strength. Proportion concrete  
42 mixes according to the properties in the following tables. The concrete supplier may produce a mix  
43 at a lower water-cement ratio to allow for adjustment of slump at the site by adding water. The addition  
44 of site water shall be in accordance with ASTM C94, and the total water-cement ratio shall not exceed  
45 the value specified below.

Class	Coarse Aggregate Gradation	Fine Aggregate Gradation	Range of Slump	Max. w/c	Air Content	Other Requirements
A	57 or 67	FA	1" to 4"	0.40	5% to 8%	
B	57 or 67	FA	1" to 4"	0.45	5% to 8%	
C	57 or 67	FA	1" to 4"	0.50	—	
D	57 or 67	FA	4" to 6"	0.50	—	Use water reducing admixture to achieve slump specified
E	4 or 57	FA	1" to 4"	0.50	—	
F	4 or 57	FA	5" to 8"	0.50	—	Use retarder
H	89	FA	5" to 8"	0.50	—	
J	Lightweight	FA	5" max	0.5	4% to 7%	Maximum 107-116 pcf dry density

- 1 Note: w/c = water-cementitious materials ratio.
- 2 B. Schedule of Concrete Classes: Provide concrete of the specified class according to the following  
3 schedule.
- 4 1. Footings: Class E  
5 2. Exterior foundation walls and piers: Class B  
6 3. Interior piers: Class C  
7 4. Retaining walls: Class B  
8 5. Interior slabs on grade: Class D  
9 6. Interior slab on metal decks: Class D  
10 7. Floor topping: Class H  
11 8. Unless noted otherwise: Class B
- 12 C. Slump of Superplasticized Concrete: Concrete containing high-range water reducing admixtures  
13 (superplasticizer) shall have 8" maximum slump, unless otherwise approved by Structural Engineer.  
14 Concrete shall arrive at job site with 2" to 3" slump, be verified, then high range water reducing  
15 admixture added to increase slump to approved level.
- 16 D. Accelerators: Add non-chloride accelerator to all concrete slabs placed at air temperatures below  
17 50°F.
- 18 E. Water Reducer: Add water reducing admixture or high range water reducing admixtures  
19 (superplasticizers) as follows:
- 20 1. All pumped concrete.  
21 2. Fiber reinforced concrete.  
22 3. As required for placement or workability.  
23 4. As required by high temperatures, low humidity, or other adverse placement conditions.  
24 5. Concrete with water-cementitious materials ratio below 0.50.
- 25 F. No other admixtures shall be used unless approved by Structural Engineer of record.
- 26 G. Chlorides: Admixtures or other ingredients including aggregates containing calcium chloride or more  
27 than 0.05% chloride ions by weight shall not be used.
- 28 H. Workability: Concrete shall have a workability such that it will fill the forms without voids,  
29 honeycombs, or rock pockets with proper vibration without permitting materials to separate or excess  
30 water to collect on the surface.

1 I. Concrete Temperatures: Minimum concrete temperature of fresh concrete varies in relation to  
2 average air temperature over a 24-hour period as follows:

- |   |    |                              |                                |
|---|----|------------------------------|--------------------------------|
| 3 | 1. | Air temperature below 0°F    | Concrete temperature 70°F min. |
| 4 | 2. | Air temperature 0°F to 30°F  | Concrete temperature 65°F min. |
| 5 | 3. | Air temperature 30°F to 50°F | Concrete temperature 50°F min. |
| 6 | 4. | Air temperature above 50°F   | No minimum temperature         |

7 The maximum temperature of concrete at the time of delivery shall be 90°F. When concrete  
8 temperature exceeds 90°F, concrete supplier shall attempt to reduce temperature by shading  
9 aggregates and cement and cooling mix water. When these methods fail to reduce concrete  
10 temperature below 90°F, supplier shall use ice in the water to reduce the concrete temperature.

11 **2.6 LEED CREDITS**

- 12 A. LEED Credit MRc 4.1/4.2 –Concrete flatwork shall contain at least 15% recycled cement (slag  
13 cement and fly ash). Concrete footings and drilled piers shall contain at least 50% recycled content.  
14 All other concrete shall contain at least 25% recycled cement.
- 15 B. LEED Credit MRc 5.1/5.2 – Concrete shall be manufactured within 500 miles of the project site.  
16 Aggregate, sand and water shall be procured form within 500 miles of the project site.

17 **PART 3 - EXECUTION**

18 **3.1 PREPARATION**

- 19 A. Do not place concrete until data on materials and mix designs have been approved, Architect has  
20 been notified, and all other affected trades have coordinated their work.
- 21 B. Remove snow, ice, frost, water, mud, and other foreign material from surfaces, reinforcing bars and  
22 embedded items against which concrete will be placed.
- 23 C. Do not allow form release agent to contact reinforcing bars.

24 **3.2 SLABS**

- 25 A. Slab on Grade:
- 26 1. All interior slabs on grades shall have a polyethylene vapor retarder conforming to ASTM  
27 E1745. Lap all joints minimum 6" and seal edges with adhesive tape. Fit vapor retarder  
28 around utilities and seal with adhesive tape as required. Place, protect, and repair vapor-  
29 retarder sheets according to ASTM E 1643 and manufacturer's written instructions.
- 30 2. Refer to Drawings and Section 31 23 00 for required sub-grade preparation beneath slabs  
31 on grade.
- 32 3. Where vapor retarder is not used below slab on grade, wet sub-grade below slab prior to  
33 placing concrete. Subgrade shall be moist with no free water and no muddy or soft spots.
- 34 4. Saw cut control joints: Cut with power saws equipped with shatterproof abrasive or  
35 diamond-rimmed blades. Cut joints into concrete when cutting action will not tear, abrade,  
36 or otherwise damage surface and before concrete develops random contraction cracks.  
37 Control joints shall be located along column lines, with intermediate joints spaced at a  
38 maximum distance of 36 times the slab thickness, unless noted otherwise. Control Joints  
39 shall be continuous, not staggered or offset. Slab panels shall have a maximum length to  
40 width ratio of 1.5 to 1. Provide additional control joints at all reentrant or isolated corners  
41 formed in the slab on grade. Refer to Drawings for typical control joint detail.

- 1 5. Provide isolation joints around each column, against grade beams and along foundation  
2 walls. Form isolation joints with 1/2" expansion joint material. Extend isolation joint  
3 material full width and depth of joint, terminating flush with finished concrete surface, unless  
4 otherwise indicated.
- 5 6. Depress slabs as required for mats architectural finishes, pits and kitchen equipment.  
6 Obtain layout and locations from Architect.
- 7 7. Verify completion of all under slab work with mechanical and electrical trades before placing  
8 slabs.
- 9 8. Slope slabs as indicated on Drawings and to provide positive drainage. Slope slab keeping  
10 bottom level and varying top. Maintain minimum thickness of concrete as indicated on  
11 Drawings. Refer to floor finishes for tolerances.
- 12 B. All slabs not on grade (all supported slabs), including slabs-on-steel decking and cast-in-place  
13 concrete slabs:
- 14 1. Supported slabs have deflections that may cause areas of concrete to have thicknesses  
15 greater than indicated on the Drawings. Contractor is expected to provide that volume as  
16 needed to finish the floor at the specified elevation. If specified floor finish tolerances are  
17 not achieved during the concrete floor construction, after formwork removal, the Contractor  
18 shall install, at no cost to the project, a self-leveling cementitious underlayment (Master  
19 Builders Mastertop 110 Underlayment or approved equal) to correct the floor flatness and  
20 levelness.
- 21 C. Embedded Items:
- 22 1. The outside diameter of embedded conduit or pipe shall not exceed one-third of the slab  
23 thickness in structural slabs, including at crossovers, and shall be placed between the top  
24 and bottom reinforcing with a minimum 3" clear cover. Conduit or pipe running parallel to  
25 each other shall be spaced at least 8" apart and no more than 2 runs stacked vertically in  
26 the slab. Conduit or pipe shall not be embedded in any supported slab less than 6" thick.  
27 No embedded conduit or pipe is allowed in any concrete slab-on-steel deck.
- 28 **3.3 CONSTRUCTION JOINTS**
- 29 A. Construction Sequence Submittal: Contractor shall submit a construction sequence indicating  
30 construction joints and the pour sequence.
- 31 B. Vertical: Locate vertical construction joints in walls not farther than a maximum of 100 feet on center.  
32 Coordinate joint locations with architectural design.
- 33 C. Horizontal: Locate horizontal joints in walls, piers and columns at underside of slabs, beams and  
34 girders and at the top of slabs and footings unless otherwise indicated. At least 24 hours shall elapse  
35 between placing concrete in a wall, beam or column and placing concrete in an area supported by  
36 the walls, beams or columns, unless approved in writing by Structural Engineer.
- 37 D. Reinforcing: Stop all welded wire reinforcement and/or reinforcing at construction joint in slabs on  
38 grade and provide dowel bars as detailed. Provide reinforcement at other construction joints as  
39 detailed. Roughen and thoroughly clean the surface of the concrete, remove all laitance, and wet the  
40 surface before placing new concrete against the joint. Slush vertical joints with a neat cement grout  
41 before placing new concrete.
- 42 E. Wall Control Joints: Locate vertical control joints in exposed walls at a minimum uniform spacing not  
43 to exceed 25 feet-0 inches. Coordinate joint locations with Architectural Drawings.

1    **3.4    CONCRETE PLACEMENT**

- 2           A.       Place concrete as continuously as possible until placement is complete. Do not place against  
3           concrete that has attained initial set, except at authorized joints. If, for any reason, concrete pour is  
4           delayed for more than 45 minutes, bulkhead off pour at last acceptable construction joint.  
5           Immediately remove excess concrete and clean forms.
- 6           B.       Do not begin to place concrete during periods of rain, sleet or snow unless adequate protection is  
7           provided.
- 8           C.       No concrete shall be cast onto or against sub-grades containing free water, frost, ice or snow.
- 9           D.       Notify the architect in advance if concrete is to be pumped.
- 10          E.       Do not place concrete until all reinforcement is in place, forms have been thoroughly cleaned and  
11          approval has been given.
- 12          F.       Do not accept concrete delivered to the job site more than 90 minutes after initial mixing.
- 13          G.       Concrete from its point of release to mixers, hoppers, or conveyances, shall not be permitted to drop  
14          more than 5 feet (10 feet for concrete containing high range water reducers). Deposit concrete  
15          directly into conveyances and directly from conveyances to final points of deposit. Sufficient  
16          transportation equipment in good working order shall be on hand before work begins. All conveying  
17          equipment must be clean and kept clean during concreting operations. Take every possible  
18          precaution to prevent segregation or loss of ingredients.
- 19          H.       Deposit concrete in wall forms in layers not greater than 12 inches in depth, each layer being  
20          compacted by internal vibration before succeeding layer is placed.
- 21          I.       Place concrete as near as possible to its final position to prevent segregation. Do not use vibrators  
22          to transport concrete within forms. Consolidate concrete in walls, columns, beams and slabs or joist  
23          construction thicker than 8" with internal vibrators (8,000 to 12,000 V.P.M.). Slabs less than 8" thick  
24          may be consolidated with internal vibrators (9,000 to 13,500 V.P.M.) or vibrating screeds supported  
25          on forms, boards or rails, approved by Structural Engineer, supplement vibration by forking or  
26          spading by hand along surfaces adjacent to forms and construction joints.
- 27          J.       Re-tempering of concrete will not be permitted. Concrete that has obtained its initial set shall be  
28          discarded.
- 29          K.       Exercise care in placing concrete over waterproof membranes, rigid insulation and/or protection  
30          boards to avoid damaging those materials. Report damage immediately, and do not proceed until  
31          damage is repaired.
- 32          L.       Remove loose debris from surfaces, thoroughly wet and slush with a neat cement grout immediately  
33          before placing new concrete, or apply bonding compound to surface and let dry before placing new  
34          concrete.
- 35          M.       Protect existing concrete work to be exposed to view and other finished materials from damage and  
36          staining resulting from concreting operations. Handle concrete carefully to avoid dripping and  
37          spillage. Remove spilled concrete from existing surfaces immediately. Covering sills, ledges, and  
38          other surfaces with protective coverings may be necessary to protect the work.
- 39          N.       Filling In: Fill in holes and openings left in concrete structures, unless otherwise indicated, after work  
40          of other trades is in place. Mix, place, and cure concrete, as specified, to blend with in-place  
41          construction. Provide other miscellaneous concrete filling indicated or required to complete Work.
- 42          O.       Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items.  
43          Cast-in inserts and accessories as shown on Drawings. Screed, tamp, and trowel-finish concrete  
44          surfaces.



1 **3.5 CONCRETE FINISHES AND TOLERANCES**

2 A. Exposed Smooth Formed Surfaces: Remove forms and perform necessary repairs and patch to  
3 produce surface finish-3.0 as specified in ACI 301. Apply the following to smooth-formed finished  
4 concrete exposed to view in the finished work. Confirm finishes with architect prior to concrete  
5 placement by submitting shop drawings indicating locations of all types of finishes.

6 1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete  
7 surfaces and rub with carborundum brick or another abrasive until producing a uniform color  
8 and texture. Do not apply cement grout other than that created by the rubbing process.

9 B. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces  
10 adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed  
11 surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed  
12 surfaces, unless otherwise indicated.

13 **3.6 CONCRETE SLAB FINISHES AND TOLERANCES**

14 A. Trowel Finish:

15 1. Screed concrete to an even plane, float, then power trowel the surface.

16 2. Hand trowel the surface smooth and free of trowel marks. Continue hand troweling until a  
17 ringing sound is produced as the floor is troweled.

18 3. Provide trowel finish as indicated on the Drawings and at the following locations:

19 a. Concrete floors exposed in finished work unless otherwise indicated.

20 b. Slabs to receive curing compounds and sealers.

21 c. Slabs to receive resilient flooring or carpet.

22 d. Slabs to receive waterproof membranes.

23 B. Fine Broom Finish:

24 1. Screed concrete to an even plane, float, then power trowel the surface. Provide fine hair  
25 broom finish perpendicular to slope, free of loose particles, ridges, projections, voids and  
26 concrete droppings.

27 2. Provide fine broom finish as indicated on the Drawings and at the following locations:

28 a. Stoop slabs.

29 b. Raised curbs and walkway areas.

30 c. Slabs to receive thin set ceramic tile.

31 C. Broom Finish:

32 1. Screed concrete to an even plane and then float. Immediately after concrete has received  
33 a floated finish, give the concrete surface a coarse transverse scored texture by drawing a  
34 coarse broom across the surface.

35 2. Provide as indicated on the Drawings and at the following locations:

36 a. ADA ramp slabs.

37 b. Exterior walkway slabs.

38 D. Float Finish:

39 1. Screed concrete to an even plane then float.

- 1                    2.        Provide as indicated on the Drawings and at the following locations:
- 2                    a.        Slabs to directly receive concrete topping.
- 3                    b.        Roof slabs to receive loose laid roof insulation.
- 4                    E.        Floor Finish Tolerances: Floor finish tolerances shall be measured by placing a freestanding  
5                    (unleveled) 10 foot straightedge anywhere on the slab and allowing it to rest upon two high spots  
6                    within 72 hours after placement of slab and removal of shoring (if present). The gap at any point  
7                    between the straightedge and the floor (and between the high spots) shall not exceed:
- 8                    1.        Slab on Grade: 1/4"
- 9                    2.        Suspended Slabs: 1/4"
- 10                   F.        Slab Drainage: Finish all concrete slabs to proper elevations to insure that all surface moisture will  
11                   drain freely to floor drains, and that no puddle areas exist. Contractor shall bear the cost of  
12                   corrections to provide positive drainage.
- 13                   G.        Special Tolerances for Concrete Slabs: No abrupt change in vertical elevation of 1/4" or more is  
14                   acceptable at the interface between slabs and within areas where pedestrian traffic is expected:

15    **3.7        CONCRETE CURING**

- 16                   A.        Freshly placed concrete shall be protected from premature drying and excessively hot temperatures.
- 17                   B.        Concrete other than high-early strength shall be maintained above 50°F and in a moist condition for  
18                   at least the first 7 days after placement, except when special curing is used. Special curing  
19                   procedures shall not be used without written permission from the Structural Engineer of Record.
- 20                   C.        Formed surfaces shall be cured by leaving the formwork in place during the curing period.
- 21                   D.        Protect concrete from excessive changes in temperature during the curing period and at the  
22                   termination of the curing process. Changes in the temperature of the concrete shall be as uniform  
23                   as possible and shall not exceed 5°F in any one hour or 50°F in any 24 hour period.
- 24                   E.        Protect concrete from injury from the elements until full strength is developed. Protect from  
25                   mechanical injury.
- 26                   F.        During cold weather construction, all footings shall be protected from frost penetration until the  
27                   building is enclosed and temporary heat is provided.

28    **3.8        SLAB CURING**

- 29                   A.        Begin curing after finishing concrete, but not before free water has disappeared from concrete  
30                   surface. Use one of the methods described below.
- 31                   B.        Moisture-Retaining-Cover Curing for Concrete Floors not Exposed in Final Condition: Cover concrete  
32                   surface with waterproof sheet material as soon as finishing operations are complete and the concrete  
33                   is sufficiently hard to be undamaged by covering. The cover shall be placed flat on the concrete  
34                   surface, avoiding wrinkles. Sprinkle concrete with water as necessary during application of covering.  
35                   Place in widest practicable width, with sides and ends lapped at least 12 inches, and seal with  
36                   waterproof tape or adhesive. Verify that the concrete is continuously wet under the sheets; otherwise,  
37                   add water through soaker hoses under the sheets. Weight down covering to prevent displacement.  
38                   Immediately repair any holes or tears during the curing period using polyethylene sheet and  
39                   waterproof tape. Curing process shall be maintained for a minimum of 7 days.
- 40                   C.        Moisture-Retaining-Fabric Curing for Concrete Floors to Remain Exposed: Cover concrete surface  
41                   with moisture retaining fabric as soon as finishing operations are complete and the concrete is  
42                   sufficiently hard to be undamaged by covering. The cover shall be installed in accordance with  
43                   manufacturer's written recommendations, in largest practical widths. Wet the slab to rejection, then

1 thoroughly wet fabric side of cover and install with poly side up. Lap over adjacent covers a minimum  
2 of 18". Wet all laps and outside edges to prevent displacement and to ensure intimate contact with  
3 concrete and adjacent covers. Rewet as necessary and protect covers from damage during curing  
4 process.

5 1. After minimum 7-day cure, remove moisture retaining fabric in sections.

6 2. A maximum of 3,500 square feet of concrete curing cover may be removed at any one time.  
7 At no time shall the exposed area be permitted to dry prior to completion of the floor  
8 scrubbing process.

9 3. Using a high powered floor scrubber capable of a minimum 80 pounds head pressure, and  
10 a mild citrus-based detergent that does not damage or mar the surface in any way, scrub  
11 the floor to remove any minerals or soluble salts that may have accumulated at the floor  
12 surface. Rinse area thoroughly with clean fresh water. Remove water and allow floor to  
13 dry. If whitening occurs during drying, repeat scrubbing process before floor dries until no  
14 whitening occurs during drying.

15 4. All areas of the floor shall remain wet during floor scrubbing process. Expose only the  
16 amount of floor surface that can be cleaned before any drying occurs without exceeding the  
17 maximum allowable exposed area.

18 D. Curing Compound: Apply uniformly in continuous operation by low pressure spray equipment or  
19 roller as soon as finishing operations are complete, free water on the surface has disappeared and  
20 no water sheen can be seen. Follow the manufacturer's written instructions. Recoat areas subjected  
21 to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair  
22 damage during curing period. Verify compatibility of the curing compound with paint, finishes, or  
23 toppings that require positive bond to the concrete. If curing compound is not compatible with paint  
24 finishes or toppings, utilize a dissipating curing compound and remove in accordance with the  
25 manufacturer's recommendations.

### 26 3.9 PENETRATING LIQUID FLOOR TREATMENTS

27 A. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment  
28 according to manufacturer's written instructions.

29 B. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface  
30 repairs in accordance with manufacturer's written instructions.

31 C. Do not apply to concrete that is less than seven days old.

32 D. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat  
33 brooming or scrubbing. Rinse with water; remove excess material until surface is dry. Apply a  
34 second coat in a similar manner if surface is rough or porous.

### 35 3.10 JOINT FILLING

36 A. Prepare, clean, and install joint filler according to manufacturer's written instructions.

37 B. Do not fill joints until construction traffic has permanently ceased.

38 C. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of  
39 joint clean and dry.

40 D. Install semi-rigid joint filler in saw-cut joints and in formed joints. Overfill joint and trim joint filler flush  
41 with top of joint after hardening.

### 42 3.11 APPLICATION OF FLOOR SEALER - FINISH COAT

43 A. Give concrete floors as indicated in Room Finish Schedule and where exposed in finished Work,  
44 second coat of curing and sealing compound immediately prior to Substantial Completion.

1 B. Clean floors and apply sealer strictly according to manufacturer's instructions. Dilution and coverage  
2 shall be as recommended by the manufacturer. Apply sealer evenly.

3 **3.12 COLD WEATHER CONCRETING**

4 A. Definition: Cold weather shall be defined as a period when for more than three successive days the  
5 average daily outdoor temperature drops below 40°F. The average daily temperature is the average  
6 of the highest and lowest temperature during the period from midnight to midnight. When  
7 temperatures above 50°F occur during more than half of any 24 hour duration, the period shall not  
8 be regarded as cold weather.

9 B. All cast-in-place concrete work occurring during cold weather shall conform to all requirements of  
10 ACI 306.1, "Standard Specification for Cold Weather Concreting", published by the American  
11 Concrete Institute, Detroit, Michigan, except as modified by the contract documents or this  
12 specification.

13 C. Planning: The General Contractor, concrete contractor, concrete supplier and the architect shall have  
14 a pre-construction conference to outline the cold weather concreting operations concerning the  
15 placing, finishing, curing and protection of the concrete during cold weather. Pre-construction  
16 conference shall occur before cold weather is expected to occur.

17 D. Detailed procedure submittal: Concrete contractor shall prepare and submit for review detailed  
18 procedures for the production, transportation placement, protection, curing and temperature  
19 monitoring of concrete during cold weather. Include procedures to be implemented upon abrupt  
20 changes in weather conditions. Do not begin cold weather concreting until these procedures have  
21 been reviewed and approved.

22 E. Mixing: Concrete flatwork poured in cold weather shall be proportioned to obtain a lower slump to  
23 minimize the amount of bleed water during finishing. All bleed water should be skimmed off flatwork  
24 prior to troweling. Concrete that will be exposed to cycles of freezing and thawing while saturated  
25 should be properly air entrained as outlined in this specification.

26 F. Protection of Concrete: Cure and protect concrete against damage from freezing for a minimum  
27 period of 72 hours, unless approved by the structural engineer. The protection period may be reduced  
28 according to ACI 306.1 requirements. Concrete contractor shall submit a letter of request to reduce  
29 the protection period, by outlining the method used to achieve the reduction per ACI 306.1.

30 1. When practical for the construction schedule, formwork shall be insulated and remain in  
31 place for at least the required protection period.

32 G. Concrete Temperatures: The minimum temperature of concrete immediately after placement shall  
33 be as specified in the following table.

Section Size	Minimum temperature of concrete as placed and maintained during the protection period	Maximum gradual decrease in surface temperature during any 24 hours after the end of the protection.	Mixing Temperatures		
			Above 30°F	0 to 30°F	Below 0°F
< 12 in	55°F	50°F	60°F	65°F	70°F
12-36 in	50°F	40°F	55°F	60°F	65°F
36-72 in	50°F	30°F	50°F	55°F	60°F
> 72 in	50°F	20°F	45°F	50°F	55°F

34 H. Mixing Temperatures: As the ambient air temperature decreases the concrete mixing temperature  
35 shall be increased to compensate for the heat lost in the period between mixing and placement. The  
36 concrete supplier shall use one or both of the following methods for increasing the concrete  
37 temperature.

- 1 1. Heating the mixing water to a temperature necessary to offset the temperature losses during  
2 transport. Supplier shall not heat water to temperatures in excess of 140°F, without taking  
3 special precautions as outlined in ACI 306.
- 4 2. Heating the aggregate with a circulated steam piping system.
- 5 I. Temperature measurements: The Contractor shall be responsible for monitoring and recording the  
6 concrete temperatures during placement and throughout the protection period.
- 7 1. Inspection personnel shall keep a record of the date, time, outside air temperature,  
8 temperature of concrete as placed, and weather conditions.
- 9 2. Temperature of the concrete and the outside air shall be recorded at regular intervals but  
10 not less than twice in a 24 hour period. The record shall include temperatures at several  
11 points within the enclosure and on the concrete surface of sufficient frequency to determine  
12 a range of temperatures.
- 13 3. Inspection agency shall submit the temperature logs to the Architect for permanent job  
14 records.

15 **3.13 HOT WEATHER PROTECTION**

- 16 A. Definition: Hot weather shall be defined as any combination of high ambient temperature, low relative  
17 humidity, high winds and intense solar radiation that leads to higher than usual evaporation. The  
18 table below defines low relative humidity based on air temperature. For a given air temperature, if  
19 the relative humidity is equal to or less than the specified minimum, provisions for hot weather  
20 concreting shall be as follows:

Air Temperature	Minimum Relative Humidity
105°F	90%
100°F	80%
95°F	70%
90°F	60%
85°F	50%
80°F	40%
75°F	30%

- 21 B. Scheduling: When hot weather is expected, adjust concrete placement schedules to avoid placing or  
22 finishing during the period from noon until 3:00 pm. When possible, slab pours should be delayed  
23 until the building is enclosed to protect the concrete from wind and direct sunlight, Construction  
24 schedule shall account for 7 day moist curing period.
- 25 C. Mixing: Concrete supplier shall adjust mix designs and admixtures to minimize slump loss. Concrete  
26 shall be mixed at a water-cement, which is lower than the specified maximum to allow for the  
27 adjustment of slump by addition of water in the field. Water reduction shall be accomplished without  
28 reducing initial slump by increasing dosage of water reducing admixture.
- 29 D. Preparation: Do not order concrete earlier than is required to avoid delays. Cool forms, subgrades  
30 and reinforcing bars with water spray from fog nozzle prior to concrete placement.
- 31 E. Delivery: Site traffic shall be coordinated and delivery times scheduled to minimize waiting times for  
32 concrete trucks.
- 33 F. Placement: Preparations shall be made to place and consolidate the concrete at the fastest possible  
34 rate. Maintain a continuous flow of concrete to the job site to avoid development of cold joints, during  
35 placement of slabs, apply fog spray to prevent moisture loss without causing surplus water to stand  
36 on concrete surface.
- 37 G. Finishing: Finish concrete as fast as practical. Continue fogging concrete during finishing. Where  
38 fogging is not possible, apply sprayable moisture-retaining film between finishing passes.

1 H. Curing: Formed concrete shall be covered with a waterproof material to retain moisture. Flat work  
2 shall be moisture cured as described in this specification. Moist curing shall continue for at least 7  
3 days.

4 **3.14 FIELD QUALITY ASSURANCE**

5 A. Independent Testing Agency and Inspector shall each perform their prescribed inspection, sampling,  
6 and testing services as described in Part 1 of this specification section.

7 B. In cases where samples have not been taken or tests conducted as specified or strength of laboratory  
8 test cylinders for a particular portion of the structure fails to meet requirements of ACI 301, for  
9 evaluation of concrete strength, Structural Engineer shall have the right to order compressive or  
10 flexural test specimens or both be taken from the hardened concrete according to ASTM C42, load  
11 tests according to ACI 318, or such other tests as may be necessary to clearly establish the strength  
12 of the in situ concrete, and such tests shall be paid for by the Contractor.

13 **3.15 REPAIR OF DEFECTIVE AREAS**

14 A. All repair of defective areas shall be made, with prior approval of Architect, as to method and  
15 procedure, in accordance with Section 5 of ACI 301, except specified bonding compound must be  
16 used.

17 B. Patch form tie holes at the following locations:

18 1. Unfinished exposed concrete (not scheduled for painting, plus at board formed concrete  
19 finish).

20 2. All other areas: Prime voids with bonding compound and fill with patching mortar. Strike  
21 flush without overlap, float to uniform texture to match adjacent surfaces.

22 3. Exposed areas scheduled for spray texture:

- 23 a. Remove projections and protrusions: 1/16" or larger.  
24 b. Remove continuous ridges 1/32" or larger.  
25 c. Fill voids and pin holes.

26 4. Exposed areas scheduled for paint or epoxy:

- 27 a. Remove projections, ridges, and other protrusions 1/32" or larger.  
28 b. Fill voids and pin holes 1/16" or larger.

29 5. Exposed areas not scheduled for paint or other finishes:

- 30 a. Remove projections, ridges and other protrusions not conforming to requirements  
31 specified under Section 03 10 00.  
32 b. Fill voids and pin holes not conforming to requirements specified under Section  
33 03 10 00.

34 C. All structural repairs shall be made, with prior approval of the Architect/Engineer, as to method and  
35 procedure, using the specified epoxy adhesive and/or epoxy mortar.

36 D. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls,  
37 air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and  
38 other discolorations that cannot be removed by cleaning.

39 1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than  
40 1/2 inch in any dimension in solid concrete but not less than 1 inch in depth. Make edges  
41 of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes  
42 and voids with bonding agent. Fill and compact with patching mortar before bonding agent  
43 has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with  
44 bonding agent.

- 1                    2.        Repair defects on surfaces exposed to view by blending white Portland cement and  
2                    standard Portland cement so that, when dry, patching mortar will match surrounding color.  
3                    Patch a test area at inconspicuous locations to verify mixture and color match before  
4                    proceeding with patching. Compact mortar in place and strike off slightly higher than  
5                    surrounding surface.
- 6                    3.        Repair defects on concealed formed surfaces that affect concrete's durability and structural  
7                    performance as determined by Architect.
- 8                    E.        Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify  
9                    surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to  
10                    drain for trueness of slope and smoothness; use a sloped template.
- 11                    1.        Repair finished surfaces containing defects. Surface defects include spalls, popouts,  
12                    honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate  
13                    to reinforcement or completely through unreinforced sections regardless of width, and other  
14                    objectionable conditions.
- 15                    2.        After concrete has cured at least 14 days, correct high areas by grinding.
- 16                    3.        Correct localized low areas during or immediately after completing surface finishing  
17                    operations by cutting out low areas and replacing with patching mortar. Finish repaired  
18                    areas to blend into adjacent concrete.
- 19                    4.        Correct other low areas scheduled to receive floor coverings with a repair underlayment.  
20                    Prepare, mix, and apply repair underlayment and primer according to manufacturer's written  
21                    instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match  
22                    adjacent floor elevations.
- 23                    5.        Correct other low areas scheduled to remain exposed with a repair topping. Cut out low  
24                    areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor  
25                    elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's  
26                    written instructions to produce a smooth, uniform, plane, and level surface.
- 27                    6.        Repair defective areas, except random cracks and single holes 1 inch or less in diameter,  
28                    by cutting out and replacing with fresh concrete. Remove defective areas with clean, square  
29                    cuts and expose steel reinforcement with at least 3/4 inch clearance all around. Dampen  
30                    concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching  
31                    concrete of same materials and mix as original concrete except without coarse aggregate.  
32                    Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner  
33                    as adjacent concrete.
- 34                    7.        Repair random cracks and single holes 1 inch or less in diameter with patching mortar.  
35                    Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose  
36                    particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching  
37                    mortar before bonding agent has dried. Compact patching mortar and finish to match  
38                    adjacent concrete. Keep patched area continuously moist for at least 72 hours.

39                    **3.16    CLEANING**

- 40                    A.        Clean exposed concrete to remove laitance, efflorescence and stains.

41                    **END OF SECTION**

SECTION 03 35 43  
CONCRETE FLOOR FINISHING

1  
2  
3 PART 1 – GENERAL  
4     1.1 [RELATED DOCUMENTS](#)  
5     1.2 [SUMMARY](#)  
6     1.3 [DEFINITIONS](#)  
7     1.4 [ACTION SUBMITTALS](#)  
8     1.5 [QUALITY ASSURANCE](#)  
9     1.6 [FIELD CONDITIONS](#)  
10 PART 2 – PRODUCTS  
11     2.1 [LIQUID FLOOR TREATMENTS](#)  
12 PART 3 – EXECUTION  
13     3.2 [INSTALLATION - GENERAL](#)  
14     3.3 [SEALED CONCRETE INSTALLATION](#)

15 **PART 1 - GENERAL**

16 **1.1 RELATED DOCUMENTS**

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

19 **1.2 SUMMARY**

- 20     A. Section includes sealed concrete finishing for existing and new concrete floors.

21 **1.3 DEFINITIONS**

- 22     A. Design Reference Sample: Sample designated by Architect in the Contract Documents that reflects  
23     acceptable surface quality and appearance of sealed concrete.

24 **1.4 ACTION SUBMITTALS**

- 25     A. Product Data: For each type of product.  
26     B. LEED Submittals:  
27         1. Laboratory Test Reports for Credit IEQ 4.3: For cleaning solvents and liquid floor treatments,  
28         documentation indicating that products comply with the testing and product requirements of the  
29         California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile  
30         Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

31 **1.5 QUALITY ASSURANCE**

- 32     A. Mockup: Refer to Section 01 43 39 – Mockups for description of construction required to complete a mockup  
33     submittal for review.

34 **1.6 FIELD CONDITIONS**

- 35     A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction  
36     activities.

37 **PART 2 - PRODUCTS**

38 **2.1 LIQUID FLOOR TREATMENTS**

- 39     A. Penetrating Liquid Floor Treatments for Sealed Concrete Finish (SEAL-1): Clear, waterborne solution of  
40     inorganic silicate or silicate materials and proprietary components; odorless; that penetrates, hardens,  
41     and is suitable for sealed concrete surfaces.  
42         1. Liquid floor treatments shall comply with the testing and product requirements of the California  
43         Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic  
44         Chemical Emissions from Indoor Sources Using Environmental Chambers."  
45     B. Solvent Cleaning Liquids:  
46         1. Flooring Adhesive Remover:  
47             a. Contains no Methylene Chloride.  
48             b. Biodegradable and water clean-up.  
49         2. Basis of Design: BEHR® NO. 995 Flooring Adhesive Remover



1 **PART 3 - EXECUTION**

2 **3.1 INSTALLATION - GENERAL**

- 3 A. Sealed Concrete (CFF-1): Level 1 – Flat (Ground), 100 grit.  
4 B. Apply sealed concrete finish system to cured and prepared slabs to match accepted mockup.  
5 1. Machine grind floor surfaces to receive sealed finishes level and smooth.  
6 2. Apply penetrating liquid floor treatment for sealed concrete in polishing sequence and according to  
7 manufacturer's written instructions, allowing recommended drying time between successive coats.  
8 3. Continue polishing with progressively finer-grit diamond polishing pads to gloss level, to match  
9 approved mockup.  
10 4. Control and dispose of waste products produced by grinding and polishing operations.  
11 5. Neutralize and clean sealed floor surfaces.

12 **3.2 SEALED CONCRETE INSTALLATION**

- 13 A. Prepare surfaces according to manufacturer's written instructions and as follows:  
14 1. Clean concrete thoroughly by scraping, applying solvents or stripping agents, sweeping and pressure  
15 washing, or scrubbing with a rotary floor machine and detergents. Rinse until water is clear and allow  
16 surface to dry.  
17 2. Test surfaces with droplets of water. If water beads and does not penetrate surface, or penetrates  
18 only in some areas, profile surfaces by grinding, sanding, or abrasive blasting. Retest and continue  
19 profiling surface until water droplets immediately darken and uniformly penetrate concrete surfaces.  
20 B. Penetrating Sealer: Apply penetrating sealer to concrete surfaces according to manufacturer's written  
21 instructions and as follows:  
22

**END OF SECTION**

**SECTION 03 53 00**  
**CONCRETE TOPPING**

- 1
- 2
- 3 PART 1 – GENERAL
- 4 [1.1 RELATED DOCUMENTS](#)
- 5 [1.2 SUMMARY](#)
- 6 [1.3 PREINSTALLATION MEETINGS](#)
- 7 [1.4 ACTION SUBMITTALS](#)
- 8 [1.5 INFORMATIONAL SUBMITTALS](#)
- 9 [1.6 DELIVERY, STORAGE, AND HANDLING](#)
- 10 [1.7 FIELD CONDITIONS](#)
- 11 PART 2 – PRODUCTS
- 12 [2.1 CONCRETE FLOOR TOPPINGS \(TPNG-1\)](#)
- 13 PART 3 – EXECUTION
- 14 [3.1 PREPARATION](#)
- 15 [3.2 FLOOR TOPPING APPLICATION](#)
- 16 [3.3 PROTECTING AND CURING](#)
- 17 [3.4 JOINT FILLING](#)
- 18 [3.5 REPAIR](#)

19 **PART 1 - GENERAL**

20 **1.1 RELATED DOCUMENTS**

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

23 **1.2 SUMMARY**

- 24 A. Section Includes:
- 25 1. Self-Leveling Portland Cement and Underlayment for placement over existing concrete substrate.

26 **1.3 PREINSTALLATION MEETINGS**

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

28 **1.4 ACTION SUBMITTALS**

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

30 **1.5 INFORMATIONAL SUBMITTALS**

- 31 A. Product Test Reports: For each concrete floor topping, for tests performed by a qualified testing agency.

32 **1.6 DELIVERY, STORAGE, AND HANDLING**

- 33 A. Deliver materials in original packages and containers, with seals unbroken, bearing manufacturer's labels
- 34 indicating brand name and directions for storage, mixing with other components, and application.
- 35 B. Store materials to comply with manufacturer's written instructions to prevent deterioration from moisture or
- 36 other detrimental effects.

37 **1.7 FIELD CONDITIONS**

- 38 A. Environmental Limitations: Comply with manufacturer's written instructions for substrate temperature and
- 39 moisture content, ambient temperature and humidity, ventilation, and other conditions affecting concrete
- 40 floor topping performance.
- 41 B. Close areas to traffic during topping application and, after application, for time period recommended in
- 42 writing by manufacturer.
- 43

1 **PART 2 - PRODUCTS**

2 **2.1 CONCRETE FLOOR TOPPINGS (TPNG-1)**

- 3 A. For topping applications that receive floor finish.
- 4 1. Basis of Design: Self-Leveling Floor Resurfacer – Fast-Setting (No. 1249-51) as manufactured by  
5 the QUIKRETE® Companies, One Securities Centre, 3490 Piedmont Road, NE, Suite 1300,  
6 Atlanta, GA 30305; telephone (404) 634-9100.
- 7 a. Manufacturers: Subject to compliance with requirements, available manufacturers offering  
8 products that may be incorporated into the Work include, but are not limited to the following:  
9 1) Ardex.  
10 2) Meadows.
- 11 2. Self-leveling, Portland Cement Based, Self-Finishing, One Component Underlayment. Comply with  
12 the following:
- 13 a. Performance and Physical Properties at 73 degrees F and 50 percent relative humidity:  
14 1) Working time, ASTM C 191: 20-40 minutes.  
15 2) Compressive Strength, ASTM C 109 Modified: 1800 psi (12.4 MPa) @ 24 hours,  
16 4000 psi (27.6 MPa) @ 7 days, 5500 psi (37.9 MPa) @ 28 days.  
17 3) Slant Shear Bond Strength, ASTM C 1059: Exceeds 1250 psi (8.6 MPa) @ 28 days.  
18 4) Walk On Time: 2-4 hours maximum.  
19 5) Tensile Bond Strength, ASTM C 1059: 300 psi (2.1 MPa) @ 7 days, 400 psi (2.8  
20 MPa) @ 28 days.
- 21 b. Bonding Agent: QUIKRETE® Bonding Adhesive (No. 9902).
- 22 B. For topping applications that polished concrete finish (CCF-1).
- 23 1. Basis of Design:
- 24 2. New concrete for polished concrete, including formwork, reinforcement, concrete materials, mixture  
25 design, placement procedures, initial finishing, and curing is specified in Section 03 30 00 "Cast-in-  
26 Place Concrete."
- 27 3. Mix Design:
- 28 a. Compressive Strength: 5,000 PSI.  
29 b. No accelerators or water reducing agents.  
30 c. Gap Graded Aggregate Mix Design: Match mix design of approved mock-up.
- 31 4. Bonding Agent: Sakcrete Concrete Bonder & Fortifier

32 **PART 3 - EXECUTION**

33 **3.1 PREPARATION**

- 34 A. Existing Concrete: Remove existing surface treatments and deteriorated and unsound concrete.  
35 Mechanically abrade base slabs to produce a heavily scarified surface profile with an amplitude of 1/4  
36 inch.
- 37 1. Prepare and clean existing base slabs according to concrete floor topping manufacturer's written  
38 instructions. Fill voids, cracks, and cavities in base slabs.
- 39 B. Install joint-filler strips where topping abuts vertical surfaces.

40 **3.2 FLOOR TOPPING APPLICATION**

- 41 A. Existing Concrete Bonding Agent:
- 42 1. For use as a paint-on bonder:  
43 2. Mix a slurry consisting of 2 parts bonding agent with one part Portland cement.  
44 3. Apply slurry with a paintbrush. Cover the area completely to insure proper bond.
- 45 B. Place concrete floor topping continuously in a single layer.

46 **3.3 PROTECTING AND CURING**

- 47 A. General: Protect freshly placed concrete floor topping from premature drying and excessive cold or hot  
48 temperatures.  
49

- 1 **3.4 JOINT FILLING**  
2 A. Prepare and clean contraction joints and install semirigid joint filler, according to manufacturer's written  
3 instructions, once topping has fully cured.  
4 B. Install semirigid joint filler full depth of contraction joints. Overfill joint and trim semirigid joint filler flush with  
5 top of joint after hardening.
- 6 **3.5 REPAIR**  
7 A. Defective Topping: Repair and patch defective concrete floor topping areas, including areas that have not  
8 bonded to concrete substrate.  
9

**END OF SECTION**

SECTION 04 01 20.63

HISTORIC BRICK MASONRY PRESERVATION/RESTORATION

PART 1 – GENERAL

- 1.1 GENERAL CONDITIONS OF THE CONTRACT
- 1.2 WORK INCLUDED
- 1.3 RELATED SECTIONS
- 1.4 QUALITY ASSURANCE
- 1.5 REFERENCES
- 1.6 SUBMITTALS
- 1.7 PRODUCT DELIVERY, STORAGE AND HANDLING
- 1.8 JOB CONDITIONS
- 1.9 GUARANTEES, WARRANTIES, CERTIFICATES
- 1.10 ATTIC STOCK

PART 2 – PRODUCTS

- 2.1 ACCEPTABLE MANUFACTURERS
- 2.2 BRICK REPAIR MATERIAL
- 2.3 BRICK REPLACEMENT MATERIAL
- 2.4 ALL MORTAR MATERIALS
- 2.5 OTHER MATERIALS

PART 3 – EXECUTION

- 3.1 EXAMINATION
- 3.2 SEQUENCING/SCHEDULING
- 3.3 SUBSTRATE PREPARATION
- 3.4 GENERAL ERECTION REQUIREMENTS
- 3.5 MORTAR MIXES
- 3.6 REPOINTING
- 3.7 REPAIR OF FRACTURED LOOSE BRICK (MASONRY ADHESIVE)
- 3.8 REPAIR OF BRICK SPALL (SUBSTITUTE BRICK PATCH)
- 3.9 ANCHOR REMOVAL
- 3.10 BRICK REPLACEMENT
- 3.11 BRICK-MATCH STAINING
- 3.12 CLEANING

**PART 1 – GENERAL**

**1.1 CONDITIONS OF THE CONTRACT**

- A. The conditions of the Contract (General, Supplementary, and Other Conditions) and the requirements of Division 1 are hereby made a part of this Section. Applicable provisions of Division 1 shall govern Work under this Section.

**1.2 WORK INCLUDED**

- A. Unless otherwise specified, the Contractor shall furnish all materials, tools, equipment, apparatus, transportation, labor and supervision required to furnish and install all the masonry as shown on the Drawings and specified.
- B. Limited repointing of brick masonry façade areas.
- C. Limited repair of fractured brick.
- D. Limited repair of brick spall.
- E. Limited anchor removal.
- F. Removal of brick in limited locations to access underlying conditions, see drawings.
- G. Retain historic brick removed for reuse as directed by the Architect and Owner.
- H. Cleaning. Refer to Section 04 01 40 – Historic Stone Preservation/Restoration.

**1.3 RELATED SECTIONS**

- A. Section 02 41 50 – Historic Selective Demolition/Deconstruction
- B. Section 04 01 40 – Historic Stone Preservation/Restoration

**1.4 QUALITY ASSURANCE**

- A. There shall be no deviation made from this Specification, the Drawings and on all approved Shop Drawings without prior written approval by the Architect.

1. Prior to covering newly installed Work with permanent materials, the Contractor shall coordinate with the Architect to review all installed components for compliance with the intent of the design as outlined in the drawings and specification of the Project Manual. In addition, the Contractor shall certify that all work was completed in accordance with the Project Manual. Should underlying work be covered prior to Architect's review, the contractor may be required to uncover the work at his own expense.
- B. All Work shall be performed by skilled journeyman masons and laborers who are considered specialists in the field of masonry preservation/restoration work similar to that required under this Contract.
- C. Masons shall have a minimum of five (5) years experience in this type of work.
- D. Samples (mock-ups) of typical masonry restoration work required by this Specification shall be installed in unobtrusive areas using materials (including salvaged brick) and methods specified, and made available for viewing by the Architect and Owner. No related work shall proceed until after mock-ups have been inspected and approved by the Architect.
- E. Furnish sample (mock-up) panel 6' long by 3' high of the proposed masonry restoration work (new, replaced masonry units and finished repointing) including color range, texture, bond, mortar and workmanship. Erect mock-up panel in the presence of the Architect. Provide separate mock-up panels for each type of brick and mortar and include limestone veneer and cap. Do not start the Work until the Architect has accepted sample mock-up panel. Use mock-up panel(s) as standard of comparison for all masonry work built of same material. Do not destroy or move the mock-up panel(s) until the Work is completed and accepted by the Owner.
- F. During the workday, should the weather conditions appear to be changing adversely, the Foreman and crew shall take preventive measures to allow the work area to be closed to a weathertight condition to avoid exposure to building, equipment, and materials.
- G. Repair any Work, damaged by failure to provide proper and adequate protection, to its original state to the satisfaction of the Owner, or remove and replace with new Work at the Contractor's expense.
- H. Use of air entraining admixtures, chlorides, or nitrates, are not allowed and will be sufficient cause to require removal and replacement of all masonry restoration work containing or treated with these materials.
- I. It will be the Architect's prerogative to forbid the use of tools or methods that do not produce the quality of work that is expected and to insist on the use of methods and tools, which will do the Work properly. Refer to the drawings and specifications for reference to areas where "handwork only" is allowed.
- J. Construct minimum 12 inch by 12-inch prisms for testing purposes as required by the Architect.

#### 1.5 REFERENCES

- A. References shall refer to the most recent standard.
  1. Brick Institute of America (BIA).
  2. American Society for Testing and Materials (ASTM).
  3. Masonry Advisory Council (MAC).
  4. Federal Specifications (FS).

#### 1.6 SUBMITTALS

- A. Submit product data and certificates for all replacement masonry units and mortar type.
- B. A total of three (3) copies of each hard copy or physical submittal are required.
- C. Submit not less than twelve (12) individual samples of proposed replacement face bricks, showing extreme variations in color and texture.
- D. Provide sample of stained brick for use in wall as described herein.
- E. Mock-up of a minimum 4' x 4' repointing using new mortar to match existing for approval by Owner and Architect. Mock-up area shall be adjacent to new repointing work.
- F. Prism Test Reports (as required)
  1. Test reports are to be submitted to the Architect for approval.
  2. Testing and reports are to be completed by an independent laboratory.
  3. Test reports shall show:
    - a. Age at test.
    - b. Storage conditions.
    - c. Dimensions of prism.
    - d. Compressive strength of individual prisms.
    - e. Coefficient of variation (v).
    - f. Ultimate compressive strength of masonry (F'm) that has been corrected for the

coefficient of variation (v) and the h/t of the prisms tested.

**1.7 PRODUCT DELIVERY, STORAGE AND HANDLING**

- A. Deliver all materials in their original unopened containers with all markings intact.
- B. Store replacement masonry units off ground to prevent contamination by mud, dust or materials likely to cause staining or other defects.
- C. Cover materials when necessary to protect from the elements.
- D. Protect masonry reinforcing from the elements.

**1.8 JOB CONDITIONS**

- A. Protection of Work
  - 1. Wall covering:
    - a. During erection, cover top of wall with strong waterproof protective covering at end of each day or shutdown.
    - b. Cover partially completed walls when Work is not in progress.
    - c. Extend protective coverings a minimum of 24 inches (610 mm) down both sides.
    - d. Hold protective coverings securely in place.
  - 2. Load application:
    - a. Do not apply uniform floor or roof loading for at least 12 hours after building masonry columns or walls.
    - b. Do not apply concentrated loads for at least three (3) days after building masonry columns or walls.
  - 3. Staining
    - a. Prevent grout or mortar from staining the face of the masonry to be left exposed.
      - i. Immediately remove grout or mortar in contact with the face of such masonry.
      - ii. Protect all sills, ledges, and projections from droppings of mortar.
      - iii. Protect door and window jambs and heads from staining or damage.
  - 4. Cold Weather Protection
    - a. Preparation:
      - i. If ice or snow has formed on replacement masonry bed, remove by carefully applying heat until the top surface is dry to the touch.
      - ii. Remove all replacement masonry that is frozen or damaged.
    - b. Products:
      - i. When brick suction exceeds the initial rate of absorption, sprinkle with heated water.
        - 1. When units are 32°F (0°C) heat water above 70°F (21°C).
        - 2. When units are below 32°F (0°C) heat water above 130°F (54°C).
      - ii. Use only dry replacement masonry units.
      - iii. Do not use wet or frozen replacement masonry units.
  - 5. Construction requirements while Work is progressing:
    - a. Air temperature 40°F (4°C) to 32°F (0°C):
      - i. Heat mixing water to produce mortar temperatures between 40°F (4°C) and 120°F (49°C).
    - b. Air temperature 32°F (0°C) to 20°F (-7°C):
      - i. Heat sand or mixing water to produce mortar temperatures between 40°F (4°C) and 120°F (49°C).
      - ii. Maintain temperatures of mortar on board above freezing.
      - iii. Use salamanders or other heat sources on both sides of walls under construction as required to properly protect replacement masonry from freezing.
      - iv. Use windbreaks when wind is in excess of 14 MPH.
      - v. Air temperatures 20°F (-7°C) and below:
        - 1. Heat mixing water to produce mortar temperatures between 40°F (4°C) and 120°F (49°C).
        - 2. Provide enclosures and auxiliary heat to maintain temperature above 32°F (0°C).
        - 3. Minimum temperature of new masonry units is to be 20°F (-7°C).
    - c. Protection requirements for completed replacement masonry and replacement masonry not being worked on.
      - i. Mean daily air temperature 40°F (4°C) to 32°F (0°C):
        - 1. Protect replacement masonry from rain or snow for 24 hours with weatherproof covering.

- 1 ii. Mean daily air temperature 32°F (0°C) to 25°F (-4°C):
  - 2 1. Completely cover replacement masonry with weatherproof covering for
  - 3 24 hours.
- 4 iii. Mean daily air temperature 25°F (-4°C) to 20°F (-7°C):
  - 5 1. Completely cover replacement masonry with insulating blankets or equal
  - 6 protection for 24 hours.
- 7 iv. Mean daily air temperature 20°F (-7°C) and below:
  - 8 1. Maintain replacement masonry temperature above 32°F (0°C) for 24 hours
  - 9 by constructing a sufficient enclosure with supplementary heat, electric
  - 10 heating blankets, infrared lamps or approved equal.

## 1.9 GUARANTEES, WARRANTIES, CERTIFICATES

- 13 A. Materials and/or workmanship shall be guaranteed against defects for a period of two (2) years
- 14 from the date of Substantial Completion as established by the Architect.

## 1.10 ATTIC STOCK

- 17 A. Provide the following products and amounts for Owner attic stock:
  - 18 1. Rehabilitation Mortars - At least 6 bags of unopened NHL 3.5 with bagged sand in
  - 19 appropriate proportions.
  - 20 2. Substitute Brick Repair Materials - At least 1 gallon unopened containers for each type of
  - 21 brick patching material used. There will be up to 6 patch colors required.
  - 22 3. Replacement Brick – Provide 100 units of each type. Brick face #1 to be stained to match
  - 23 existing variation pattern of existing brick.

## PART 2 - PRODUCTS

### 2.1 ACCEPTABLE MANUFACTURERS

- 28 A. Provide products by Manufacturers specified herein which meet or exceed standards as set forth in
- 29 this Section. No products specified or approved shall contain asbestos.
- 30 B. All materials shall be new unless noted otherwise.

### 2.2 BRICK REPAIR MATERIAL

- 33 A. Substitute Brick Repair Material: Must use only mineral-based, single component products that
- 34 contain natural binders; no synthetic polymers or additives are permitted. Substitute brick material
- 35 must be pre-mixed in a quality controlled factory, with only the addition of water required at the site
- 36 prior to installation.
- 37 B. Acceptable material:
  - 38 1. Jahn M100 Terra Cotta and Brick Repair Mortar, Cathedral Stone Products, Jessup,
  - 39 Maryland
- 40 C. Brick Repair Material shall be custom colored to match the existing brick and produced in a quality
- 41 controlled factory environment. The contractor will be expected to keep a stock of a range of
- 42 custom colors that is equal in number to the number of colors in the custom brick blend (up to 6).
- 43 D. No field mixing of color pigments into the repair materials is permitted on-site.
- 44 E. No color staining of existing brick requiring repairs or newly applied repair materials is permitted.
- 45 F. Apply substitute brick materials to areas no more than 2 inches in depth and 3 inches wide or as
- 46 specifically allowed by the manufacturer.

### 2.3 BRICK REPLACEMENT MATERIAL

- 49 A. Replacement Brick (Interior Wythes): New, solid, severe weathering (SW) brick units to match size
- 50 and mass of existing masonry. Final size and color selection shall be confirmed by a custom brick
- 51 sample approval process. Replacement brick shall be manufactured by Belden Brick Company,
- 52 Canton, Ohio or approved equal.
- 53 B. Replacement Brick (Face Brick #1): Salvaged brick actual size 8" x 2 1/4" x 3 3/4" such as Antique
- 54 Buff with iron spots by Gavin Historical Brick, Iowa City, contact John Gavin at (888) 559-5828,
- 55 [info@historicalbricks.com](mailto:info@historicalbricks.com). This will be a salvaged brick that must match the existing historic brick
- 56 in color. No substitutions will be considered or allowed.
- 57 C. Brick Stain: For use on Face Brick #1 only. Pigmented mineral silicate stain utilizing a dilution
- 58 method of color matching such as Restauro Lasur by KEIM. Contractor shall provide color sample
- 59 mock-ups for approval by the City of Madison Preservation Planner and the architect. Substitutions
- 60 may be requested prior to the submission of bids. Allow 5 days for architect's review and approval.



- 1 D. Replacement Brick (Face Brick #2): Salvaged brick actual size 8" x 2 1/4" x 3 3/4" such as Antique  
2 Red scratch face by Gavin Historical Brick, Iowa City, contact John Gavin at (888) 559-5828,  
3 [info@historicalbricks.com](mailto:info@historicalbricks.com). This will be a salvaged brick that must match the existing historic brick  
4 in color. No substitutions will be considered or allowed.  
5

## 6 2.4 ALL MORTAR MATERIALS

- 7 A. The basis of the mortar for this project shall be:  
8 1. St. Astier Natural Hydraulic Lime NHL 3.5, distributed by TransMineral USA.  
9 2. Pigment – None.  
10 3. Sand – Sand shall be clean and uncontaminated by clay/silt. Janesville #1 by Janesville  
11 Sand and Gravel, 1110 Harding Street, P.O. Box 427 Janesville, WI 53547, 800-955-  
12 7702.  
13 4. Final mortar mix shall be determined in the field under the direction of the Architect. For  
14 the purposes of this bid use the following lime/sand ratio (1:2.5) by volume.  
15 B. All mortar shall be prepared and placed in accordance with the Department of the Interior National  
16 Park Service Cultural Resources Preservation Briefs 2, "Repointing Mortar Joints in Historic  
17 Masonry Buildings" (Revised Edition October 1998), and in compliance with the guidelines set forth  
18 by the Secretary of the Interior's Standards.  
19 C. The mortar shall match the original in color, grain size and texture. The compressive strength of the  
20 repointing mortar shall be equal or less than the compressive strength of the original mortar and  
21 surrounding brick. The replacement mortar shall contain approximately the same ingredient  
22 proportions of the original mortar and shall have a water vapor transmission rate greater than all  
23 adjacent masonry.  
24 D. All replacement mortar ingredients and mortar formulations have been established from test data  
25 gathered from the original materials sampled from site, and from performance data observed in the  
26 field.  
27 E. Mixing of individual mortar ingredients at the construction site will be permitted.  
28 F. Repointing mortars may be pre-blended (not including water) in single containers in a factory-  
29 controlled environment, however the architect shall have FULL authority to reject any process that  
30 in his sole discretion will not meet the intent of this specification.  
31 G. All ingredients will be converted from volume measurements to weight measurements to ensure  
32 quality production of the mortar. This must be accomplished prior to any mix manufacture with the  
33 Natural Hydraulic Lime manufacturer.  
34 H. All mortar materials delivered to the site shall be tested to confirm specification compliance before  
35 mortar is installed in the wall.  
36

## 37 2.5 OTHER MATERIALS

- 38 A. Structural Angle Steel Lintels: hot dipped galvanized ASTM A36 steel – all steel shall be galvanized  
39 post fabrication. No additional openings or cuts to previously galvanized steel will be accepted  
40 without prior approval from the architect.  
41 B. Self-adhering Membrane Flashing: "Polyguard 400 Thru Wall Flashing," a 40 mil, self-adhering,  
42 self-healing membrane consisting of a rubberized asphalt waterproofing element, bonded to a  
43 strong polyethylene film top surface, as manufactured by Polyguard Products Inc, Ennis, Texas, or  
44 "Perm-A-Barrier Wall Flashing," 40-mil, self-adhering membrane wall flashing as manufactured by  
45 W.R. Grace & Co., Columbia, Maryland, or approved equal.  
46 C. Through-wall Flashing Drip Edge: "Preformed Stainless Steel Drip Edge." 28 gauge (15 mils thick),  
47 1-5/8" wide with a 3/8" bend at one end made of Type 304 grade, dull finish stainless steel in  
48 conformance with ASTM A 167, as manufactured by Polyguard Products inc, Ennis, Texas, or  
49 approved equal.  
50 D. Portland Cement: Not Used.  
51 E. Lime: No non-NHL lime may be used without Architect's and NHL manufacturer's review and  
52 approval.  
53 F. Water: Potable, fresh, clean, clear and free from injurious amounts of sewage, oil, acid, alkali,  
54 salts, organic matter or other detrimental substances.  
55 G. Weep Vent: "Mortar Net Weep", 90% open polyester mesh, color to match mortar, as manufactured  
56 by Mortar Net USA. (limited use only – consult Architect)  
57 H. Weeps: "# 341 Series Round Plastic Weep Holes," medium density polyethylene, 3/8" outside  
58 diameter (O.D.) by 4" long with stainless steel screen insert and double cotton wick, as  
59 manufactured by H & B Illinois, Chicago, Illinois.  
60  
61

- 1 I. Other Materials: All other materials not specifically described but required for a complete and  
2 proper installation of the Work in this Section, shall be selected by the Contractor subject to the  
3 approval of the Architect.  
4

5 **PART 3 – EXECUTION**  
6

7 **3.1 EXAMINATION**

- 8 A. The Masonry Contractor shall have the sole responsibility for the accuracy of all measurements  
9 and for the estimate of material quantities required and necessary to satisfy the requirements of the  
10 Drawings and these Specifications.  
11

12 **3.2 SEQUENCING/SCHEDULING**

- 13 A. Perform only as much Work as can be restored to a weathertight condition each day or before  
14 showers commence.  
15 B. All related flashing work shall be completed each day.  
16 C. All other work required for a complete and proper installation per the Drawings and these  
17 Specifications that constitute a complete and proper installation shall be completed each day.  
18

19 **3.3 SUBSTRATE PREPARATION**

- 20 A. Remove all existing materials as specified to perform the Work.  
21 B. Exterior masonry surfaces to remain in place shall be meticulously inspected for cracks or defects.  
22 C. Any mortar joint that is loose, porous, crumbled, cracked, badly weathered (deeper than 1/8"  
23 behind masonry surface), un-bonded to adjacent masonry units, or a potential source of leakage  
24 shall be deemed defective. All spalled, cracked, broken, or otherwise defective brick shall be  
25 removed and replaced using brick and mortar as specified herein.  
26 D. Included in the definition of defective shall be cracked joints that have been sealed.  
27 E. Any missing brick and/or mortar joints that lack mortar or has lost bond, is spalled, or broken, which  
28 can be detected from a maximum distance of ten (10) feet under clear skies during daylight times  
29 by an observer with normal vision, shall be deemed profusely defective for this Project.  
30 F. All cracks, defective, or profusely defective mortar joints shall be cut out or ground out the full width  
31 of the joint to a minimum depth of 3/4".  
32 G. Where mortar is broken or loose beyond a depth of 3/4", remove unsound mortar to where firm  
33 solid mortar is encountered prior to pointing. All joints must be cut clean of unsound mortar  
34 material in a square manner full depth of cut. Furrow shaped joints will not be acceptable.  
35 H. The cutting out of joints shall be done with suitable tools, either hand tools or mechanical  
36 equipment, in such a manner as will not loosen adjacent joints or injure the edges or corners of the  
37 replacement masonry units. Where the mortar is tightly bonded at one side of the joint, and if the  
38 contour permits, the cutting shall be done with portable electric grinders with abrasive wheels to  
39 minimize spalling at the edges of the replacement masonry units.  
40 I. After the joint has been cut out, all loose material shall be removed by chisel, brush, air jet, or water  
41 stream. Following this cleaning, the joint shall be thoroughly moistened. The joint shall be damp,  
42 but without free water on the surface at the time of pointing.  
43 J. Isolated bricks with cracks larger than 1/32" shall be deemed defective and shall be replaced. Prior  
44 to removal consult Architect for approval.  
45 K. Facing brick, which are spalled 1/16" or greater in depth over 10 percent or more of the face area  
46 shall be removed and replaced. Prior to removal consult Architect for approval.  
47 L. Wetting Brick: Wet brick with absorption rates in excess of 30 gal. / 30 in<sup>2</sup> / minute (30 gal. / 194  
48 cm<sup>2</sup> / minute) determined by ASTM C67, so that the rate of absorption when laid does not exceed  
49 this amount. Recommended procedure to insure that bricks are nearly saturated when laid is to  
50 place a hose on the pile of brick until the water runs from the pile. This should be done one day  
51 before the brick are to be used. In extremely warm weather, place the hose on the pile several  
52 hours before the bricks are to be used.  
53

54 **3.4 GENERAL ERECTION REQUIREMENTS**

- 55 A. Pattern Bond  
56 1. Lay new replacement masonry to match existing brick patterns.  
57 2. Match existing header courses, refer to brick patterns in the field.  
58 3. Bond unexposed replacement masonry units wythe-to-wythe by lapping at least 2" (51  
59 mm).  
60 B. Joining of Work  
61 1. Where fresh replacement masonry joins partially set masonry:

- 1 a. Remove loose brick and mortar.
- 2 b. Clean and lightly wet exposed surface of set masonry.
- 3 2. Stop off horizontal run of masonry by racking back 1/2 length of unit in each course.
- 4 3. Toothing is not permitted except upon written acceptance of the Architect.
- 5 C. Tooling
- 6 1. Tool exposed joints when "thumb-print" hard with a round jointer, slightly larger than width
- 7 of joint.
- 8 2. Trowel-point or concave-tool exterior joints below grade.
- 9 3. Following at the proper interval, all new mortar joints shall be compressed and tooled with
- 10 a smooth rounded iron of selected width to produce a smooth, dense surface, very slightly
- 11 concave, or similar depth as typically existing, and tightly pressed against the edges of the
- 12 masonry units. Complete by gently brushing the face of the joint to match existing.
- 13 D. Flashing
- 14 1. Clean surface of masonry smooth and free from projections that might puncture flashing
- 15 material.
- 16 a. Install new thru-wall flashings as shown on the Drawings.
- 17 b. Install thru-wall flashings per the Manufacturers recommendations.
- 18 c. Place thru-wall flashings on bed of mortar.
- 19 d. Cover flashing with mortar.
- 20 E. Weep Holes
- 21 1. Provide weep holes in head joints in first course immediately above all flashings.
- 22 2. Maximum spacing: 24 in. (610 mm) on-center.
- 23 3. Keep weep holes and area above through-wall flashing free of mortar drippings.
- 24 F. Sealant Recesses
- 25 1. Leave joints around outside perimeters of exterior doors, window frames and other wall
- 26 openings.
- 27 a. Depth: Uniform 3/4" (19 mm).
- 28 b. Width: 1/4" (6.4 mm) to 3/8" (9.5 mm).
- 29 G. Movement Joints
- 30 1. Locate as shown on the Drawings.
- 31 2. Keep clean from all mortar and debris.
- 32 H. Cutting Brick
- 33 1. Cut bricks with motor driven saw or other methods that provide cuts that are straight and
- 34 true.
- 35 I. Mortar Joint Thickness
- 36 1. Lay brick with joints to match existing but not to exceed 1/2" (12.7 mm) without prior
- 37 approval from Architect.
- 38 J. Construction Tolerances
- 39 1. Maximum variation from plumb in vertical lines and surfaces of wall arises:
- 40 a. 1/4" (6.4 mm) in 10 ft. (3 m).
- 41 b. 3/8" (9.6 mm) in a story height not to exceed 20 ft. (6 m).
- 42 c. 1/2" (12.7 mm) in 40 ft. (12 m) or more.
- 43 2. Maximum variation from plumb for external corners, expansion joints and other
- 44 conspicuous lines:
- 45 a. 1/4" (6.4 mm) in any story or 20 ft. (6 m) maximum.
- 46 b. 1/2" (12.7 mm) in 40 ft. (12 m) or more.
- 47 3. Maximum variation from level of grades for exposed lintels, sills, parapets, horizontal
- 48 grooves and other conspicuous lines:
- 49 a. 1/4" (6.4 mm) in any bay or 20 ft. (6 m).
- 50 b. 1/2" (12.7 mm) in 40 ft. (12 m) or more.
- 51 4. Maximum variation from plan location or related portion of walls:
- 52 a. 1/2" (12.7 mm) in any bay or 20 ft. (6 m).
- 53 b. 3/4" (19 mm) in 40 ft. (12 m) or more.
- 54 5. Maximum variation in cross-sectional dimensions of columns and thickness of walls from
- 55 dimensions shown on the Drawings:
- 56 a. Minus 1/4" (6.4 mm).
- 57 b. Plus 1/2" (12.7 mm).
- 58
- 59 **3.5 MORTAR MIXES**
- 60 A. All equipment for mixing, transporting and applying mortar shall be clean and free from hardened
- 61 mortar, dirt, ice, or other foreign matter.

- B. Follow printed manufacturer's instructions for mixing preblended mortar.
- C. Refer to Section 04 01 40 - Historic Stone Preservation/Restoration for all mortar.

**3.6 REPOINTING**

- A. See "3.3 Substrate Preparation" for repointing general preparation requirements.
- B. With joint damp, completely fill with mortar.
- C. Following at the proper interval, the joint shall be compressed and tooled with a smooth rounded iron of selected width to produce a smooth, dense surface, very slightly concave, or similar depth as typically existing, and tightly pressed against the edges of the masonry units. Complete by gently brushing the face of the joint to match existing adjacent rough texture.
- D. All necessary protection shall be provided to prevent damage to the existing roofs.

**3.7 REPAIR OF FRACTURED LOOSE BRICK (MASONRY ADHESIVE)**

- A. Retain salvageable brick masonry pieces and prepare all surfaces to receive adhesive.
- B. Install masonry adhesive in strict accordance with manufacturer's instructions.
- C. Bond masonry pieces as specified in strict accordance with manufacturer's instructions.

**3.8 REPAIR OF BRICK SPALL (SUBSTITUTE BRICK PATCH)**

- A. Substitute brick repairs require a moldable, plastic filled material applied directly to the loss area and set into place by its own adhesion to the brick substrate. Such brick repair mortars and putties are typically offered by manufacturing companies that do not sell brick.
- B. Substitute brick material may not be installed in thicknesses exceeding 2 inches. Brick repairs in excess of 2 inches thick will require reconfiguring the brick in lieu of performing other repairs.
- C. Remove all loose mortar and masonry prior to installation of the substitute brick material. "Sound" the masonry with a hammer to verify its integrity. If necessary, cut away an additional 1/2" of the brick substrate to ensure the surface to be repaired is solid and stable. Remove any sealant residue.
- D. Cut out all cramp anchors, threaded rod anchors and/or dowels within the damaged masonry area. Any anchors that are free of rust, solidly embedded, and do not project beyond the solid masonry surface may remain. All others should be removed.
- E. Using clean water and a scrub brush, clean all dust from surface and pores of the substrate.
- F. For very dry or porous surfaces, pre-wet the substrate ahead of time to prevent the substrate from drawing moisture out of the repair too quickly. Re-wet the surface immediately before applying the repair material.
- G. Use methods established in project training program to deliver the substitute brick repair work as demonstrated and approved by the Architect and Owner.
- H. Only rehabilitation technicians that hold a Project Training "Substitute Brick Certificate" will be permitted to work on the scope of this brick repair treatment as defined.
- I. Curing methods vary in different parts of the country and at different times of the year, calling for different amounts of water to be used in the first 36 hours after application. Adjustments also have to take into account how much time is remaining before freezing weather occurs.
- J. Follow all manufacturers' instructions pertaining to the placement of materials. If the manufacturer requires that installers of a specified product be trained, provide this documentation to the Architect and supporting documentation. Training certificates previously issued by product companies for the application of specified products may not be substituted for the Project Training "Substitute Brick Certificate" on this project. Applicators previously trained by product companies are encouraged to work on this specific scope, but it is not a mandatory requirement of this specification, only that of the product company to ensure the proper placement of the materials.

**3.9 ANCHOR REMOVAL**

- A. Remove masonry anchors, brackets, wood nailers, and other extraneous items no longer in use unless identified as historically significant or indicated to remain.
- B. Remove items carefully to avoid spalling or cracking masonry.
- C. If item cannot be removed without damaging surrounding masonry, cut off item flush with surface and core drill surrounding masonry and item as close around item as practical.

**3.10 BRICK REPLACEMENT**

- A. When directed, remove brick that has deteriorated or is damaged beyond repair. Carefully demolish or remove entire units from joint to joint, without damaging surrounding brick, in a manner that permits replacement with full size units.
- B. Sort brick by size and zone for future use.

- 1 C. Support and protect remaining brickwork that surrounds removal area and adjoining construction in  
2 an undamaged condition.  
3 D. Remove in an undamaged condition as many whole brick units as possible.  
4 E. Remove mortar, loose particles, and soil from brick by cleaning with hand chisels, needle scalers,  
5 brushes, and water.  
6 F. Remove sealants by cutting close to brick with utility knife and cleaning with solvents.  
7 G. Reuse salvaged brick to the fullest extent possible. Integrate new replacement brick in concealed  
8 areas or shielded from public view.  
9 H. Deliver cleaned brick not required for reuse to Owner.  
10 I. Clean brick surrounding removal areas by removing mortar, dust, and loose particles in preparation  
11 for replacement.  
12 J. Only rehabilitation technicians that hold a Project Training "Brick Removal and Replacement  
13 Certificate" will be permitted to work on the scope of this brick repair treatment as defined.  
14 K. Replace removed brick with other removed brick, where possible, or with new brick matching  
15 existing brick, including size. Butter vertical joints for full width before setting and set units in full  
16 bed of mortar, unless otherwise indicated.  
17 L. Rake out mortar used for laying brick before mortar sets and point new mortar joints in repaired  
18 area to comply with requirements for repointing existing brick, and at same time as repointing of  
19 surrounding area.  
20

21 **3.11 BRICK-MATCH STAINING**

- 22 A. Follow the manufacturer's installation requirements without exception  
23 B. Using dilution ratios ranging from 1:14 to No Dilution, provide six dilution samples on the specified  
24 replacement brick for the architect and owner's approval.  
25 C. Using the accepted dilution ratios, create a color blend that matches the existing adjacent brick.  
26 D. Create a 4' X 4' portable sample panel for the architect and owner's approval.  
27 E. Install one area of brick replacement in-situ for the architect and owner's approval prior to  
28 commencing with the remainder of the work  
29

30 **3.12 CLEANING**

- 31 A. Refer to Section 04 01 40 – Historic Stone Preservation/Restoration for final cleaning.  
32 B. Cut out any defective joints and holes in exposed masonry and re-point with mortar.  
33 C. Clean all exposed unglazed masonry.  
34 1. Apply cleaning agent to sample wall area of 20 sq. ft. (2 sq. m) in location acceptable to  
35 the Architect.  
36 2. Do not proceed with cleaning until the Architect approves sample area.  
37 3. Clean initially with stiff brushes and water.  
38 4. When cleaning agent is required:  
39 a. Follow brick Manufacturer's recommendations  
40 b. Do not use acid solutions to clean light colored brick.  
41 c. Thoroughly wet surface of masonry on which no green efflorescence (staining)  
42 appears.  
43 d. Scrub with acceptable cleaning agent.  
44 e. Immediately rinse with clean water.  
45 f. Do small sections at a time.  
46 g. Work from top to bottom.  
47 h. Protect all sash, metal lintels and other corrodible parts when masonry is cleaned  
48 with an acid solution.  
49 i. Remove green efflorescence (staining) in accordance with brick manufacturer's  
50 recommendations and BIA "Technical Notes 23 Series."  
51

52 **END OF SECTION**  
53

SECTION 04 01 40  
HISTORIC STONE PRESERVATION/RESTORATION

PART 1 – GENERAL

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- 1.3 DESCRIPTION
- 1.4 QUALITY ASSURANCE
- 1.5 SUBMITTALS
- 1.6 SUBSTITUTIONS
- 1.7 PRODUCT DELIVERY, STORAGE AND HANDLING
- 1.8 PROJECT CONDITIONS
- 1.9 ATTIC STOCK

PART 2 – PRODUCTS

- 2.1 MANUFACTURERS
- 2.2 SUBSTITUTE STONE REPAIR MATERIALS
- 2.3 STONE REPLACEMENT MORTAR
- 2.4 ALL MORTAR MATERIALS
- 2.5 OTHER MATERIALS

PART 3 – EXECUTION

- 3.1 EXAMINATION
- 3.2 SUBSTITUTE STONE PATCH (SSP)
- 3.3 FERROUS ANCHOR BOLT/REMOVAL
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- 3.7 DUTCHMAN
- 3.8 CRACK INJECTION AND STAIN
- 3.9 MASONRY ADHESIVE
- 3.10 DRESS STONE IN-SITU
- 3.11 BALUSTER REPAIR
- 3.12 POINTING OF MORTAR JOINTS IN STONE
- 3.13 CONSOLIDATION
- 3.14 FINISHING TECHNIQUES
- 3.15 LEAD CAP FLASHING INSTALLATION
- 3.16 CLEANING

**PART 1 – GENERAL**

**1.1 SCOPE**

- A. The work under this section shall consist of providing all materials, labor, equipment, tools, protection and supervision necessary for the mobilization; select removal of entire stone units; deconstruction; stone harvesting, redressing and cleaning for reuse; cleaning; wall reconstruction; rebuilding of missing features with substitute stone material; stone surface redressing in situ; stone crack injection; stone crack mortar repair; stone removal and replacement with new stone; stone removal and replacement with reclaimed stone; and stone removal and replacement with harvested stone.

**1.2 RELATED WORK**

- A. Applicable provisions of Division 1 shall govern work under this Section.

**1.3 DESCRIPTION**

- A. In addition to all other requirements, all work of this Section shall be performed under the guidelines of the Secretary of the Interior's Standards for the Treatment of Historic Properties and must comply with the Secretary of the Interior's Standards for Rehabilitation.
- B. The intent of this Section is:
  - 1. To carefully deconstruct the existing wall in successive segments as shown on the drawings.
  - 2. To save as much of the historic material as possible.
  - 3. To repair all deteriorated stone that is deemed to be suitable for reuse.

- 1 4. That all repair and replacement materials will match historic construction in all physical
- 2 and visual aspects, including material, form, color, texture, and workmanship.
- 3 5. That all work will be done using the gentlest methods available.
- 4 6. That sound historical materials will not be put at risk due to the work of this Section.
- 5 C. Work includes, but is not limited to, the following (Refer to Exhibit G for further information):
- 6 1. Limited repointing of all stone masonry as shown on the drawings.
- 7 2. Removal of cement-based mortar smears from the stone surfaces at areas that require
- 8 100% rebuild or as otherwise shown on the drawings.
- 9 3. Removal of previous cement-based repairs and mismatching substitute stone repair
- 10 materials as determined by Architect at areas that require 100% rebuild or as otherwise
- 11 shown on the drawings.
- 12 4. Replacement or repair – exfoliated, scaled, disaggregated, chipped, cracked, spalled and
- 13 broken – limestone as identified in Exhibits F and G.
- 14 5. Removal of existing sealant debris and oils from stone surfaces at areas that require
- 15 100% rebuild or as otherwise shown on the drawings.
- 16 6. Cleaning of all masonry surfaces upon completion of the repair work. 100% cleaning of
- 17 the stone is not a requirement of this bid.
- 18

#### 1.4 QUALITY ASSURANCE

- 19 A. Pre-Construction Conference: Prior to beginning the work of this Section, the General Contractor
- 20 and all Masonry Sub-contractors shall convene a meeting with the Architect and Owner's
- 21 Representative(s) to review the requirements of the Quality Assurance Plan, Project Training
- 22 Program, installation procedures, location of required test areas, and all job conditions and
- 23 processes.
- 24 B. Quality Assurance Plan: Prior to beginning Work, submit a written Quality Assurance Plan to
- 25 Architect and Owner for review and approval. Allow 2 weeks for review and approval process. Do
- 26 not proceed without written approval of plan. The Owner's Quality Control Representative and the
- 27 Architect shall review work on a regular basis for conformance with the approved Quality
- 28 Assurance Plan. Quality Assurance Plan shall, at a minimum, include the following items:
- 29 1. Describe on-site project training program.
- 30 a. Include certificate issuer name and qualifications with the specific requisites
- 31 established to meet the Historic Material Restoration Requirements (HMRR)
- 32 identified in the project documents.
- 33 b. Identify the classroom curriculum and/or outline for the Architect's review
- 34 and approval.
- 35 c. Provide a sample classroom examination
- 36 d. Identify the field work verification process and confirm location and scope of
- 37 all mock-ups for Architect's review and approval.
- 38 e. Provide a list of all sub-contractor and/or other employees that will submit to
- 39 the training and certification process.
- 40 2. Describe all methods of mobilization and access to work areas.
- 41 3. Describe methods of dust containment during the work of this section.
- 42 4. Describe the methods of protecting surrounding stone and landscape. Submit
- 43 drawings of protection when requested by Architect.
- 44 5. Describe the Work procedures, materials, and tools the contractor proposes to use for
- 45 each historic material restoration requirement specified.
- 46 6. Describe the sequence of historic material restoration requirements.
- 47 7. Describe how the sequence of historic material restoration requirements and the
- 48 construction schedule changes as it relates to climate fluctuations and protection of
- 49 completed work.
- 50 8. Describe the methods for surveying original layout and collecting datum points and
- 51 plumb lines for rebuilding stone masonry.
- 52 9. Describe the methods for shoring and providing a safe working environment.
- 53 10. Describe the methods for deconstruction of the masonry parapets (stone and brick)
- 54 and tools for cleaning the stone for reuse.
- 55 11. Describe the methods for deconstruction of individual stone and tools for cleaning the
- 56 stone for reuse.
- 57 12. Describe the method and approach to cleaning cement-based mortar and old
- 58 patching materials from the stone face.
- 59 13. Describe, in detail, the matching procedures relating to techniques and tools
- 60 proposed for stone redressing.
- 61

- 1 14. Describe the complete stone removal procedures; include equipment, approach and  
2 where (on-site or in shop) the stone will be redressed.
- 3 15. Describe the complete stone redressing procedures; include equipment, approach  
4 and where (on-site or in shop) the stone will be redressed.
- 5 16. Describe the procedure for mixing and matching of substitute stone materials.
- 6 17. Describe the methods and system by which the use of reclaimed stone can be  
7 utilized.
- 8 18. Describe the methods for setting stone back into wall for rebuilding the wall and  
9 maintaining the original bonding and course layout concept.
- 10 19. Describe the methods of transition points where rehabilitation work will meet the  
11 original historic work.
- 12 C. Historic Masonry Consultant – Training Program Instructor:
- 13 1. The contractor shall secure and pay for the services of an independent historic  
14 masonry consultant to provide the on-site project training certificate program.
- 15 a. The independent historic masonry consultant shall have 10 years'  
16 experience in historic masonry work and be well-versed in the requirements  
17 of the Secretary of the Interior's Standards for Rehabilitation as they relate to  
18 the work of this Section.
- 19 b. The instructor responsible for issuing certificates shall provide evidence of  
20 training experience on 5 other projects of similar scope and scale.
- 21 c. Product manufacturers, vendors, distributors, or suppliers of materials  
22 specified in this Section shall **not** be permitted to offer on-site project training  
23 certificates.
- 24 D. Project Training Program Definition and Use (Refer to Section 04 01 40 1.4.K):
- 25 1. All workers must obtain project training certificate(s) in order to work on the project.  
26 Project training certificates are earned by individual workers and issued with the  
27 understanding that they are for limited time use, enforceable only to this specific  
28 project and for a specific historic masonry repair requirement.
- 29 a. The certificates cannot be earned by a company.
- 30 b. They are non-transferable and only valid for the specific rehabilitation  
31 treatment specified. For example: this project has defined several  
32 rehabilitation treatments in the scope that will require separate on-site  
33 training sessions for issuance of the required project training certificates.
- 34 c. The contractor has the flexibility to assign workers that are most proficient in  
35 the skills required for the specified rehabilitation treatment. It is not  
36 necessary, nor a requirement of this specification, that all workers obtain all  
37 project training certificates offered. A laborer, for example, may need to  
38 become proficient at historic material removal, documentation, and inventory  
39 control, as well as mortar mixing, but not need to be qualified to set stone or  
40 prepare stone surfaces for repair.
- 41 d. The contractor must assign workers to tasks that the workers are assigned  
42 to only. None certified tasks may be undertaken by any personnel.
- 43 e. The contractor and/or the Historic Masonry Consultant shall develop a  
44 method for identifying workers and their certifications to aid in the review of  
45 workers and their work.
- 46 2. Owner reserves the right to remove any workers from the project site who does not  
47 meet the standards and performance criteria as described in this section.
- 48 E. Stone Rehabilitation Firm Qualifications:
- 49 1. The General Contractor shall engage an experienced masonry rehabilitation firm to  
50 perform work in this section. The firm shall have completed work similar in material,  
51 design, and extent to that indicated for this Project and shall demonstrate a record of  
52 successful in-service performance. Proven implementation of the Secretary of the  
53 Interior's Standards for Rehabilitation: Preservation Briefs #1 and #2 and compliance  
54 with TMS 402-08/ACI 530-08/ASCE 5-08 are required.
- 55 F. Field Supervision:
- 56 1. Masonry rehabilitation firms shall maintain an experienced full-time supervisor on the  
57 Project site at all times when stone masonry rehabilitation is in progress. A single  
58 individual shall be responsible for supervising the stone masonry rehabilitation work  
59 throughout the duration of the Project.
- 60 G. Rehabilitation Worker Qualifications:



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1. Rehabilitation specialist firms must employ craftspersons who are experienced with and specialize in rehabilitation work of the types they will be performing.
  2. All rehabilitation treatments must be performed by a project - certified craftsperson who is familiar with historic stone construction. The Contractor shall provide proof of such knowledge to the Architect by submitting a project training certificate for each worker for each rehabilitation treatment to be assigned.
  3. Only skilled journeyman masons who are familiar with and experienced with the materials and methods specified, and who have successfully obtained a Project Training Certificate as defined herein and are familiar with the design requirements shall be used for the scope of this Section.
- H. Source Limitations:
1. Each type of material for stone rehabilitation shall be obtained from a single source with resources sufficient to provide materials of consistent quality in color, texture, detailing, appearance and physical properties.
- I. Mortar Analysis and Testing (By Owner):
1. Applicable ASTM Testing and analysis shall be performed on both the existing historic mortar and any new mortar proposed for the setting and repointing of existing and new stone. All testing shall meet industry standards and be carried out by an independent laboratory with experience in historic masonry materials. The Contractor shall be responsible for providing the Architect with technical test data documenting, at a minimum, the compressive strength ASTM Test C170, rate of absorption ASTM Test C97 and vapor transmission characteristics ASTM Test E96-Water Method-Modified, in comparison to the original historic mortar.
  2. Note ASTM Test E96-Water Method-Modified testing shall be completed by:
    - a. AMT Laboratories • 3741 Greenway Circle • Lawrence, Kansas 66046 • (888) 376-3600
    - b. Contact: Courtney Murdock
- J. Stone Analysis and Testing (By Owner):
1. Applicable ASTM Testing and analysis shall be performed on both the existing historic stone and any new stone or reclaimed stone proposed for replacement. All testing shall meet industry standards and be carried out by an independent laboratory with experience in historic masonry materials. The Contractor shall be responsible for providing the Architect with technical test data documenting, at a minimum, the compressive strength ASTM Test C170, rate of absorption ASTM Test C97 and vapor transmission characteristics ASTM Test E96-Water Method-Modified, in comparison to the original historic stone.
  2. Note ASTM Test E96-Water Method-Modified testing shall be completed by:
    - a. AMT Laboratories • 3741 Greenway Circle • Lawrence, Kansas 66046 • (888) 376-3600
    - b. Contact Courtney Murdock
- K. Stone Treatment Mock-ups:
1. All submittals as noted herein shall be submitted and approved prior to the creation of mock-ups.
  2. Consult the Architect for placement, size, and location of mock-ups. Mock-ups shall demonstrate to the Architect and Owner the methods and quality of workmanship to be performed in all stone treatments.
  3. The mock-ups shall be installed and approved as part of the certification process required under this contract; and shall be required only for those treatments that are included in this scope of work.
  4. Prepare mock-ups directly on the existing historic wall under the same weather conditions expected during the remainder of the work.
  5. Throughout rehabilitation, retain approved mock-up panels in undisturbed condition, suitably marked, as a standard for judging completed work.
    1. There shall be one approved mock-up for every worker and every treatment for which they are certified.
  6. Mock-ups shall include separate treatments, as called out on the drawings and related specification Sections, see Part 3 – Execution herein. These are as follows:
    - a. Repointing Mortar Installation - Repoint mortar joints, 12 feet in length and three (3) courses high. (Training and Certification for this task is required)
    - b. Substitute Stone Patch – Substitute stone patch material repair on at least two (2) stones. Include one stone on which to demonstrate proficiency in

- 1 removing previous patching material and repairing with new substitute stone  
2 patch material. (Training and Certification for this task is required)
- 3 c. Crack Repair – Repair one (1) crack, 18 inches in length, using dispersed  
4 hydrated lime injection technique with spachal surface treatment. (Training  
5 and Certification for this task is required)
- 6 d. Dutchman - Undertake Dutchman repairs in two (2) locations, including one  
7 that is only cut and prepared for application. (Training and Certification for  
8 this task is required)
- 9 e. Masonry Adhesive – Perform one (1) masonry adhesive process that fully  
10 meets the requirements of this specification.
- 11 f. Stain – Perform one (1) area of stone stain to match adjacent original stone  
12 (post-cleaning).
- 13 g. Redress Stone in-situ – Perform one (1) area of stone resurfacing/redress.
- 14 h. Baluster Repair – Complete baluster repair in one (1) location/one (1)  
15 baluster. The work will include the binding, removal, core-drill, helical  
16 anchor installation, lime injection/adhesive installation and stain.
- 17 i. Cleaning - restoration cleaning will not be required.
- 18 j. Note: Review all masonry restoration exhibits to confirm all work required  
19 under this section.  
20

### 21 1.5 SUBMITTALS

- 22 A. Submit the following items in time to prevent delay of the work and to allow adequate time for  
23 review. Do not order materials or start work before receiving written approval.
- 24 B. Submit samples of all specified materials and Material Safety Data Sheets (MSDS) as appropriate.
- 25 C. Submit test results from all ASTM testing analyses as described in Quality Assurance.
- 26 1. All testing shall be coordinated by: John Lambert, 681 South 4050 West, Salt Lake  
27 City, UT 84104; (801) 509-5099 email: [john@masonry-restoration.com](mailto:john@masonry-restoration.com)
- 28 2. Preferred Laboratory Vendor: AMT Laboratories • 3741 Greenway Circle • Lawrence,  
29 Kansas 66046 • (888) 376-3600
- 30 D. Quality Assurance Plan
- 31 1. Submit written plan as outlined in the Quality Assurance Section for the work of this  
32 Section.
- 33 E. Historic Masonry Consultant – Training Program Instructor
- 34 1. Preferred Vendor: John Lambert, Historic Masonry Trainer/Abstract Masonry  
35 Restoration, Inc., 681 South 4050 West, Salt Lake City, UT 84104; (801) 509-5099  
36 email: [john@masonry-restoration.com](mailto:john@masonry-restoration.com)
- 37 2. Other vendors may be considered but must be vetted and approved by the Architect  
38 **PRIOR** to submitting bid. No substitutions will be allowed after the Bid due date.
- 39 F. Project Training Program Plan
- 40 1. Submit written documentation of a training certificate program which complies with  
41 ASTM E2659-09 Standard Practice for Certificate Programs specific to the  
42 rehabilitation treatment requirements of this project. At a minimum the training  
43 program shall include all stone treatment requirements listed on the drawings and the  
44 removal of both cement based mortars and lime mortar and installation of lime mortar.  
45 The documentation shall include: the number of learning events; a defined scope of  
46 training; a list of learning objectives, outcomes, assessment, and evaluation; samples  
47 of written tests; description of skills testing methodology; and requisites to obtain a  
48 certificate.
- 49 G. Project Training Certificates
- 50 1. Submit written project training certificates from an independent Historic Masonry  
51 Consultant – Training Program Instructor verifying that all workers, installers,  
52 supervisors, project managers, and foremen have successfully completed the  
53 requisites from the on-site training program specific to the rehabilitation treatments  
54 assigned to them individually and as specified for this project.
- 55 H. Stone Samples for Verification
- 56 1. Before erecting mockup, submit samples of the following:
- 57 a. Stone Replacement – Full Reclaimed Stones – Owner has a supply of  
58 reclaimed stone for use on this project. Contractor shall verify whether stone  
59 meets specification requirements. Owner makes no assurance that the  
60 reclaimed stone will meet project specification requirements.

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- b. Stone Replacement – Full New Stones – Full new stones shall meet specification requirements for color texture, density, technical performance, and stone type.
  - c. Stone Replacement – Cut Stones – Create each profile for review and approval.
2. Substitute Stone Repair Material – Provide at least two samples for patching material that will match the existing stone. Patching shall match existing stone; therefore, multiple submittals are expected. Substitute stone repair material will not be permitted to be applied in missing areas of more than 2 inches deep.
  3. Qualification Data for Stone Rehabilitation Firm – The firm must submit written documentation of at least 10 individual projects completed in the last 15 years for which they have been the primary masonry specialist. Work must be performed by a contractor with 15 years’ documented successful experience in comparable historic stone masonry rehabilitation projects in size, age and material and who employs personnel skilled in the rehabilitation treatments and rehabilitation process and operations indicated.
    - a. The written submission must include the following:
      - i. Name and address of project
      - ii. Name, address and phone numbers of Client
      - iii. Date of project completion
      - iv. Age of structure and whether it was listed on the National Register of Historic Places or is designated as a Historic Landmark
      - v. How the work scope was specifically delivered to comply with the Secretary of the Interior’s Standards for Rehabilitation.
      - vi. Size of the project, in terms of square feet of stone masonry restored
      - vii. List of materials (including names and manufacturers) used on project
  4. Qualification Data for Field Supervisor –The firm must submit written documentation of at least 10 projects that the Field Supervisor has supervised. The projects may include those that were completed under the employment of a different firm. The list must include projects that are similar in size, age and material to the current project. All stone treatments must be performed and supervised by craftsmen whom are familiar with historic stone masonry construction.
    - a. The written submission must include the following:
      - i. Name and address of project
      - ii. Name, address and phone numbers of Client
      - iii. Date of project completion
      - iv. Size of the project, in terms of square feet of stone masonry required
      - v. List of materials (including names and manufacturers) used on project
      - vi. Name(s) of firm(s) the work was performed under, if different from submitting firm
      - vii. Proof of expertise in historic stone masonry, as indicated by a rehabilitation treatment certificate from the training program defined in this specification
  5. Qualification Data for Workers – The firm must submit the name of each craftsperson who will be assigned to this project. Only skilled journeyman masons, trained and certified by the historic masonry consultant, shall be used for masonry rehabilitation. All stone treatments must be performed and supervised by craftsmen who are familiar with historic stone masonry construction.
    - a. Include the following:
      - i. Name of craftsperson
      - ii. Position craftsperson will hold on this project
      - iii. Number of years working as a masonry rehabilitation specialist
      - iv. Proof of expertise in historic stone masonry, as indicated by a project certificate from the training program defined in this specification
      - v. Submit digital photographic documentation proposed procedures

**1.6 SUBSTITUTIONS**

- A. If alternatives to the methods and materials indicated are proposed for any phase of rehabilitation work, the Contractor shall provide written descriptions and programs of testing and install all test panel samples and mock-ups to demonstrate the effectiveness of the alternatives for use on this project.

- 1 B. The Contractor must provide documentation showing compliance with the requirements for  
2 substitutions and the following information:  
3 1. Coordination information, including a list of changes to other work that will be  
4 necessary to accommodate the substitution  
5 2. A comparison of the substituted products and materials with the specified products  
6 and methods, including performance, weight, size, durability, and visual effect.  
7 3. Certification that the substitution conforms to the contract documents and is  
8 appropriate for the applications indicated. Material substitution requests must be  
9 accompanied by independent laboratory test reports from a lab designated by the  
10 Architect to establish equivalent performance levels and specification compliance.  
11 The Architect shall designate the testing lab, and the party requesting the substitution  
12 shall pay for testing.  
13

14 **1.7 PRODUCT DELIVERY, STORAGE AND HANDLING**

- 15 A. Deliver and store materials in manufacturer's original unopened containers bearing labels  
16 indicating the grade, batch, production data, type, and names of products and manufacturers.  
17 B. During storage and construction, protect rehabilitation materials from wetting by rain, snow or  
18 ground water, and from staining or intermixture with earth or other types of materials.  
19 C. Protect stone and other materials from deterioration by moisture and temperature. Store stone  
20 in a dry location or in waterproof containers. Keep stone on pallets. Do not shrink wrap stone  
21 on pallets.  
22 D. Comply with product manufacturer's recommendations for minimum and maximum  
23 temperature requirements for storage.  
24 E. Comply with the manufacturer's written specifications and recommendations for application  
25 and installation.  
26 F. Store all materials in a location that will not impede the progress of the work.  
27

28 **1.8 PROJECT CONDITIONS**

- 29 A. Do not perform any masonry work unless air temperatures are between 40 degrees Fahrenheit  
30 (10 degrees Celsius) and 95 degrees Fahrenheit (32 degrees Celsius) and will remain so for at  
31 least 120 hours after completion of the work. To prevent premature evaporation of the mortar,  
32 phase masonry work during hot weather by completing the process on the shady side of the  
33 wall or by scheduling installation of materials during cooler evening hours.  
34 B. Do not use frozen materials or materials mixed or coated with ice or frost. Do not lower the  
35 freezing point of mortar by the use of admixtures or anti-freeze agents, and do not use  
36 chlorides in the mortar.  
37 C. Prevent mortar from staining the face of the masonry or other surfaces to be left exposed.  
38 Immediately remove all mortar that comes in contact with any surface.  
39 D. Cover partially completed work when work is not in progress.  
40 E. Protect projections from droppings.  
41 F. Damage occurring to the structure as a result of the Contractor's failure to protect against such  
42 damage shall be the Contractor's responsibility. The contractor shall restore damaged areas to  
43 the complete satisfaction of the Architect at no expense to the Owner.  
44 G. Cold-Weather Requirement for masonry repair and mortar:  
45 1. Follow ACSI 530 and manufacturers written installation requirements.  
46 H. Hot-Weather Requirements:  
47 1. Protect masonry repair and mortar-joint pointing when temperature and humidity  
48 conditions produce excessive evaporation of water. Provide artificial shade and wind  
49 breaks and use cooled materials as required. Do not apply mortar to substrates with  
50 temperatures of 90 degrees Fahrenheit and above.  
51

52 **1.9 ATTIC STOCK**

- 53 A. Provide the following products and amounts for Owner attic stock:  
54 1. Rehabilitation Mortars - At least 6 bags of unopened NHL 3.5.  
55 2. Substitute Stone Repair Materials - At least 1 gallon unopened containers for each  
56 type of stone patching material used. There will be up to 6 patch colors required.  
57 3. Any unused, reclaimed stone from stone replacement such as the rebuild of the  
58 Wilson Stairs at the end of the Project. Palletize the stones and transport to an offsite  
59 location as designated by the City.  
60  
61

**PART 2 – PRODUCTS**

**2.1 MANUFACTURERS**

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply for product selection:
1. Products: Subject to compliance with requirements, provide one of the products specified.
  2. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

**2.2 SUBSTITUTE STONE PATCH MATERIAL**

- A. Substitute Stone Patch Material: Must use only mineral-based, single component products that contain natural binders; no synthetic polymers or additives are permitted. Substitute stone material must be pre-mixed in a quality controlled factory, with only the addition of water required at the site prior to installation.
- B. Acceptable material:
1. Jahn M70 Repair Mortar, Cathedral Stone Products, Jessup, Maryland
- C. Substitute Stone Patch Material shall be custom colored to match the existing stone and produced in a quality controlled factory environment. The contractor will be expected to keep a stock of a range of six (6) custom colors.
- D. No field mixing of color pigments into the repair materials is permitted on-site.
- E. No color staining of existing stone or newly applied repair materials is permitted.
- F. Apply substitute stone materials to areas no more than 2 inches in depth and 3 inches wide or as specifically allowed by the manufacturer.

**2.3 STONE REPLACEMENT MATERIAL**

- A. Oolitic Indiana Limestone shall be by the Indiana Limestone Company; no substitutes will be allowed. The Contractor shall use replacement stone that is compatible to the existing stone in appearance, color and texture, as well as in the physical properties identified in section 1.4.j (above) the following manufacturers/distributed may be contacted for samples:
1. Quarra Stone Company, LLC, Madison, Wisconsin, Contact: Steve Ensor, (608) 246-8803
  2. Galloy & Van Etten, Chicago, Illinois, Contact: Tom Van Etten, (773) 928-4800
  3. Gary Galassi Stone & Steel, Romeoville, Illinois, Contact: (815) 886-3906
  4. Madison Block and Stone, Madison, Wisconsin, Contact: Wayne Welzien, (608) 429-5633
  5. Halquist Stone Co. Inc., Sussex, WI, Contact: (262) 246-9000
  6. Approved equal (approval required prior to Bid)
- B. Mortar for laying replacement stone: Mortar shall be the same as the pointing mortar, as defined in this Section.

**2.4 ALL MORTAR MATERIALS**

- A. The basis of the mortar for this project shall be:
1. St. Astier Natural Hydraulic Lime NHL 3.5, distributed by TransMineral USA.
  2. Pigment – None.
  3. Sand – Sand shall be clean and uncontaminated by clay/silt. Janesville #1 by Janesville Sand and Gravel, 1110 Harding Street, P.O. Box 427 Janesville, WI 53547, 800-955-7702.
  4. Final mortar mix shall be determined in the field under the direction of the Architect. For the purposes of this bid use the following lime/sand ratio (1:2.5) by volume.
- B. All mortar shall be prepared and placed in accordance with the Department of the Interior National Park Service Cultural Resources Preservation Briefs 2, "Repointing Mortar Joints in Historic Masonry Buildings" (Revised Edition October 1998), and in compliance with the guidelines set forth by the Secretary of the Interior's Standards.
- C. The mortar shall match the original in color, grain size and texture. The compressive strength of the repointing mortar shall be equal or less than the compressive strength of the original mortar and surrounding brick. The replacement mortar shall contain approximately the same ingredient proportions of the original mortar and shall have a water vapor transmission rate greater than all adjacent masonry.
- D. All replacement mortar ingredients and mortar formulations have been established from test data gathered from the original materials sampled from site, and from performance data observed in the field.
- E. Mixing of individual mortar ingredients at the construction site will be permitted.

- 1 F. Repointing mortars may be pre-blended (not including water) in single containers in a factory-  
2 controlled environment, however the architect shall have FULL authority to reject any process that  
3 in his sole discretion will not meet the intent of this specification.  
4 G. All ingredients will be converted from volume measurements to weight measurements to ensure  
5 quality production of the mortar. This must be accomplished prior to any mix manufacture with the  
6 Natural Hydraulic Lime manufacturer.  
7 H. All mortar materials delivered to the site shall be tested to confirm specification compliance before  
8 mortar is installed in the wall.  
9

## 10 2.5 OTHER MATERIALS

- 11 A. Expansion Anchor: HY 150 Max with stainless steel bolt washer and nut, manufactured by Hilti,  
12 Inc., 1132 Miller Park Way, Milwaukee, Wisconsin, 53214, [us-sales@hilti.com](mailto:us-sales@hilti.com).  
13 B. Shims: 2 inch by 4 inch by 1/16 inch, 1/8 inch, and 1/4 inch, plastic shims as manufactured by  
14 Racknow Polymers and distributed by Lance Construction Supplies, Inc., Chicago, Illinois, or  
15 approved equal.  
16 C. Strap Anchors: "No. 141 U-Type Stone Anchor," 8 inches long by 1-1/4 inch wide with a 7/8 inch  
17 bend (Interior dimension). 16 gauge or 0.625 inch (1/16 inch) thickness, stainless steel conforming  
18 to ASTM A 167, AISI Type 304, as manufactured by Heckmann Building Products, Inc., Melrose  
19 Park, Illinois.  
20 D. Dowels (Pins): 3/8 inch diameter by 4 inch long, smooth finish, stainless steel, conforming to ASTM  
21 267, AISI Type 304 or 316.  
22 E. Lead Cap Flashing: Such as Weathercap lead flashing (Type A and Type B), by Weathercap, Inc.,  
23 P.O. Box 1776 Slidell, LA 70459 (985) 649-4000.  
24 F. Water: Potable (this means that you should be able to drink it), fresh, clean, clear and free from  
25 injurious amounts of sewage, oil, acid, alkali, salts, organic matter or other detrimental substances.  
26 G. Structural Angle Steel Lintels: hot dipped galvanized ASTM A36 steel – galvanized post  
27 modification.  
28 H. Self-adhering Membrane Flashing: "Polyguard 400 Thru Wall Flashing," a 40 mil, self-adhering,  
29 self-healing membrane consisting of a rubberized asphalt waterproofing element, bonded to a  
30 strong polyethylene film top surface, as manufactured by Polyguard Products Inc, Ennis, Texas, or  
31 "Perm-A-Barrier Wall Flashing," 40-mil, self-adhering membrane wall flashing as manufactured by  
32 W.R. Grace & Co., Columbia, Maryland, or approved equal.  
33 I. Through-wall Flashing Drip Edge: "Preformed Stainless Steel Drip Edge." 28 gauge (15 mils thick),  
34 1-5/8" wide with a 3/8" bend at one end made of Type 304 grade, dull finish stainless steel in  
35 conformance with ASTM A 167, as manufactured by Polyguard Products inc, Ennis, Texas, or  
36 approved equal.  
37 J. Helical Anchors: Such as Spira-Lok helical wall tie system by Blok-Lok. Confirm size and confirm  
38 with Architect prior to use.  
39 K. Masonry Adhesive: Such as Ultimate Modified Polyurethane Hybrid (MPH), color: Buff, by  
40 Bonstone Materials Corp.  
41 L. Crack Injection Material: Depending upon condition in field (characteristics of crack) the following  
42 materials may be used:  
43 i. Dispersed Hydrated Lime Injection Mortar such as DHL-IM by US Heritage Group or  
44 approved equal.  
45 ii. Last Patch Gel by Bonstone Materials Corp.  
46 iii. Crack Repair 31, Low Viscosity Crack Injection Resin by Bonstone Materials Corp.  
47 M. Consolidation Treatment: Such as HCT (Pretreatment) and OH100 Consolidation Treatment by  
48 Prosoco.  
49 N. Cleaner for Asphalt Tar and Non-Silicone Sealant: Thixotropic stripping compound such as Sure  
50 Klean Fast Acting Stripper by Prosoco or approved equal.  
51 O. Cleaner for Silicone Sealants: Such as Sure Klean Dicone NC9 by Prosoco or approved equal.  
52 P. Other Items: All other materials not specifically described but required for a complete and proper  
53 installation of the Work in this Section, shall be selected by the Contractor subject to approval by  
54 the Architect.  
55

## 56 **PART 3 – EXECUTION**

### 57 3.1 EXAMINATION

- 58 A. The Contractor shall have the sole responsibility for the accuracy of all measurements and for the  
59 estimate of material quantities required and necessary to satisfy the requirements of these  
60

Specifications. It is the intent of this project to salvage, preserve and reuse existing stone to the greatest extent possible.

- B. Whenever possible, where full stone replacement is deemed necessary, use approved original material salvaged and stored by the Owner.
- C. Should replacement stone be required due to irreparable damage; match all physical properties including color, texture and size of existing stone.
- D. Verify that installation conditions are satisfactory to receive work of this Section.
- E. Do not proceed until unsatisfactory conditions have been corrected.
- F. Beginning work constitutes the Contractor's acceptance of conditions as satisfactory.
- G. During deconstruction, as well as rehabilitation operations, restore all areas to a weathertight condition each day and/or before inclement weather commences.

### 3.2 SUBSTITUTE STONE PATCH (SSP)

- A. Substitute stone repairs require a moldable, plastic filled material applied directly to the loss area and set into place by its own adhesion to the stone substrate. Such stone repair mortars and putties are typically offered by manufacturing companies that do not sell stone. Estimates for the volume of material removed and needed for this repair are provided in Exhibit G; final scope may vary depending on conditions encountered in the field.
- B. Substitute stone material may not be installed in thicknesses exceeding 2 inches. Stone repairs in excess of 2 inches thick will require reconfiguring the stone in lieu of performing other repairs.
- C. Remove all loose mortar and masonry prior to installation of the substitute stone material. "Sound" the masonry with a hammer to verify its integrity. If necessary, cut away an additional 1/2" of the stone substrate to ensure the surface to be repaired is solid and stable. Remove any sealant residue.
- D. Cut out all cramp anchors, threaded rod anchors and/or dowels within the damaged masonry area. Any anchors that are free of rust, solidly embedded, and do not project beyond the solid masonry surface may remain. All others should be removed.
- E. Using clean water and a scrub brush, clean all dust from surface and pores of the substrate.
- F. For very dry or porous surfaces, pre-wet the substrate ahead of time to prevent the substrate from drawing moisture out of the repair too quickly. Re-wet the surface immediately before applying the repair material.
- G. Use methods established in project training program to deliver the substitute stone repair work as demonstrated and approved by the Architect and Owner.
- H. Curing methods vary in different parts of the country and at different times of the year, calling for different amounts of water to be used in the first 36 hours after application. Adjustments also have to take into account how much time is remaining before freezing weather occurs.
- I. Follow all manufacturers' instructions pertaining to the placement of materials. If the manufacturer requires that installers of a specified product be trained, provide this documentation to the Architect and supporting documentation. Training certificates previously issued by product companies for the application of specified products may not be substituted for the Project Training "Substitute Stone Certificate" on this project. Applicators previously trained by product companies are encouraged to work on this specific scope, but it is not a mandatory requirement of this specification, only that of the product company to ensure the proper placement of the materials.
- J. Only rehabilitation technicians that hold a Project Training "Substitute Stone Repair Certificate" will be permitted to work on the scope of this stone repair treatment as defined.

### 3.3 FERROUS ANCHOR/BOLT REMOVAL

- A. Remove masonry anchors, brackets, wood nailers, and other extraneous items no longer in use unless identified as historically significant or indicated to remain. Estimates for the number of fastener repairs needed for this work are provided in Exhibit G; final scope may vary depending on conditions encountered in the field.
- B. Remove items carefully to avoid spalling or cracking masonry.
- C. If item cannot be removed without damaging surrounding masonry, cut off item flush with surface and core drill surrounding masonry and item as close around item as practical.
- D. Only rehabilitation technicians that hold a Project Training "Ferrous Anchor/Bolt Removal Certificate" will be permitted to work on the scope of this stone repair treatment as defined.

### 3.4 STONE PLUG REPAIR

- A. At locations where ferrous anchor bolts and the like are removed prepare a replacement plug by core-drilling replacement stone. Use a drill sized to produce a core that will fit into hole drilled in damaged stone with tolerances of no more than +/- 1/16 inch. Estimates for the number of stone

1 plugs needed for this repair are provided in Exhibit G; final scope may vary depending on  
2 conditions encountered in the field.

- 3 B. Adhere the repair piece with substitute stone patch material and clamp so the seam may cure. Prior  
4 to adhering with lime putty, the new piece of stone shall be carved and refined to match the surface  
5 of the adjacent original stone in both profile and finish. This step is necessary to allow a virtually  
6 invisible replacement repair.
- 7 C. Use methods established in project training program to deliver acceptable repair work as  
8 demonstrated and approved by the Architect and Owner.
- 9 D. Prior to installing the new piece, the stone shall be carved and refined to match the surface of the  
10 adjacent original stone in both profile and finish. This step is necessary to allow a virtually invisible  
11 replacement repair. Adhere the repair piece with mortar that has a high content of lime (hydrated  
12 or putty) and clamp so the seam may cure.
- 13 E. Only rehabilitation technicians that hold a Project Training "Stone Plug Repair Certificate" will be  
14 permitted to work on the scope of this stone repair treatment as defined.

### 15 16 **3.5 REMOVE, REDRESS AND RESET**

- 17 A. Before removing any deteriorated masonry units establish bonding patterns, levels and coursings.  
18 Label each unit, numbered on drawings, for this treatment to correspond. Intent of label is to  
19 ensure return of stone to same location and bond pattern. Label the stones on a surface which will  
20 be completely hidden once the stones are reinstalled. The method of labeling should be  
21 compatible with specified mortars (and not result in non-adhesion or an adverse reaction to the  
22 mortar, etc.) Numbered stones should be oriented the same (up/down, north, south, east, west)  
23 when reinstalled as when they were removed. Estimates for the amount of each technique/scope  
24 needed for this repair are provided in Exhibit G; final scope may vary depending on conditions  
25 encountered in the field.
- 26 B. Carefully remove units in gentlest means necessary for reinstallation at the same location.
- 27 C. Scale off all loose pieces of original stone from masonry intended to be removed, redressed and  
28 returned, including surface material in powder or granular form and detachments of planer  
29 elements, spalls and chips. Contractor shall sound all stone on building by using the "ring test  
30 method" in order to distinguish fully intact stone from those in which delamination may be hidden or  
31 pieces of unstable material may not be immediately visible.
- 32 D. Remove mortar, loose particles, and soil from stone by cleaning with hand chisels, needle scalers,  
33 brushes, and water.
- 34 E. Remove sealants, asphalt and other asphaltic materials by cutting close to stone with utility knife  
35 and cleaning with solvents.
- 36 F. Use methods established in project training program to redress the stone surface to match the  
37 original surface textures and profiles as approved by the Architect and Owner and as required.
- 38 G. It is the intention of this treatment to avoid introducing products to the face of the stone merely to  
39 enhance the look and color of the surface.
- 40 H. Reset unit plane or plumb with the surrounding stone masonry surfaces. The maximum open space  
41 behind the returned stone unit is equal half of the stone's depth. Notify Architect for alternate stone  
42 treatment repair if open space exceeds permissible depth. No infill will be permitted behind stone.
- 43 I. Butter vertical joints for full width before setting and set units in full bed of mortar, unless otherwise  
44 indicated.
- 45 J. Rake out mortar used for laying stone before mortar sets and point new mortar joints in repaired  
46 area to comply with requirements for repointing existing stone, and at same time as repointing of  
47 surrounding area.
- 48 K. Only rehabilitation technicians that hold a Project Training "Remove, Redress and Return  
49 Certificate" will be permitted to work on the scope of this stone repair treatment as defined.

### 50 51 **3.6 STONE REMOVAL AND REPLACEMENT**

- 52 A. When directed, remove stone that has deteriorated or is damaged beyond repair. Carefully  
53 demolish or remove entire units from joint to joint, without damaging surrounding stone, in a  
54 manner that permits replacement with full size units. Estimates for the volume of material removed  
55 and needed for this repair are provided in Exhibit G; final scope may vary depending on conditions  
56 encountered in the field.
- 57 B. Sort stone by size and zone for future use.
- 58 C. Support and protect remaining stonework that surrounds removal area and adjoining construction  
59 in an undamaged condition.
- 60 D. Remove in an undamaged condition as many whole stone units as possible.



- 1 E. Remove mortar, loose particles, and soil from stone by cleaning with hand chisels, needle scalers,  
2 brushes, and water.
- 3 F. Remove sealants, asphalt and other asphaltic materials by cutting close to stone with utility knife  
4 and cleaning with solvents.
- 5 G. Reuse salvaged stone to the fullest extent possible. Integrate new replacement stone in concealed  
6 areas or shielded from public view.
- 7 H. Deliver cleaned stone not required for reuse to Owner per subsection 1.9 of this document.
- 8 I. Clean stone surrounding removal areas by removing mortar, dust, and loose particles in  
9 preparation for replacement.
- 10 J. Only rehabilitation technicians that hold a Project Training "Stone Removal and Replacement  
11 Certificate" will be permitted to work on the scope of this stone repair treatment as defined.
- 12 K. Replace removed stone with other removed stone, where possible, or with new stone matching  
13 existing stone, including size. Butter vertical joints for full width before setting and set units in full  
14 bed of mortar, unless otherwise indicated.
- 15 L. Rake out mortar used for laying stone before mortar sets and point new mortar joints in repaired  
16 area to comply with requirements for repointing existing stone, and at same time as repointing of  
17 surrounding area.
- 18 M. Only rehabilitation technicians that hold a Project Training "Stone Removal and Replacement  
19 Certificate" will be permitted to work on the scope of this stone repair treatment as defined.  
20

### 3.7 DUTCHMAN

- 22 A. Remove damaged stone to a specified depth and insert a new piece of stone to fit in the opening to  
23 create the appearance of a seamless patch. Estimates for the volume of each technique/scope  
24 needed for this repair are provided in Exhibit G; final scope may vary depending on conditions  
25 encountered in the field.
- 26 B. Carefully remove the deteriorated stone material in a larger stone. The Dutchman repair will be  
27 required on stones with surface face loss which exceeds 2 inches minimum in depth.
- 28 C. At locations indicated, remove regular geometric portions of stone units. Carefully remove stone by  
29 making vertical and horizontal saw cuts at face of stone and demolishing corner portion of stone  
30 unit to depth required for fitting partial replacement. Make edges of stone at cuts smooth and  
31 square to each other and to finished surface.
- 32 D. Remove loose mortar particles and other debris from surfaces to be bonded and surfaces of  
33 adjacent stone units that will receive mortar by cleaning with stiff-fiber brush.
- 34 E. The new piece must precisely fit into place with tolerances of no more than +/-1/16-inch. Supporting  
35 rods of stainless steel may be necessary for some Dutchman repairs, depending on the extent of  
36 the repair and the location.
- 37 F. Prior to installing the new piece, the stone shall be carved and refined to match the surface of the  
38 adjacent original stone in both profile and finish. This step is necessary to allow a virtually invisible  
39 replacement repair. Adhere the repair piece with specified adhesive.  
40

### 3.8 CRACK INJECTION AND STAIN

- 42 A. General: Comply with cementitious crack filler manufacturer's written instructions. Estimates for the  
43 amount of crack injection needed for this repair are provided in Exhibit G; alternative methods may  
44 be proposed to reduce impact on existing material. Final scope may vary depending on conditions  
45 encountered in the field.
- 46 B. Drill 1/4-inch- (6-mm-) diameter, downward-sloping injection holes as follows:
- 47 1. Transverse Cracks Less Than 3/8 inch (10 mm) Wide: Drill holes through center of crack  
48 at 12 to 18 inches (300 to 500 mm) o.c.
- 49 2. Transverse Cracks More Than 3/8 inch (10 mm) Wide: Drill holes through center of crack  
50 at 18 to 36 inches (500 to 1000 mm) o.c.
- 51 C. Clean out drill holes and cracks with compressed air and water. Remove dirt and organic matter,  
52 loose material, sealants, and failed crack repair materials.
- 53 D. Place plastic injection ports in drilled holes and seal face of cracks between injection ports with clay  
54 or other non-staining, removable plugging material. Leave openings at upper ends of cracks for air  
55 release.
- 56 E. Inject cementitious crack filler through ports sequentially, beginning at one end of area and working  
57 to opposite end; where possible begin at lower end of injection area and work upward.
- 58 F. Inject filler until it extrudes from adjacent ports. After port has been injected, plug with clay or other  
59 suitable material and begin injecting filler at adjacent port, repeating process until all ports have  
60 been injected.
- 61 G. Clean cementitious crack filler from face of stone before it sets by scrubbing with water.

- 1 H. After cementitious crack filler has set, remove injection ports, plugging material, and excess filler.  
2 Patch injection holes and surface of cracks as specified.  
3 I. For all areas of exposed crack filler material, apply new stain/pigment to offset the color to best  
4 match the adjacent stone.  
5 J. Only rehabilitation technicians that hold a Project Training "Crack Lime Injection and Stain  
6 Certificate" will be permitted to work on the scope of this stone repair treatment as defined.  
7

### 3.9 MASONRY ADHESIVE

- 8  
9 A. General: Comply with masonry adhesive manufacturer's written instructions. Estimates for the  
10 amount of masonry adhesive needed for this repair are provided in Exhibit G; final scope may vary  
11 depending on conditions encountered in the field.  
12 B. Carefully remove stone fragments as required and reserve for adhesion to existing stone substrate.  
13 C. Prepare all surfaces for adhesion as directed by the adhesive manufacturer.  
14 D. Apply masonry adhesive in strict accordance with the requirements of the adhesive manufacturer.  
15 E. Reinstall reserved stone fragments, clamping or securing as required to promote a permanent bond  
16 F. Avoid excessive adhesive and immediately clean all adhesive smears  
17 G. Fill all voids remaining after the stone material has been adhered with compatible stone patch  
18 material as specified herein  
19 H. Only rehabilitation technicians that hold a Project Training "Masonry Adhesive Certificate" will be  
20 permitted to work on the scope of this stone repair treatment as defined.  
21

### 3.10 DRESS STONE IN-SITU

- 22  
23 A. Carefully remove loose stone fragments from face of stone. Estimates for the area of redress in-situ  
24 needed for this repair are provided in Exhibit G; final scope may vary depending on conditions  
25 encountered in the field.  
26 B. Finish face of stone to match existing texture.  
27

### 3.11 BALUSTER REPAIR

- 28  
29 A. It is the intent of this project to preserve all balusters for reinstallation.  
30 B. Bidders note: this process has been developed and executed on one baluster. The actual process  
31 can be made available at your request.  
32 C. Bind the balusters. While the balusters are still in place, bind and fully support each individual  
33 baluster through the use of non-penetrating and/or destructive means.  
34 D. Remove and preserve the balusters for reuse. Number each baluster and document its location in  
35 the wall so that it can be returned during the parapet rebuild.  
36 E. Prepare the baluster for helifix installation. This has been done during our mock-up process by  
37 creating a simple jig.  
38 F. Drill helifix port vertically into baluster.  
39 G. Install helifix anchor in strict accordance with manufacturer's requirements.  
40 H. Repair cracks utilizing methods described herein including lime injection, staining, stone substitute  
41 material patch, etc.  
42 I. Reinstall balusters.  
43 J. Touch up as required.  
44

### 3.12 POINTING OF MORTAR JOINTS IN STONE

- 45  
46 A. Center Cut Method: Existing horizontal mortar joints (bed joints) may be raked out using a rotary  
47 grinder with diamond blade that is narrower than the joint width but not more than 50%.  
48 B. The vertical mortar joints (head joints) shall be removed by hand using masonry chisels or  
49 pneumatic carving tools powered by air; they SHALL NOT be raked out using rotary power saws.  
50 This work should be included in the overall cost for repointing; final scope may vary depending on  
51 conditions encountered in the field.  
52 C. All joints (unless otherwise noted) shall be raked back to sound, solid, back up material. All raking  
53 out should leave a clean, square face at the back of the joint to provide for maximum contact of  
54 pointing mortar with the masonry back up mortar. Shallow or feather edging shall not be permitted.  
55 D. If, after mortar is raked back voids are encountered in the historic mortar, then prepare the joint to  
56 provide a proper substrate for pointing mortar installation (tamp pointing).  
57 E. Existing mortar joints shall be raked out a minimum depth of 2 1/2 times the width of the existing  
58 mortar joints or as indicated on the drawings.  
59 F. Contractor shall not widen the existing masonry joints.  
60 G. The surrounding masonry edges shall not be spalled or chipped in the process of mortar removal.

- 1 H. Damage to surrounding stone resulting from rotary blade over running shall not be permitted.  
2 Contractor shall replace all stone damaged during mortar removal with replacement units that  
3 match the original exactly. This work shall be done at the Contractor's sole expense.
- 4 I. Remove all friable material. Brush, vacuum, blow out or flush joints with water to remove dirt and  
5 loose debris, working from top to bottom of wall.
- 6 J. Exposed surface of stone adjacent to joint shall be thoroughly saturated prior to re-pointing.  
7 Maintain a water sprayer on site at all times during the re-pointing process.
- 8 K. The mortar material shall resemble the consistency of brown sugar during installation. This drier  
9 consistency enables the material to be tightly packed into the joint and allows for cleaner work and  
10 helps to prevent shrinkage cracks as the mortar cures.
- 11 L. Walls should be presoaked with water 10 minutes prior to pointing or as weather conditions dictate.  
12 Walls should be misted with water for duration of at least 3 minutes at the end of the day after initial  
13 installation. Keep newly pointed wall moist for a minimum of 3-days after installation, including  
14 weekends and holidays. 3 times per day minimum – morning, noon and night.
- 15 M. Rinse stone joint with water to remove dust and mortar particles. Time the rinsing application so  
16 that at the time of pointing excess water has evaporated or run off. Joint surfaces should be damp  
17 but free from standing water.
- 18 N. Mortar may be pre-mixed by approved manufacturer.
- 19 O. Joints should be pointed in layers or "lifts" where the joints are deeper than 1-1/4 inch. Apply in  
20 layers not greater than 1/2 the depth but not more than 1-1/4 inch or until a uniform depth is  
21 formed. Compact each layer thoroughly and allow it to become thumbprint hard before applying the  
22 next layer.
- 23 P. Lift examples:  
24 1. 3/16" joint depth (1/16" joint existing) point in one lift  
25 2. 5/16" joint depth (1/8" joint existing) point in one lift  
26 3. 5/8" joint depth (1/4" joint existing) point in one lift  
27 4. 5/16" joint depth (3/8" joint existing) point in one lift  
28 5. 1-1/4" joint depth (1/2" joint existing) point in one lift  
29 6. 1-7/8" joint depth (3/4" joint existing) point in one lift  
30 7. 2-1/2" joint depth (1" joint existing) point in one lift
- 31 Q. Point all mortar joints to a weather struck/stipple finish profile.
- 32 R. When mortar is thumbprint hard the joints shall be finished to match the original historic joint profile.
- 33 S. Keep mortar from drying out too quickly. Protection from direct sun and high winds for the first 72  
34 hours after installation. Thoroughly soak the wall a minimum of three times per day for the first 3  
35 days. Protect freshly pointed areas with vapor permeable sheeting such as burlap for the first 24  
36 hours after installation.
- 37 T. Install permanent protection from direct sun and high winds. If a scaffold is used, 100% sun screen  
38 mesh should be utilized.
- 39 U. Thoroughly soak the wall a minimum of three times per day for the first 3 days. Protect freshly  
40 pointed areas with damp breathable sheeting (burlap or for the first 24 hours after installation.
- 41 V. Allow mortar to harden at least 30 days before beginning cleaning work.

### 3.13 CONSOLIDATION

- 44 A. Install consolidation material as specified in strict accordance with the manufacturer's  
45 requirements. Estimates for scope of this treatment are included in the notes. No works is to  
46 commence on a sacred stone without first receiving approval for the final scope from the Architect.

### 3.14 FINISHING TECHNIQUES

- 49 A. Acceptable finishing techniques for redressing, substitute stone and crack repair will be defined  
50 during the demonstration and test panel work which is part of the training program as approved by  
51 the Architect and Owner.
- 52 B. Do not create vibrations in the wall to dislodge or separate bond from previously completed work.

### 3.15 LEAD CAP FLASHING INSTALLATION

- 55 A. Install new lead cap flashings in strict accordance with the manufacturer's requirements.

### 3.16 CLEANING

- 58 A. Use care when installing mortar, use appropriate methods and workers who are capable of  
59 executing work without excessive mess.

- 1 B. After mortar has fully hardened, thoroughly clean exposed masonry surfaces of excess mortar and  
2 foreign matter; use wood scrapers, stiff-nylon or fiber brushes, and clean water, spray applied at  
3 low pressure.  
4 1. Do not use metal scrapers or brushes.  
5 2. Do not use acidic or alkaline cleaners.  
6 C. Wash adjacent non-masonry surfaces, if applicable. Use detergent and soft brushes or cloths.  
7 D. Sweep and rake adjacent pavement and grounds to remove masonry debris. Where necessary,  
8 pressure wash surfaces to remove mortar, dust, dirt, and stains.  
9 E. Preliminary Cleaning: Before beginning general cleaning, remove extraneous substances that are  
10 resistant to cleaning methods being used. Extraneous substances include paint, caulking, sealant,  
11 asphalt, and tar.  
12 F. Remove paint and caulking with a non-damaging/staining paint remover.  
13 G. Repeat application up to two times if needed.  
14 H. Remove asphalt and tar with solvent-type paint remover.  
15 I. Apply only to asphalt and tar by brush without pre-wetting.  
16 J. Allow paint remover to remain on surface for 10 to 30 minutes.  
17 K. Rinse off with water following manufacturer's instructions.  
18 L. Repeat application if needed.  
19 M. Chemical Cleaner Application Methods: **NO CHEMICAL CLEANERS WILL BE PERMITTED FOR**  
20 **USE ON THIS PROJECT EXCEPT THOSE SPECIFICALLY SPECIFIED.** Prior to commencement  
21 of any cleaning the contractor shall test the areas as recommended by the manufacturer pending  
22 the Architect's review and approval. Final cleaning process must be approved by the Owner and  
23 Architect.  
24 N. Removing Plant Growth: Completely remove plant, moss, and shrub growth from masonry  
25 surfaces. Carefully remove plants, creepers, and vegetation by cutting at roots and allowing to dry  
26 as long as possible before removal. Remove loose soil and debris from open masonry joints to  
27 whatever depth they occur.  
28 O. Proceed with cleaning in an orderly manner with material selected from mock up testing; work from  
29 top to bottom of each scaffold width and from one end of each elevation to the other.  
30 P. Perform each cleaning method indicated in a manner that results in uniform coverage of all  
31 surfaces, including corners, moldings, and interstices, and that produces an even effect without  
32 streaking or damaging masonry surfaces. Keep area of wall below area of wall being cleaned wet  
33 at all times by rinsing with clean water.  
34 Q. Use only those cleaning methods approved for each foreign material to be removed.  
35 1. Do not use wire brushes or brushes that are not resistant to the cleaner being used.  
36 2. Do not use plastic-bristle brushes if natural-fiber brushes will resist cleaner being used.  
37 3. Use spray equipment that provides controlled application at volume and pressure  
38 indicated, measured at spray tip. Adjust pressure and volume to ensure that cleaning  
39 methods do not damage masonry.  
40 4. Equip units with pressure gages.  
41 5. For water spray application, use fan-shaped spray tip that disperses water at an angle of  
42 25 to 50 degrees.  
43 6. For high-pressure water spray application, use fan-shaped spray tip that disperses water  
44 at an angle of at least 40 degrees. Do not exceed 800 psi. Keep the tip a minimum of 20  
45 inches from masonry.  
46 7. For heated water spray application, use equipment capable of maintaining temperature  
47 between 140 and 160 deg F, 185 to 190 deg F in warm weather, at flow rates indicated.  
48 R. After mortar has fully hardened, thoroughly clean exposed masonry surfaces of excess mortar and  
49 foreign matter; use wood scrapers, stiff-nylon or -fiber brushes, and clean water, spray applied at  
50 low pressure. Do not use metal scrapers or brushes. Do not use acidic or alkaline cleaners to  
51 remove excess mortar.  
52 S. Wash adjacent materials and other non-masonry surfaces. Use detergent and soft brushes or  
53 cloths.  
54 T. Clean masonry debris from roof; rinse off roof and flush scuppers.  
55 U. Sweep and rake adjacent pavement and grounds to remove masonry debris. Where necessary,  
56 pressure wash surfaces to remove mortar, dust, dirt, and stains.  
57  
58

END OF SECTION

SECTION 04 22 00  
CONCRETE UNIT MASONRY

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35 **PART 1 - GENERAL**

36 **1.1 SUMMARY**

- 37 A. Section Includes:
- 38 1. Concrete masonry units.
- 39 2. Steel reinforcing bars.

40 **1.2 DEFINITIONS**

- 41 A. CMU(s): Concrete masonry unit(s).
- 42 B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

43 **1.3 ACTION SUBMITTALS**

- 44 A. Product Data: For each type of product.
- 45 B. Sustainable Design Submittals:
  - 46 1. Product Certificates: For regional materials, indicating location of material manufacturer and point
  - 47 of extraction, harvest, or recovery for each raw material. Include distance to Project and cost for
  - 48 each regional material.
- 49 C. Shop Drawings: For reinforcing steel. Detail bending, lap lengths, and placement of unit masonry
- 50 reinforcing bars. Comply with ACI 315.
- 51 D. Samples: For each type and color of the following:
  - 52 1. Exposed CMUs.
  - 53 2. Pigmented and colored-aggregate mortar.

- 1 **1.4 INFORMATIONAL SUBMITTALS**
- 2 A. Material Certificates: For each type and size of product. For masonry units, include data on material
- 3 properties and material test reports substantiating compliance with requirements.
- 4 B. Mix Designs: For each type of mortar, Include description of type and proportions of ingredients.
- 5 1. Include test reports for mortar mixes required to comply with property specification. Test according
- 6 to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and
- 7 ASTM C 91/C 91M for air content.
- 8 2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with
- 9 compressive strength requirement.
- 10 **1.5 QUALITY ASSURANCE**
- 11 A. Mockup: Refer to Section 01 43 39 – Mockups for description of construction required to complete a
- 12 mockup submittal for review.
- 13 B. Sample Panels: Build sample panels to verify selections made under Sample submittals and to
- 14 demonstrate aesthetic effects. Comply with requirements in Section 01 40 00 "Quality Requirements" for
- 15 mockups.
- 16 1. Build sample panels for typical exterior and interior walls in sizes approximately 48 inches long by
- 17 48 inches by full thickness.
- 18 **1.6 FIELD CONDITIONS**
- 19 A. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do
- 20 not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing
- 21 conditions. Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.
- 22 B. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in
- 23 TMS 602/ACI 530.1/ASCE 6.

24 **PART 2 - PRODUCTS**

- 25 **2.1 UNIT MASONRY, GENERAL**
- 26 A. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6, except as modified by requirements in the
- 27 Contract Documents.
- 28 B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain
- 29 chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in
- 30 the completed Work.
- 31 C. Fire-Resistance Ratings: Comply with requirements for fire-resistance-rated assembly designs indicated.
- 32 1. Where fire-resistance-rated construction is indicated, units shall be listed and labeled by a qualified
- 33 testing agency acceptable to authorities having jurisdiction.
- 34 2. Tests shall comply with UL 618 "Standards of Concrete Masonry Units".
- 35 3. Each unit shall be stamped "Classified UL--See Certificate".
- 36 **2.2 CONCRETE MASONRY UNITS**
- 37 1. 6" Nominal width: CMU-1
- 38 2. 8" Nominal width: CMU-2, Class C-3 (for 3hr rated barrier at north side of addition)
- 39 B. Regional Materials: CMUs shall be manufactured within 500 miles of Project site.
- 40 C. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of
- 41 adjacent units unless otherwise indicated.
- 42 1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and
- 43 other special conditions.
- 44 D. Integral Water Repellent: Provide units made with integral water repellent for exposed units and where
- 45 indicated.
- 46 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products
- 47 that may be incorporated into the Work include, but are not limited to the following:
- 48 a. ACM Chemistries.
- 49 b. BASF Corporation; Construction Systems.
- 50 c. GCP Applied Technologies (formerly Grace Construction Products).
- 51 E. CMUs: ASTM C 90.
- 52 1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of
- 53 2150 psi.
- 54 2. Density Classification: Medium weight.

- 1 **2.3 CONCRETE LINTELS**
- 2 A. Concrete Lintels: ASTM C 1623, matching CMUs in color, texture, and density classification; and with
- 3 reinforcing bars indicated. Provide lintels with net-area compressive strength not less than that of CMUs.
- 4 **2.4 MORTAR AND GROUT MATERIALS**
- 5 A. Regional Materials: Aggregate for mortar and grout, cement, and lime shall be manufactured within 500
- 6 miles of Project site.
- 7 B. Portland Cement: ASTM C 150/C 150M, Type I or II, except Type III may be used for cold-weather
- 8 construction. Provide natural color or white cement as required to produce mortar color indicated.
- 9 C. Hydrated Lime: ASTM C 207, Type S.
- 10 D. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other
- 11 ingredients.
- 12 E. Masonry Cement: ASTM C 91/C 91M.
- 13 F. Aggregate for Mortar: ASTM C 144.
- 14 1. White-Mortar Aggregates: Natural white sand or crushed white stone.
- 15 2. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required
- 16 mortar color.
- 17 G. Aggregate for Grout: ASTM C 404.
- 18 H. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with
- 19 ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of
- 20 composition indicated.
- 21 I. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with CMUs
- 22 containing integral water repellent from same manufacturer.
- 23 J. Water: Potable.
- 24 **2.5 REINFORCEMENT**
- 25 A. Uncoated-Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60.
- 26 B. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells
- 27 and to hold reinforcing bars in center of cells. Units are formed from 0.148-inch steel wire, hot-dip
- 28 galvanized after fabrication. Provide units designed for number of bars indicated.
- 29 C. Masonry-Joint Reinforcement, General: ASTM A 951/A 951M.
- 30 1. Interior Walls: Mill- galvanized, carbon steel.
- 31 2. Exterior Walls: Hot-dip galvanized carbon steel.
- 32 3. Wire Size for Side Rods: [0.148-inch] [0.187-inch] diameter.
- 33 4. Wire Size for Cross Rods: [0.148-inch] [0.187-inch] diameter.
- 34 5. Spacing of Cross Rods: Not more than 16 inches o.c.
- 35 6. Provide in lengths of not less than 10 feet [, with prefabricated corner and tee units].
- 36 **2.6 TIES AND ANCHORS**
- 37 A. Materials: Provide ties and anchors specified in this article that are made from materials that comply with
- 38 the following unless otherwise indicated:
- 39 1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82/A 82M, with ASTM A 153/A 153M, Class B-2
- 40 coating.
- 41 2. Steel Sheet, Galvanized after Fabrication: ASTM A 1008/A 1008M, Commercial Steel, with
- 42 ASTM A 153/A 153M, Class B coating.
- 43 3. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- 44 B. Adjustable Anchors for Connecting to Structural Steel Framing: Provide anchors that allow vertical or
- 45 horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
- 46 1. Anchor Section for Welding to Steel Frame: Crimped 1/4-inch-diameter, hot-dip galvanized-steel
- 47 wire.
- 48 2. Tie Section: Triangular-shaped wire tie made from [0.187-inch-] [0.25-inch-] diameter, hot-dip
- 49 galvanized-steel wire.
- 50

- 1 C. Adjustable Anchors for Connecting to Concrete: Provide anchors that allow vertical or horizontal  
2 adjustment but resist tension and compression forces perpendicular to plane of wall.  
3 1. Connector Section: Dovetail tabs for inserting into dovetail slots in concrete and attached to tie  
4 section; formed from [0.060-inch-thick steel sheet, galvanized after fabrication] [0.105-inch-thick  
5 steel sheet, galvanized after fabrication].  
6 2. Tie Section: Triangular-shaped wire tie made from [0.187-inch-] [0.25-inch-] diameter, hot-dip  
7 galvanized-steel wire.  
8 3. Corrugated-Metal Ties: Metal strips not less than 7/8 inch wide with corrugations having a  
9 wavelength of 0.3 to 0.5 inch and an amplitude of 0.06 to 0.10 inch made from [0.060-inch-thick  
10 steel sheet, galvanized after fabrication] [0.075-inch-thick steel sheet, galvanized after fabrication]  
11 [0.105-inch-thick steel sheet, galvanized after fabrication] with dovetail tabs for inserting into  
12 dovetail slots in concrete.  
13 D. Partition Top Anchors: 0.105-inch-thick metal plate with a 3/8-inch-diameter metal rod 6 inches long  
14 welded to plate and with closed-end plastic tube fitted over rod that allows rod to move in and out of tube.  
15 Fabricate from steel, hot-dip galvanized after fabrication.  
16 E. Rigid Anchors: Fabricate from steel bars 1-1/2 inches wide by 1/4 inch thick by 24 inches long, with ends  
17 turned up 2 inches or with cross pins unless otherwise indicated.  
18 1. Corrosion Protection: Hot-dip galvanized to comply with ASTM A 153/A 153M.

19 **2.7 EMBEDDED FLASHING MATERIALS**

- 20 A. Metal Flashing: Provide metal flashing complying with Section 07 62 00 "Sheet Metal Flashing and Trim"  
21 and as follows:  
22 1. Fabricate metal drip edges from stainless steel. Extend at least 3 inches into wall and 1/2 inch out  
23 from wall, with outer edge bent down 30 degrees and hemmed.  
24 2. Fabricate metal sealant stops from stainless steel. Extend at least 3 inches into wall and out to  
25 exterior face of wall. At exterior face of wall, bend metal back on itself for 3/4 inch and down into  
26 joint 1/4 inch to form a stop for retaining sealant backer rod.  
27 3. Fabricate metal expansion-joint strips from stainless steel to shapes indicated.  
28 B. Flexible Flashing: Use the following unless otherwise indicated:  
29 1. Butyl Rubber Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl  
30 rubber compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded  
31 polyolefin to produce an overall thickness of not less than 0.040 inch.  
32 a. <Double click here to find, evaluate, and insert list of manufacturers and products.>  
33 2. EPDM Flashing: Sheet flashing product made from ethylene-propylene-diene terpolymer,  
34 complying with ASTM D 4637/D 4637M, 0.090 inch thick.  
35 C. Single-Wythe CMU Flashing System: System of CMU cell flashing pans and interlocking CMU web covers  
36 made from UV-resistant, high-density polyethylene. Cell flashing pans have integral weep spouts designed  
37 to be built into mortar bed joints and that extend into the cell to prevent clogging with mortar.  
38 D. Solder and Sealants for Sheet Metal Flashings: As specified in Section 07 62 00 "Sheet Metal Flashing  
39 and Trim."  
40 E. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or  
41 products recommended by flashing manufacturer for bonding flashing sheets to each other and to  
42 substrates.

43 **2.8 MISCELLANEOUS MASONRY ACCESSORIES**

- 44 A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to  
45 35 percent; of width and thickness indicated; formulated from neoprene.  
46 B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with  
47 ASTM D 2000, Designation M2AA-805 and designed to fit standard sash block and to maintain lateral  
48 stability in masonry wall; size and configuration as indicated.  
49 C. Bond-Breaker Strips: Asphalt-saturated felt complying with ASTM D 226/D 226M, Type I (No. 15 asphalt  
50 felt).

51 **2.9 MASONRY-CELL FILL**

- 52 A. Loose-Fill Insulation: Perlite complying with ASTM C 549, Type II (surface treated for water repellency and  
53 limited moisture absorption) or Type IV (surface treated for water repellency and to limit dust generation).  
54 B. Lightweight-Aggregate Fill: ASTM C 331/C 331M.  
55



- 1 **2.10 MORTAR AND GROUT MIXES**  
2 A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-  
3 repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.  
4 1. Do not use calcium chloride in mortar or grout.  
5 2. Use masonry cement mortar unless otherwise indicated.  
6 3. For exterior masonry, use portland cement-lime or masonry cement mortar.  
7 4. For reinforced masonry, use portland cement-lime or masonry cement mortar.  
8 5. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view,  
9 regardless of weather conditions, to ensure that mortar color is consistent.  
10 B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure  
11 quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to  
12 Project site.  
13 C. Mortar for Unit Masonry: Comply with ASTM C 270, Property Specification. Provide the following types of  
14 mortar for applications stated unless another type is indicated.  
15 1. For masonry below grade or in contact with earth, use Type S.  
16 2. For reinforced masonry, use Type N.  
17 3. For mortar parge coats, use Type S or Type N.  
18 4. For exterior, above-grade, load-bearing and nonload-bearing walls and parapet walls; for interior  
19 load-bearing walls; for interior nonload-bearing partitions; and for other applications where another  
20 type is not indicated, use Type N.  
21 5. For interior nonload-bearing partitions, Type O may be used instead of Type N.  
22 D. Grout for Unit Masonry: Comply with ASTM C 476.  
23 1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply  
24 with TMS 602/ACI 530.1/ASCE 6 for dimensions of grout spaces and pour height.  
25 2. Proportion grout in accordance with ASTM C 476, Table 1 or paragraph 4.2.2 for specified 28-day  
26 compressive strength indicated, but not less than 2000 psi.  
27 3. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C 143/C 143M.

28 **PART 3 - EXECUTION**

29 **3.1 INSTALLATION, GENERAL**

- 30 A. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit  
31 adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow  
32 units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where  
33 possible, cut edges concealed.

34 **3.2 TOLERANCES**

- 35 A. Dimensions and Locations of Elements:  
36 1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch or minus 1/4  
37 inch.  
38 2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2  
39 inch.  
40 3. For location of elements in elevation, do not vary from that indicated by more than plus or minus  
41 1/4 inch in a story height or 1/2 inch total.  
42 B. Lines and Levels:  
43 1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10  
44 feet, or 1/2-inch maximum.  
45 2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level  
46 by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2-inch maximum.  
47 3. For vertical lines and surfaces, do not vary from plumb by more than 1/4 inch in 10 feet, 3/8 inch in  
48 20 feet, or 1/2-inch maximum.  
49 4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and  
50 control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2-  
51 inch maximum.  
52 5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 feet, 3/8 inch in 20  
53 feet, or 1/2-inch maximum.  
54

- 1 C. Joints:  
2 1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a  
3 maximum thickness limited to 1/2 inch.  
4 2. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus  
5 1/4 inch.  
6 3. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch.

7 **3.3 LAYING MASONRY WALLS**

- 8 A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and  
9 for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-  
10 size units, particularly at corners, jambs, and, where possible, at other locations.  
11 B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do  
12 not use units with less-than-nominal 4-inch horizontal face dimensions at corners or jambs.  
13 C. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly  
14 with masonry around built-in items.  
15 D. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.  
16 E. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire  
17 mesh, or plastic mesh in the joint below, and rod mortar or grout into core.  
18 F. Fill cores in hollow CMUs with grout 24 inches under bearing plates, beams, lintels, posts, and similar  
19 items unless otherwise indicated.

20 **3.4 MORTAR BEDDING AND JOINTING**

- 21 A. Lay hollow CMUs as follows:  
22 1. Bed face shells in mortar and make head joints of depth equal to bed joints.  
23 2. Bed webs in mortar in all courses of piers, columns, and pilasters.  
24 3. Bed webs in mortar in grouted masonry, including starting course on footings.  
25 4. Fully bed entire units, including areas under cells, at starting course on footings where cells are not  
26 grouted.  
27 B. Lay solid CMUs with completely filled bed and head joints; butter ends with sufficient mortar to fill head  
28 joints and shove into place. Do not deeply furrow bed joints or slush head joints.  
29 C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness  
30 unless otherwise indicated.  
31 D. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint)  
32 unless otherwise indicated.

33 **3.5 MASONRY-CELL FILL**

- 34 A. Pour lightweight-aggregate fill into cavities to fill void spaces. Maintain inspection ports to show presence  
35 of fill at extremities of each pour area. Close the ports after filling has been confirmed. Limit the fall of fill to  
36 one story high, but not more than 20 feet.  
37 B. Install molded-polystyrene insulation units into masonry unit cells before laying units.

38 **3.6 MASONRY-JOINT REINFORCEMENT**

- 39 A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on  
40 exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.  
41 1. Space reinforcement not more than 16 inches o.c.  
42 2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.  
43 3. Provide reinforcement not more than 8 inches above and below wall openings and extending 12  
44 inches beyond openings in addition to continuous reinforcement.  
45 B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.  
46 C. Provide continuity at wall intersections by using prefabricated T-shaped units.  
47 D. Provide continuity at corners by using prefabricated L-shaped units.

48 **3.7 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE**

- 49 A. Anchor masonry to structural steel and concrete, where masonry abuts or faces structural steel or  
50 concrete, to comply with the following:  
51 1. Provide an open space not less than 1/2 inch wide between masonry and structural steel or  
52 concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.  
53 2. Anchor masonry with anchors embedded in masonry joints and attached to structure.  
54 3. Space anchors as indicated, but not more than 24 inches o.c. vertically and 36 inches o.c.  
55 horizontally.

- 1 **3.8 FLASHING**
- 2 A. General: Install embedded flashing at ledges and other obstructions to downward flow of water in wall
- 3 where indicated.
- 4 B. Install flashing as follows unless otherwise indicated:
- 5 1. Prepare masonry surfaces so they are smooth and free from projections that could puncture
- 6 flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar
- 7 and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive,
- 8 sealant, or tape as recommended by flashing manufacturer.
- 9 2. At lintels, extend flashing a minimum of 6 inches into masonry at each end. At heads and sills,
- 10 extend flashing 6 inches at ends and turn up not less than 2 inches to form end dams.
- 11 3. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2
- 12 inch back from outside face of wall, and adhere flexible flashing to top of metal drip edge.
- 13 4. Install metal flashing termination beneath flexible flashing at exterior face of wall. Stop flexible
- 14 flashing 1/2 inch back from outside face of wall, and adhere flexible flashing to top of metal flashing
- 15 termination.
- 16 C. Install single-wythe CMU flashing system in bed joints of CMU walls where indicated to comply with
- 17 manufacturer's written instructions. Install CMU cell pans with upturned edges located below face shells
- 18 and webs of CMUs above and with weep spouts aligned with face of wall. Install CMU web covers so that
- 19 they cover upturned edges of CMU cell pans at CMU webs and extend from face shell to face shell.

- 20 **3.9 REINFORCED UNIT MASONRY INSTALLATION**
- 21 A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced
- 22 masonry elements during construction.
- 23 1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated.
- 24 Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms
- 25 to maintain position and shape during construction and curing of reinforced masonry.
- 26 2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to
- 27 carry their own weight and that of other loads that may be placed on them during construction.
- 28 B. Placing Reinforcement: Comply with requirements in TMS 602/ACI 530.1/ASCE 6.
- 29 C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to
- 30 resist grout pressure.
- 31 1. Comply with requirements in TMS 602/ACI 530.1/ASCE 6 for cleanouts and for grout placement,
- 32 including minimum grout space and maximum pour height.
- 33 2. Limit height of vertical grout pours to not more than 60 inches.

- 34 **3.10 FIELD QUALITY CONTROL**
- 35 A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare
- 36 reports. Allow inspectors access to scaffolding and work areas as needed to perform tests and
- 37 inspections. Retesting of materials that fail to comply with specified requirements shall be done at
- 38 Contractor's expense.
- 39 B. Inspections: Special inspections according to Level B in TMS 402/ACI 530/ASCE 5.
- 40 1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
- 41 2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes,
- 42 and locations of reinforcement.
- 43 3. Place grout only after inspectors have verified proportions of site-prepared grout.
- 44 C. Testing Prior to Construction: One set of tests.
- 45 D. Testing Frequency: One set of tests for each 5000 sq. ft. of wall area or portion thereof.
- 46 E. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C 140 for compressive
- 47 strength.
- 48 F. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780.
- 49 G. Mortar Test (Property Specification): For each mix provided, according to ASTM C 780. Test mortar for
- 50 compressive strength.
- 51 H. Grout Test (Compressive Strength): For each mix provided, according to ASTM C 1019.

- 52 **3.11 PARGING**
- 53 A. Parge exterior faces of below-grade masonry walls, where indicated, in two uniform coats to a total
- 54 thickness of 3/4 inch. Dampen wall before applying first coat, and scarify first coat to ensure full bond to
- 55 subsequent coat.
- 56 B. Use a steel-trowel finish to produce a smooth, flat, dense surface with a maximum surface variation of 1/8
- 57 inch per foot. Form a wash at top of parging and a cove at bottom.
- 58 C. Damp-cure parging for at least 24 hours and protect parging until cured.

1 **3.12 REPAIRING, POINTING, AND CLEANING**

- 2 A. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and  
3 smears before tooling joints.  
4 B. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:  
5 1. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison  
6 purposes.  
7 2. Clean concrete masonry by applicable cleaning methods indicated in NCMA TEK 8-4A.

8 **3.13 MASONRY WASTE DISPOSAL**

- 9 A. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated  
10 sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.  
11 1. Do not dispose of masonry waste as fill within 18 inches of finished grade.  
12 B. Masonry Waste Recycling: Return broken CMUs not used as fill to manufacturer for recycling.  
13 C. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described  
14 above or recycled, and other masonry waste, and legally dispose of off Owner's property.

15 **END OF SECTION**

SECTION 04 45 50  
EXISTING MARBLE REFURBISHMENT

- 1  
2  
3 PART 1 – GENERAL  
4 1.1 [RELATED DOCUMENTS](#)  
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7 1.4 [SUBMITTALS](#)  
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21 3.5 [PREPARATION CLEANING](#)  
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23

24 **PART 1: GENERAL**  
25

- 26 1.13 RELATED DOCUMENTS  
27 A. Applicable provisions of Division 1 shall govern work under this section.  
28 1.14 SCOPE OF WORK  
29 A. Work of this Section includes:  
30 1. Prepare and install all marble including; marble removed by this Section, salvaged marble  
31 provided by owner or new marble.  
32 2. Provide new marble  
33 3. Cleaning, grouting and tuckpointing of existing, in-place, marble.  
34 4. Cleaning of marble installed by this Section.  
35  
36 1.15 QUALITY ASSURANCE  
37 A. All marble materials, fabrication, finish and installation shall comply with Marble Institute of  
38 America Design Manual IV (MIA) and Tile Council of America (TCA) "Handbook for Ceramic  
39 Tile Installation" specifications, except as otherwise shown on drawings and specified herein.  
40 B. Marble workers for all work of this Section must be skilled craftsmen who are experienced and  
41 specialize in work of the types they will be performing. Workers shall have a minimum of 10  
42 years documented experience in this trade installing, cleaning and grouting marble. Submit  
43 documentation of firm experience, qualifications and worker experience.  
44 C. Mockups: Refer to Section 01 43 39. Prepare mockups of historic treatment  
45 repair processes to demonstrate aesthetic effects and to set quality standards for materi-  
46 als and execution, and for fabrication and installation. Prepare mockups so they are as in-  
47 conspicuous as practicable. Mock-ups shall be full sections.  
48  
49 1. Locate mockups (3) on existing surfaces where directed by Architect in locations  
50 that enable viewing under same conditions as the completed Work.  
51 2. Approval of mockups does not constitute approval of deviations from the Con-  
52 tract  
53 Documents contained in mockups unless Architect specifically approves such de-  
54 viations in writing.  
55 3. Subject to compliance with requirements, approved mockups may become part of  
56 the completed Work if undisturbed at time of Substantial Completion.  
57  
58 1.16 SUBMITTALS  
59 A. Submit shop drawings for all marble work, showing cutting and setting diagrams, as well as  
60 joining, finish, sizes of pieces, anchors, and all other pertinent information.  
61 B. Submit samples of finished work for approval of Architect where patching is required.

- 1 1.17 DELIVERY, STORAGE AND HANDLING  
2 A. Carefully transport marble from storage where it is presently stored, to specific room where it is  
3 to be installed.  
4 B. Protect marble against staining and physical damage, such as chipping scratching and  
5 breaking.  
6 C. Store and protect marble on wood pallets, covered with non-staining paper until ready to be  
7 used. If transported outside, protect from adverse weather. Do not store outside or in any  
8 location where marble might be exposed to freezing conditions. Allow air to circulate around  
9 marble.

10  
11 **PART 2 - PRODUCTS**

12  
13 2.1 MATERIALS - MARBLE

- 14 A. Salvaged Marble.  
15 1. Existing Stored Marble. Owner has several sections of original marble base in storage.  
16 Contractor shall choose from this existing marble for appropriate pieces that may be used  
17 in this project.  
18 2. All re-used marble must be whole pieces that will fit compatibly within the existing  
19 patterns. Salvaged pieces must conform dimensionally to original dimensions of marble in  
20 intended spaces. Partial size pieces may not be used to make up a whole panel.  
21 B. New Marble.  
22 1. Contractor shall provide and install new marble were required or necessary.  
23 2. Selection of new marble shall be per approval of the Preservation Architect and Owner.  
24 Marble for first floor  
25 XTILE-2C White Carrara Floor Tile, Diamond Shape and Perimeter Margins to match  
26 existing.  
27 XTILE-2D Verde Antique Green Tile, Feature Triangle tile, to match existing  
28 C. Marble to be repaired.  
29 1. Where noted on drawings, repair damaged marble items.  
30 2. Marble Repair Products (do NOT apply to wall base external corners or wall panel  
31 external corners): Cathedral Stone Products, Inc. [www.cathedralstone.com](http://www.cathedralstone.com). Product  
32 reference: Jahn M120 Marble Repair Mortar.

33 2.2 ANCHORING DEVICES

- 34 A. Dowels and Pins: Brass, 1/4 inch x 2 inches or size as required.  
35 B. Exposed Anchoring Devices: Not allowed.  
36 C. Other Anchoring Devices: Brass. Wire anchors shall be #12 gauge, half hard yellow brass  
37 grouted into marble.

38 2.3 MORTAR AND GROUT MATERIALS

- 39 A. Portland Cement: ASTM C150.  
40 B. Hydrated Lime: ASTM C207, Type S.  
41 C. Plaster of Paris: Conform to applicable standards for top grade materials. specify  
42 Sand: Clean, sharp and free of soluble salts and organic materials, screened as required for  
43 desired results.  
44 E. Water: Clean, free from deleterious amounts of acids, alkalies, organic materials and other  
45 impurities, and potable.  
46 F. Cushions: Aluminum or plastic.  
47 G. Marble Dust: Type recommended by the industry for use intended and matching existing  
48 marble as approved by Architect.  
49 H. Epoxy Mortar: Epoxy resin and epoxy hardener two-part, 100% solids mixture.

50 2.4 MIXES

- 51 A. Mortar Setting Bed for Marble: MIA 101.10.2 Dry-Set Mortar; One part (nonstaining) Portland  
52 cement to one half part lime to four and one half parts of sand. Add enough water to make  
53 mortars plastic.  
54 B. Grout: MIA 101.6.2; Sand-portland cement mixture, mixed on-the-job in following proportions of  
55 portland cement to fine graded clean sand in accordance with ASTM C144: 1:1 for joints up to  
56 1/8 inch; 1: for joints 1/8 - 1/2 inch; 1:3 for joints over 1/2 inch wide. Up to 1/5 part lime  
57 acceptable.

58 2.5 ACCESSORY MATERIALS

- 59 A. Marble Cleaners.  
60 1. Walls: Spic-N-Span brand water soluble cleaner. Substitute only as approved in writing  
61 by Architect.

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2. Floors: Marbleous as manufactured by Masury/Columbia, Melrose Park, Ill. Use with floor cleaning machine in accordance with manufacturer's recommendations.
  3. Clean, soft cotton cloths.
  4. Natural sponges.
  5. Water: potable.
  6. Materials containing acid or wax are not allowed.

8 2.6 FABRICATION

- 9 A. Contractor shall do all cutting and fitting of marble (new or salvaged) to fit required patterns and profiles or to match new work to existing.
- 10 B. Do all cutting and drilling for hardware and anchorage in a true and neat manner to ensure acceptable, correct installation and to accommodate all items by other trades to be set into or pass through marble. Use special care in making cutouts in marble. Curves shall be uniform and true and shall match existing where required. Contractor shall take all measurements at job site as required for proper fit.
- 11 C. All edges shall be cut true and square or as existing conditions require; plane surfaces shall be true and flat, without elevations or depressions. Ease edges if necessary to match original, similar work.
- 12 D. All newly cut, exposed marble edges shall be finely honed and/or polished to match existing marble.
- 13 E. Where required, provide pear-shaped cutouts in substrate to receive wire anchors. If existing cutouts in existing pieces are in proper location, they may be cleaned out and reused.
- 14 F. Plinths may vary in size and may have to be modified by contractor to match width of door casings.

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26 **PART 3 - EXECUTION**

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28 3.1 PREPARATION FOR INSTALLING MARBLE

- 29 A. Use extreme care in moving marble. Marble damaged by Contractor shall be replaced with approved matching marble at no additional cost to Owner.
- 30 B. Use care so as not to scratch or damage finished surfaces of marble.
- 31 C. Patch existing in-place marble where shown on drawings or where approved by Architect. Do not use new or salvaged marble with holes requiring patches unless specifically approved by Architect. Mix epoxy grout and approved matching marble dust to proper consistency. Fill holes flush with adjoining surfaces. Leave marble surfaces in finished condition. Samples of finished patching shall be submitted to Architect and approved prior to starting patching.

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37 3.2 INSTALLATION TOLERANCES

- 38 A. 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.
- 39 B. Variation in Surface Plane: Do not exceed 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 3/8 inch maximum from level or slope indicated.
- 40 C. Variation in Plane between Adjacent Units (Lipping): Do not exceed 1/32-inch difference between planes of adjacent units.

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44 3.3 INSTALLATION

- 45 C. General:
  - 46 1. Follow cleaning procedures before, during and after installation of marble.
  - 47 2. Install marble tile and grout in accordance with the Tile Council of America Installation Handbook.
  - 48 3. New and/or modified marble tile floors shall be laid up with carefully selected marble to match existing patterns, colors and borders on all sides.
  - 49 4. New Door openings: New marble for jambs, heads and sills shall be profiled and segmented to match appearance of designated existing, original door opening.
  - 50 5. Base shall be installed in as long a length as possible and as approved by Architect. Adjacent pieces of wall and toilet compartment marble shall be carefully matched for color and veining and as approved by the Preservation Architect.
  - 51 6. When ready for setting, units shall be brushed free of dust or other foreign matter and shall be thoroughly washed and wetted with clean water immediately before being laid.
  - 52 7. Each unit shall be placed accurately, true to line and level, in full bed of mortar with joints solidly filled.
  - 53 8. Backs of marble shall be back plastered completely with same non-staining mortar used for setting to thickness as required to match existing.
  - 54 9. Wet substrate before apply mortar.

10. Set marble square and true with edges of face joints plumb.
  11. Use care in blending color and veining of marble to produce homogeneous effect.
  12. Grout joints per applicable standards.
  13. After setting and grouting, immediately remove all surplus material from face of marble.
  14. Joints shall match existing. Grout shall be carefully colored to match joints.
  15. Do not install marble on new concrete surfaces until concrete has cured for a minimum of 90 days.
  16. Protect all finished marble.
- D. Anchors and Dowels:
1. A minimum of two (2) anchors are required on all wall panels up to two (2) square feet in area; and a minimum of four (4) anchors required on all pieces over two (2) square feet in area.
  2. Where shown or required, anchor adjoining pieces with pins or dowels. Set with equal penetration into each connecting piece.
  3. Jamb and Heads: A minimum of three anchors are required on each jamb and two in each head.
- E. Marble Wall Panels
1. Set by spotting with Plaster of Paris mortar and by attaching with concealed anchors secured into wall backing.
  2. Butter joints fully with grout as each piece is set.
- F. Marble Bases, Thresholds, Plinths and Where Required to Match Existing.
1. Clean substrate thoroughly.
  2. Wet substrate and install stiff mortar bed; tamp marble to proper level. Lift marble and apply paste of Portland cement to back of marble. Reset and tamp lightly to insure good bond.
  3. Grout joints with previously specified grout to match existing joints.
  4. Carefully patch all holes in marble. Grout shall match existing in color as approved by Architect.
- 3.4 REPOINTING EXISTING MARBLE
- A. All cracked and loose grout shall be removed.
  - B. Any tool or technique for removing grout which may scratch or mar the surface of the marble shall not be used. Any damage caused to marble by this work shall be repaired or replaced at the Owner's discretion by this contractor with no expense to Owner.
  - C. Strike joints to be pointed with approved bladed tool. Drag along center of joint with leverage to score joint and loosen and remove grout to a minimum depth of 1/4 inch.
  - D. Remove grout from sides of marble by cutting and grinding with a burred bladed tool.
  - E. Grout tooled joints in accordance with TCA standards using approved mortar.
- 3.5 PREPARATION CLEANING
- A. Existing, in-place marble.
    1. Remove loose dirt and particulate matter from marble surface and natural voids with vacuuming device equipped with soft brush type attachments.
    2. Wash marble with approved cleaner and water using soft cotton cloths and natural sponges.
- 3.6 FINAL CLEANING AND CLEAN-UP
- A. At completion of new marble work, clean all newly installed marble and existing marble where repointing has been done. Point up any open joints and replace defective marble. Cleaner must be approved by Architect. Buff all surfaces to produce an appearance that matches existing.
    1. All marble surfaces shall be cleaned, including removal of all spots and stains. Clean existing marble being reused after installation.
    2. Protect adjoining surfaces from water and cleaning materials.
    3. Clean with approved cleaning material, natural sponges and water. Rinse well afterwards with clean water, removing all residue.
    4. Removing Spots and Stains: Use small amount of approved cleaning material to determine type and amount of material to be used, as well as length of time for cleaning material(s) to be left in place before removing. Thoroughly remove all cleaning material and residue as recommended by manufacturer of material and best practices of trade.
    5. At completion of work, carefully transport unused marble pieces to Owner's off-site storage.



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- 1           D.     Protect all finished marble. Prohibit traffic from installed stone for a minimum of 72 hours. Protect  
2           installed stonework during construction with nonstaining kraft paper. Where adjoining areas  
3           require construction work access, cover stonework with a minimum of 3/4-inch untreated plywood  
4           over nonstaining kraft paper.  
5  
6

**END OF SECTION**

**SECTION 05 12 23  
STRUCTURAL STEEL**

- 1
- 2
- 3
- 4 PART 1 – GENERAL
- 5 1.1 DESCRIPTION
- 6 1.2 QUALITY ASSURANCE
- 7 1.3 TESTING AND INSPECTION
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- 10 PART 2 – PRODUCTS
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- 17 3.3 REPAIRS, PROTECTION, AND TOUCH UP
- 18 3.4 GROUTING
- 19 3.5 MISCELLANEOUS STEEL AND STEEL LINTELS

20 **PART 1 - GENERAL**

21 **1.1 DESCRIPTION**

- 22 A. The General and Supplementary Conditions of the Construction Contract and Division 1 - General
- 23 Requirements apply to the work specified in this section.
  
- 24 B. This section includes fabrication and erection of structural steel work, as shown on the Drawings and
- 25 specified herein. Work shall include, but not be limited to the following items:
  - 26 1. Structural steel
  - 27 2. Base and bearing plates.
  - 28 3. Deck support angles and framing for roof openings.
  - 29 4. Steel lintel members for masonry openings.
  - 30 5. Edge angles and bent plates.
  - 31 6. Connection plates.
  - 32 7. Shear stud connectors.
  - 33 8. Architecturally Exposed Structural Steel (AESS).
  - 34 9. All other steel items as listed in AISC – “Code of Standard Practice for Steel Buildings and
  - 35 Bridges” as shown on structural and architectural drawings.
  
- 36 C. Work shall also include grouting of all structural steel members where indicated.
  
- 37 D. Structural notes indicated on the drawings regarding structural steel framing should be considered a
- 38 part of this specification.
  
- 39 E. No substitutions will be allowed without the Engineer’s approval.

40 **1.2 QUALITY ASSURANCE**

- 41 A. Codes and Standards: Comply with the provisions of the following codes, specifications, and
- 42 standards except where more stringent requirements are shown or specified.
  - 43 1. AISC - Specification for Structural Joints Using ASTM A325 or A490 Bolts.
  - 44 2. AISC - Code of Standard Practice for Buildings and Bridges.
  - 45 3. AISC - Specification for the Design of Steel Hollow Structural Sections.

- 1 4. AISC - Specification for Allowable Stress Design of Single-Angle Members or Specification  
2 for Load and Resistance Factor Design of Single-Angle Members.
- 3 5. AISC 360-05 – Specification for Structural Steel Buildings – Allowable Strength Design, 13<sup>th</sup>  
4 Edition.
- 5 6. ASTM A36 - Standard Specification for Carbon Structural Steel.
- 6 7. ASTM A53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated  
7 Welded and Seamless
- 8 8. ASTM A108 - Standard Specification for Steel Bar, Carbon, Cold-Finished, Standard  
9 Quality.
- 10 9. ASTM A123 - Standard Specification for Zinc (Hot Dip Galvanized) Coatings on Iron and  
11 Steel Products.
- 12 10. ASTM A153 - Standard Specification for Zinc Coating (Hot Dip), on Iron and Steel Hardware.
- 13 11. ASTM A193 - Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials  
14 for High-Temperature Service.
- 15 12. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile  
16 Strength.
- 17 13. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi  
18 Minimum Tensile Strength.
- 19 14. ASTM A500 - Standard Specification for Cold Formed Welded and Seamless Carbon Steel  
20 Structural Tubing in Rounds and Shapes.
- 21 15. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts.
- 22 16. ASTM A572 - Standard Specification for High Strength, Low-Alloy Columbium-Vanadium  
23 Structural Steel.
- 24 17. ASTM A992 - Standard Specification for Steel for Structural Shapes for use in Building  
25 Framing.
- 26 18. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and  
27 Steel.
- 28 19. ASTM F436 - Standard Specification for Hardened Steel Washers.
- 29 20. ASTM F1554 - Standard Specification for Anchor Bolts, Steel 36, 55 and 105 ksi Yield  
30 Strength
- 31 21. AWS D1.1 - Structural Welding Code.
- 32 22. SSPC - Steel Structures Painting Council.
- 33 B. Where any provisions of other pertinent codes and standards conflict with this specification, the more  
34 stringent provision shall govern.
- 35 C. Fabrication, Erection, and Welding Qualifications:
  - 36 1. Fabricate structural steel members in accordance with AISC Specification for the design,  
37 fabrication and erection of structural steel for buildings.
  - 38 2. Steel fabricator shall not have less than five (5) years of continuous experience in fabrication  
39 of structural steel framing.

- 1 3. Steel erector shall not have less than five (5) years of continuous experience in the erection  
2 of structural steel framing.
- 3 4. All welding of structural steel shall be performed by operators who have been recently  
4 qualified as prescribed in "Qualification Procedures" of the American Welding Society  
5 (AWS).
- 6 D. Tolerances: Tolerances shall be as indicated by the AISC Code of Standard Practice for Buildings  
7 and Bridges except that tolerances for fabricating, rolling, cambering and erection shall not be  
8 cumulative.
- 9 E. Mockup: Refer to Section 01 43 39 - Mockups for description of construction required to complete a  
10 mockup submittal for review.

11 **1.3 TESTING AND INSPECTION**

- 12 A. Inspection and Testing:
- 13 1. The Owner shall employ an Inspection Agency to perform the duties and responsibilities  
14 specified below.
- 15 2. Refer to architectural, civil, mechanical, and electrical specifications for testing and  
16 inspection requirements of non-structural components.
- 17 3. Work performed on the premises of a fabricator approved by the building official need not  
18 be tested and inspected per the table below. The fabricator shall submit a certificate of  
19 compliance that the work has been performed in accordance with the approved plans and  
20 specification to the building official and the Architect and Engineer of Record.
- 21 4. Duties of the Inspection Agency:
- 22 a. Perform all testing and inspection required per approved testing and inspection  
23 program.
- 24 b. Furnish inspection reports to the building official, the Owner, the Architect, the  
25 Engineer of Record, and the General Contractor. The reports shall be completed  
26 and furnished within 48 hours of inspected work.
- 27 c. Submit a final signed report stating whether the work requiring Inspection was, to  
28 the best of the Inspection Agency's knowledge in conformance with the approved  
29 plans and specifications.
- 30 5. Structural Component Testing and Inspection Schedule for Section 05 12 23 is as follows:

Structural Steel	Continuous	Periodic	Referenced Standard
1. Material verification of high-strength bolts, nuts, and washers:			
A. Identification markings to conform to ASTM standards specified in the approved construction documents.		X	Applicable ASTM material standards: AISC 360, Section A3.3
B. Manufacturer's certificate of compliance required.		X	
2. Inspection of high-strength bolting:			
A. Snug-tight joints.		X	AISC 360, Section M2.5
B. Pretensioned and slip-critical joints using turn-of-nut with matchmarking or direct tension indicator methods of installation.		X	

Structural Steel	Continuous	Periodic	Referenced Standard
C. Pretensioned and slip-critical joints using turn-of-nut without matchmarking or calibrated wrench methods of installation.	X		
3. Material verification of structural steel:			
A. Identification markings to conform to AISC 360.		X	AISC 360, Section M5.5
B. Manufacturer's certified test reports.		X	
4. Material verification of weld filler materials:			
A. Identification markings to conform to AWS specification in the approved construction documents.		X	AISC 360, Section A3.5 and applicable AWS A5 documents
B. Manufacturer's certificate of compliance required		X	
5. Inspection of welding:			
A. Complete and partial joint penetration groove welds	X		AWS D1.1
B. Multi-pass fillet welds	X		AWS D1.1
C. Single-pass fillet welds > 5/16" (7.9 mm)	X		AWS D1.1
D. Plug and slot welds.	X		AWS D1.1
E. Single-pass fillet welds ≤ 5/16" (7.9 mm)		X	AWS D1.1
F. Composite stud testing		X	AWS D1.1
6. Inspection of steel frame joint details for compliance:			
A. Details such as bracing and stiffening.		X	
B. Member locations.		X	
C. Application of joint details at each connection.		X	

1 **1.4 SUBMITTALS**

2 A. Shop Drawings:

3 1. Prepare and submit complete erection and detailed shop drawings for Engineer's approval,  
4 including framing plans indicating size, weight and location of all structural members. Shop  
5 drawings shall indicate methods of connecting, anchoring, fastening, bracing and attaching  
6 work of other trades.

7 a. Where contract documents indicate verify in field (VIF) dimensions, shop drawings  
8 shall indicate these dimensions and Contractor shall note that the dimensions have  
9 been verified.

10 b. This specification modifies AISC Code of Standard Practice by deleting the  
11 following sentence from 4.4.1(c): "Release by the Owner's Designated  
12 Representatives for Design and Construction for the Fabricator to begin fabrication  
13 using the approved submittals." Review of the shop drawings by the Engineer shall  
14 not relieve the fabricator of this responsibility.

15 2. Furnish both the Engineer and Architect with one copy of the following:

- 16 a. Final shop drawings containing all review notations.  
17 b. Field Use/For Construction Drawings.

18 3. The steel fabricator shall submit a setting plan for all embedded items for Engineer's  
19 approval.

20 4. Shop drawings shall identify and mark AESS members and items. Specific project  
21 requirements for AESS (required blast cleaning, SSPC designation, special handling etc.)  
22 relating to shop fabrication and field erection practices shall be indicated on the shop  
23 drawings.

- 1 5. Welder's Certification: Submit certification for all welders employed on the project  
2 demonstrating they have been AWS qualified to perform the welding procedures required  
3 for this project.
- 4 6. General Contractor/Construction Manager to provide copies of field concrete cylinder  
5 breaks indicating the concrete meets 75% of the design compressive strength to the steel  
6 erector.
- 7 B. The General Contractor shall conduct a field survey of as-built anchors and bearing plate locations  
8 and elevations prior to steel erection. Survey shall be furnished to the steel fabricator. Contractor  
9 shall identify deviations from approved shop drawings and submit proposed repairs and modifications  
10 to the Engineer and steel fabricator for approval.
- 11 C. Product Data:
- 12 1. Prepare and submit product data for Engineer's approval for shop applied primers, finished  
13 paint system, expansion and/or adhesive anchors, non-shrink grout and other  
14 miscellaneous materials.
- 15 D. LEED Certification: Submit manufacturer's certification for each steel product including the following:
- 16 1. LEED Credit MRc 4.1/4.2 – Recycled content, including percentage of pre-consumer (post-  
17 industrial) and post-consumer recycled content. Also provide manufacturer's name, product  
18 cost and steel processing furnace type.
- 19 2. LEED Credit MRc 5.1/5.2 – Location of manufacturing plant, manufacturer's name, product  
20 cost and location of extraction or harvest of raw materials.

21 **1.5 PRODUCT DELIVERY, STORAGE AND HANDLING**

- 22 A. Steel members shall be transported, stored and erected in a manner that will avoid any damage or  
23 deformation. Materials should be stored to allow easy access for inspection and identification. Bent  
24 or deformed members will be rejected and shall be replaced or repaired at the expense of the  
25 responsible party. Store clear of the ground and in such a manner as to eliminate excessive handling.
- 26 B. Store fasteners in a protected location. Clean and re-lubricate bolts and nuts before use.

27 **PART 2 - PRODUCTS**

28 **2.1 MATERIALS**

- 29 A. Structural Steel:
- 30 1. All structural steel shall be free from defects impairing strength, durability or appearance.  
31 All structural steel shall meet the latest minimum requirements as follows:
- 32 a. Structural steel shapes, bars and plates shall conform to the ASTM designations  
33 listed in the General Notes of the Drawings.
- 34 b. Square and rectangular structural tubing shall be cold formed conforming to the  
35 ASTM designations listed in the General Notes of the Drawings.
- 36 c. Steel pipe shall conform to the ASTM designations listed in the General Notes of  
37 the Drawings.
- 38 B. High Strength Structural Bolts:
- 39 1. High strength structural bolts shall conform to the ASTM designations listed in the General  
40 Notes of the Drawings.

- 1                    2.            High strength bolts shall be detailed and installed in accordance with AISC - "Specification  
2                    for Structural Joints Using ASTM A325 or A490 Bolts."
- 3                    3.            Manufacturer's symbol and grade markings shall appear on all bolts and nuts.
- 4                    C.            Anchoring Devices:
- 5                    1.            Anchor Rods: Anchor rods used with structural steel members shall be plain threaded rods  
6                    conforming to the ASTM designations listed in the General Notes of the Drawings.
- 7                    2.            Expansion Anchors: Expansion anchors shall consist of one-piece wedge type carbon steel  
8                    anchors with heavy-duty nuts and washers. All components shall be zinc plated in  
9                    accordance with ASTM B633. Refer to the drawing details and General Notes for the  
10                    expansion anchors used as the basis of design and the acceptable alternates.
- 11                    3.            Adhesive Anchoring System: Adhesive anchoring system shall consist of a threaded anchor  
12                    rod complete with nut and washer and the adhesive cartridge. Refer to the drawing details  
13                    and General Notes for the adhesive anchoring systems used as the basis of design and the  
14                    acceptable alternates.
- 15                    a.            Nuts shall meet ASTM A563, Grade DH, and washers shall meet ASTM F436.
- 16                    b.            All components shall be zinc plated in accordance with ASTM B633 SC1.
- 17                    c.            Adhesive shall consist of a two-part acrylic based adhesive applied in a dual  
18                    cartridge dispensing system that properly mixes the components at the point of  
19                    application.
- 20                    D.            Welding Materials:
- 21                    1.            Type required for material being welded in conformance with AWS D1.1.
- 22                    E.            Stud Connectors:
- 23                    1.            For threaded studs that are being used to connect steel beams to embed plates, use ASTM  
24                    A108, Type A, Grades 1010 through 1020 forged steel, headed uncoated with a minimum  
25                    tensile strength of 61,000 psi. Fabricated within the tolerances set forth in AWS D1.1.
- 26                    2.            Studs applied by means of the electric arc welding process and shall use an arc shield  
27                    ferrules of heat resistant ceramic.
- 28                    F.            Paints and Primers:
- 29                    1.            Fabricator's standard lead- and chromate-free, non-asphalitic, rust-inhibiting primer.
- 30                    2.            Galvanizing repair paint: SSPC Paint 20.
- 31                    3.            Refer to Specification Section 09 90 00 for additional paint requirements.
- 32                    G.            Non-Shrink Grout for Base and Bearing Plates: Non-shrink grout, conforming to ASTM C1107, shall  
33                    be pre-mixed, non-metallic, non-corrosive, non-staining product containing selected silica sand,  
34                    Portland cement, shrinkage compensating agents, plasticizing and water reducing agents. All  
35                    constituents shall meet the requirements of these specifications. Minimum compressive strength at  
36                    28-days shall be 7,000 psi as determined by ASTM C109. Follow manufacturer's instructions for  
37                    handling, mixing, placing and curing. Acceptable products are:
- 38                    1.            Euclid Chemical Company - Euco N.S. Grout  
39                    2.            L&M Construction Chemical - Crystex.  
40                    3.            Master Builders - Masterflow 713.  
41                    4.            Sonneborn - SonnogROUT.  
42                    5.            Five Star Products Inc. – Five Star Grout.





- 1 F. Shop Priming:
- 2 1. Unless noted otherwise below, structural steel shall not be shop primed.
- 3 2. The following are steel surfaces to receive shop priming:
- 4 a. Surfaces outside the building envelope that are not galvanized.
- 5 b. Surfaces to be painted per Architect's drawings.
- 6 3. If the steel pieces are to be shop primed, the following surfaces are exceptions to shop
- 7 priming:
- 8 a. Surfaces embedded in concrete or mortar. Extend priming of partially embedded
- 9 members to a depth of 2 inches.
- 10 b. Surfaces to be field welded.
- 11 c. Surfaces to be high-strength bolted with slip-critical connections.
- 12 d. Surfaces to receive sprayed fire-resistive materials.
- 13 e. Galvanized surfaces.
- 14 4. Surface Preparation: Clean Surfaces to be painted. Remove loose rust and mill scale and
- 15 spatter, slag, or flux deposits. Prepare surfaces according to the following specifications
- 16 and standards:
- 17 a. SSPC-SP3, "Power Tool Cleaning."
- 18 5. Priming: Apply primer in accordance with paint manufacturer's recommendations, and at a
- 19 rate recommended by SSPC to provide a dry film thickness of not less than 1.5 mils. Use
- 20 priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
- 21 G. Finished Paint System:
- 22 1. Finished paint coats shall be in accordance with paint manufacturer's recommendations,
- 23 and specification Division 9.
- 24 2. Paint shall be free of sags, runs, drips or other defects. Allow ample drying time before
- 25 handling to prevent damage to coatings.
- 26 3. Strip paint corners, crevices, bolts, welds, and sharp edges.
- 27 4. Apply one coat of shop paint to surfaces that will be inaccessible after assembly or erection.
- 28 H. Finished Paint System for Exposed Structural Steel: Structural steel exposed to the elements of
- 29 weather shall be painted as follows:
- 30 1. Apply one coat of steel primer in shop as specified above.
- 31 2. Apply two coats of alkyd enamel paint to a minimum dry film thickness of 1.5 mils for each
- 32 coat. Paint shall be applied according to the manufacturer's recommendations.
- 33 3. Paint shall be free of sags, runs, drips or other defects. Allow ample drying time before
- 34 handling to prevent damage to coatings.

- 1 I. Galvanizing:
- 2 1. Hot-Dip Galvanized Finish: Apply Zinc coating by the hot-dip process to structural steel  
3 according to ASTM A 123.
- 4 a. Fill vent holes and grind smooth after galvanizing.
- 5 b. Unless otherwise noted on drawings or in Division 9, all exterior steel components  
6 exposed to the elements shall be galvanized, including, but not limited to, lintels.

7 **2.3 LEED CREDIT**

- 8 A. LEED Credit MRc 4.1/4.2:
- 9 1. Steel products shall be made using an Electric Arc Furnace and shall have a minimum  
10 recycled content of 80%, including at least 65% post-consumer recycled content and 15%  
11 post-industrial recycled content.
- 12 2. Steel products made using a Basic Oxygen Furnace shall have a minimum recycled content  
13 of 25%, including at least 20% post-consumer recycled content and 5% post-industrial  
14 recycled content.
- 15 B. LEED Credit MRc 5.1/5.2:
- 16 1. Steel products shall be manufactured within 500 miles of project site. Recycled scrap  
17 products shall be procured from within 500 miles of the project site.

18 **PART 3 - EXECUTION**

19 **3.1 ERECTION**

- 20 A. Erection Procedures:
- 21 1. The erector and not the structural engineer of record shall be responsible for the means,  
22 methods and safety of erection of the structural steel framing.
- 23 2. Erection of all structural steel items shall meet the requirements of AISC "Specification and  
24 Code of Standard Practice."
- 25 3. All work shall be erected square, plumb, straight and true, accurately fitted and with tight  
26 joints and intersections, by mechanics experienced in the erection of structural steel. Make  
27 allowances for difference between temperature at time of erection and mean temperature  
28 when structure is completed and in service.
- 29 4. All base plates shall be supported on steel wedges, steel shims or heavy duty leveling nuts  
30 until the supported members have been leveled and plumbed.
- 31 a. Snug tighten anchor rods after supported members have been positioned and  
32 plumb. Do not remove wedges or shims but, if protruding, cut off flush with edge  
33 of base plate before packing with grout.
- 34 b. Promptly place non-shrink grout between bearing surfaces and base plates so no  
35 voids remain. Neatly finish exposed surfaces; protect grout and allow to cure.  
36 Comply with manufacturers written installation instructions for shrinkage-resistant  
37 grouts.

- 1 5. Field connections of structural work shall be made with either high strength bolts (bearing  
2 type) or by welding. Proper precaution shall be taken to ensure that anchored items will not  
3 be distorted or overstressed due to improperly fabricated items.
- 4 6. Splice members only where indicated.
- 5 7. Remove erection bolts on welded, Architecturally Exposed Structural Steel; fill holes with  
6 plug welds; and grind smooth at exposed surfaces.
- 7 8. Do not use thermal cutting during erection unless approved by the Engineer/Architect in  
8 writing.
- 9 9. Steel erection shall not proceed without concrete in footings, piers, and walls attaining 75%  
10 of the intended minimum compressive design strength. Documentation must be provided  
11 indicating compliance with this requirement.
- 12 B. Bracing and Protection:
- 13 1. Steel shall be well plumbed, leveled and braced to prevent any movement.
- 14 a. Contractor shall provide and maintain all necessary temporary guying of steel  
15 frame to resist safely all wind and construction loads during erection and to assure  
16 proper alignment of all parts of the steel frame.
- 17 2. Provide all temporary flooring, bracing, shoring and guards necessary to prevent damage  
18 or injury. All partially erected steel shall be secured in an approved manner during  
19 interruptions of work.
- 20 C. Anchor and Foundation Rods:
- 21 1. All anchor or foundation rods and similar steel items to be built into concrete or masonry are  
22 to be set by the concrete or masonry contractors and shall be furnished promptly so that  
23 they may be built in as the work progresses because cutting of structural steel members to  
24 accommodate errors pertaining to embedded items will not be permitted.
- 25 **3.2 FIELD WELDING**
- 26 A. Welding Procedures:
- 27 1. All field welding shall be in accordance with AISC Specifications and conform to AWS D1.1  
28 "Structural Welding Code - Steel".
- 29 a. Comply with AISC's "Code of Standard Practice for Steel Buildings and Bridges"  
30 for bearing, adequacy of temporary connections, alignment, and removal of paint  
31 on surfaces adjacent to field welds.
- 32 b. Assemble and weld built-up sections by methods that will maintain true alignment  
33 of axes without exceeding tolerances of AISC's "Code of Standard Practice" for  
34 Steel Buildings and Bridges" for mill material.
- 35 c. Verify that weld sizes, fabrication sequence, and equipment used for  
36 Architecturally Exposed Structural Steel will limit distortions to allowable  
37 tolerances. Prevent damage due to field welding on exposed surfaces.
- 38 1) Grind butt welds flush.
- 39 2) Grind or fill exposed fillet welds to smooth profile. Dress exposed welds.



SECTION 05 12 50

HISTORIC STRUCTURAL STEEL PRESERVATION/RESTORATION

PART 1 – GENERAL

- 1.1 CONDITIONS OF THE CONTRACT
- 1.2 WORK INCLUDED
- 1.3 RELATED SECTIONS
- 1.4 QUALITY ASSURANCE
- 1.5 REFERENCES
- 1.6 SUBMITTALS
- 1.7 PRODUCT DELIVERY, STORAGE AND HANDLING
- 1.8 GUARANTEES, WARRANTIES AND CERTIFICATES

PART 2 – PRODUCTS

- 2.1 ACCEPTABLE MANUFACTURERS
- 2.2 MATERIALS - GENERAL

PART 3 – EXECUTION

- 3.1 EXAMINATION
- 3.2 SEQUENCING/SCHEDULING
- 3.3 GENERAL NOTES
- 3.4 EXISTING STRUCTURAL STEEL LINTEL RESTORATION

**PART 1 – GENERAL**

**1.1 CONDITIONS OF THE CONTRACT**

- A. The conditions of the Contract (General, Supplementary, and Other Conditions) and the requirements of Division 1 are hereby made a part of this Section. Applicable provisions of Division 1 shall govern Work under this Section.

**1.2 WORK INCLUDED**

- A. Unless otherwise specified, the Contractor shall furnish all materials, tools, equipment, apparatus, transportation, labor and supervision required to totally complete all the structural steel restoration work as shown on the Drawings and as specified herein.

**1.3 RELATED SECTIONS**

- A. Section 02 41 50 – Historic Selective Demolition/Deconstruction
- B. Section 04 01 20.63 – Historic Brick Masonry Preservation/Restoration
- C. Section 04 01 40 – Historic Stone Preservation/Restoration
- D. Section 07 01 90.71 – Historic Sealant Rehabilitation

**1.4 QUALITY ASSURANCE**

- A. There shall be no deviation made from this Specification without prior written approval by the Architect.
- B. In some instances, shoring must be provided and installed prior to completing portions of the structural steel restoration Work. All pertinent proposed shoring plans and details must be approved by the Architect and in place as required before any subsequent structural steel restoration work can proceed. All shoring systems shall be designed by the Contractor who shall be ultimately responsible for same.
- C. All structural steel restoration work shall be performed by skilled journeymen tradesmen including but not limited to, steel workers, welders, stonemasons, masons, tuckpointers, and laborers who are considered specialists in the field of the work specified in this Section.
- D. Journeymen tradesmen shall have a minimum of five (5) years experience in the specified type of work.
- E. During the workday should the weather conditions appear to be changing adversely, the Contractor shall take preventative measures to protect any unfinished Work that was to be performed that day and to allow adequate time for the work area to be properly closed to a watertight condition to avoid exposure to the building interior.
- F. Repair any Work damaged by failure to provide proper and adequate protection, to its original state to the satisfaction of the Owner, or remove and replace the defective Work with new at the Contractor's expense.

- 1 G. It will be the Architect's prerogative to forbid the use of tools or methods that do not produce the  
2 quality of work that is expected and to insist on the use of tools and methods, which will do the  
3 structural steel work properly.
- 4 H. The Architect reserves the right to approve the material supplier for the new materials specified in  
5 this Section.
- 6 I. All material and workmanship quality shall be in accordance with current industry standards and  
7 practices in conformance with the organizations outlined in 1.5. REFERENCES below.
- 8 J. Codes and Standards: Comply with provisions of the following, except as otherwise indicated:  
9 1. AISC "Code of Standard Practice for Steel Buildings and Bridges".  
10 2. AISC "Specifications for Structural Steel Buildings".  
11 3. "Specifications for Structural Joints using ASTM A325 or A490 Bolts" approved by the  
12 Research Council on Structural Connections.  
13 4. AWS D1.  
14 5. ASTM A6.
- 15 K. Qualifications for Welding Work: Qualify welding procedures and welding operators in accordance  
16 with the requirements of AWS D1.1.
- 17 L. All materials used shall not contain asbestos fibers.
- 18

### 19 1.5 REFERENCES

- 20 A. References shall refer to the most recent industry standard and recommendations as represented  
21 by the organizations listed below.  
22 1. American Institute of Steel Construction (AISC).  
23 2. American Welding Society (AWS).  
24 3. Research Council on Structural Connections (RCSC).  
25 4. American Society for Testing and Materials (ASTM).  
26 5. Federal Specifications (FS).
- 27

### 28 1.6 SUBMITTALS

- 29 A. Provide all data and sample materials in strict conformance with SECTION 01 33 00 – SUBMITTAL  
30 PROCEDURES, and as specified below.
- 31 B. Each submittal shall be clearly marked with the specific Specification Section, page number, and  
32 item designation that it represents. Each submittal shall be presented in the order that it is outlined  
33 in the PROJECT MANUAL – TABLE OF CONTENTS. Failure to do so may result in immediate  
34 rejection of the submittal.
- 35 C. A total of three (3) copies of each submittal (data sheets) are required.
- 36 D. Provide submittal information and Shop Drawings (as applicable) for the following materials as  
37 specified in PART 2 – PRODUCTS:  
38 1. Structural Steel Protective Coating  
39 2. Membrane Flashings (at steel lintels)  
40 3. Termination Bar  
41 4. Termination Bar Fasteners  
42 5. Termination Bar Sealant
- 43 E. For structural steel and related items (as applicable to this Project) provide the following:  
44 1. Product Data: Submit product data or Manufacturer's specifications and installation  
45 instructions for the following products. Include laboratory test reports and other data to  
46 show compliance with Specifications (including specified standards).  
47 a. Structural steel (each type), including certified copies of mill reports covering  
48 chemical and physical properties.  
49 b. Anchor bolts.  
50 c. Unfinished threaded fasteners.  
51 d. High-strength bolts (each type), including nuts and washers; include direct  
52 tension indicators if used.  
53 e. Structural steel primer paint.  
54 f. Nonmetallic shrinkage-resistant grout.  
55 2. Material Safety Data Sheets (MSDS): Submit MSDS for structural steel (each type),  
56 anchor bolts, unfinished threaded fasteners, high-strength bolts (each type) including nuts  
57 and washers, structural steel primer paint and nonmetallic shrinkage-resistant grout.  
58 3. Shop Drawings: Submit Shop Drawings, including complete details and schedules for  
59 fabrication and assembly of structural steel members, procedures, and diagrams.

- a. Include details of cuts, connections, cambers, holes, and other pertinent data. Include welds by standard AWS symbols and show size, length, and type of each weld.
- b. Provide setting drawings, templates, and directions for installation of anchor bolts and other anchorages to be installed as work of other Sections.
4. Welder Certifications: Provide certification that welders to be employed in work have satisfactorily passed qualification tests in accordance with AWS D1.1. If recertification of welders is required, retesting will be Contractor's responsibility.
5. Test Reports: Submit test reports conducted on shop, field bolted, and welded connections. Include data on type(s) of tests conducted and test results.
6. Welding Procedures: Provide written welding procedure specification (WPS) document per AWS Code requirements.

#### 1.7 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to site at such intervals to ensure uninterrupted progress of work.
- B. Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place concrete or masonry, in ample time so that work will not be delayed.
- C. Store materials to permit easy access for inspection and identification. Keep steel members off ground by using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration. If bolts and nuts become dry or rusty, clean and lubricate before use. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures. Repair or replace damaged materials or structures as directed.
- D. Field Measurements: Check actual locations of existing construction to which structural steel must fit, by accurate field measurements before fabrication; show recorded measurements on final Shop Drawings.

#### 1.8 GUARANTEES, WARRANTIES, CERTIFICATES

- A. The Contractor and the material Manufacturer's shall guaranty both material and/or workmanship, and warrant the performance of all items specified in this Section for a period of two (2) years from the date of Substantial Completion as determined by the Architect.

### PART 2 – PRODUCTS

#### 2.1 ACCEPTABLE MANUFACTURERS

- A. Provide products by Manufacturer's specified herein, which meet or exceed standards as set forth in this Section. No products specified or approved shall contain asbestos.
- B. All materials shall be new unless noted otherwise on the Drawings and Specifications.
- C. No material substitutions will be accepted unless specified as "or approved equal," and approved in advance by the Architect.

#### 2.2 MATERIALS – GENERAL

- A. New Structural Steel Sections and Plates: Conform to ASTM A36
- B. Structural Steel Protective Coating: "Omnithane Series 1," modified aromatic polyurethane primer and, "Endura-Shield Series 73," aliphatic acrylic polyurethane finish coating, as manufactured by Tnemec Co, Inc., Kansas City, Missouri, or approved equal.
- C. Membrane Flashings (at steel lintels): "Perm-A-Barrier Wall Flashing," 40-mil, self-adhering membrane wall flashing as manufactured by W.R. Grace & Co., Columbia, Maryland, or approved equal.
- D. Termination Bar: Stainless steel, 1" high by 0.075" thick, with pre-drilled holes at 8" on-center as manufactured by Advanced Building Products, Inc., Springvale, ME, or approved equal.
- E. Termination Bar Fasteners: "410 Stainless Steel Tapcon," 3/16" diameter, minimum 1-1/4 penetration, as manufactured by ITW Buildex, Itasca, Illinois, or approved equal.
- F. Termination Bar Sealant: "Sonolastic NP1," one-component, polyurethane-based moisture curing gun grade sealant by BASF Construction Chemicals, Shakopee, Minnesota, or approved equal. Note: sealant shall also conform to Specification Section 07900 – Sealants.
- G. Other Items: All other materials not specifically described but required for a complete and proper installation of the Work in this Section, shall be selected by the Contractor subject to approval by the Architect.

1 **PART 3 – EXECUTION**

2  
3 **3.1 EXAMINATION**

- 4 A. The Contractor shall have the sole responsibility for the accuracy of all measurements and for the  
5 estimate of material quantities required and necessary to satisfy the requirements of these  
6 Specifications.

7  
8 **3.2 SEQUENCE/SCHEDULING**

- 9 A. During structural steel restoration operations, restore all areas to a weathertight condition each day  
10 and/or before inclement weather commences.  
11 B. The Contractor shall not proceed with the Work until all unsatisfactory conditions detrimental to the  
12 proper and timely completion of the Work have been corrected.

13  
14 **3.3 GENERAL NOTES**

- 15 A. Structural steel shall be detailed, fabricated and erected in accordance with the AISC "Specification  
16 for the Design, Fabrication and Erection of Structural Steel for Buildings, Allowable Stress Design  
17 and Plastic Design." and the AISC "Code of Standard Practice", current edition.  
18 B. Steel shall conform to the following specifications (unless otherwise noted).  
19 1. Miscellaneous Sections and Plates: ASTM A36  
20 2. Welding Electrodes: E-70XX  
21 C. All welding shall comply with AWS D1.1 using E-70XX electrodes. All welding shall be done by  
22 AWS pre-qualified welders, certified for welds made. Provide continuous minimum sized welds per  
23 AISC requirements, unless otherwise noted.  
24 D. All existing dimensions and conditions must be verified by the Contractor prior to any fabrication  
25 and installation.  
26 E. The Contractor shall supervise and direct the structural steel restoration work and shall be solely  
27 responsible for all construction means, methods, techniques, sequences, and procedures.  
28 F. All local, State, and Federal regulations and procedures regarding safety are the responsibility of  
29 the Contractor.

30  
31 **3.4 EXISTING STRUCTURAL STEEL LINTEL RESTORATION**

- 32 A. Carefully inspect the condition of the existing steel lintels once the existing masonry has been  
33 removed at areas as indicated on the Drawings. Remove all existing mortar and other existing  
34 materials as required so that the condition of the existing steel can be closely inspected. Report  
35 any excessive rust, deterioration, or steel deformation to the Architect immediately prior to  
36 continuing with any structural steel restoration work.  
37 B. Replace and/or repair all severely rusted, deteriorated or deformed structural steel as deemed  
38 unacceptable by the Architect and/or his Structural Engineer. All existing structural steel  
39 replacement and/or repair work shall be performed as shown on the Drawings. However, if a  
40 condition arises that is not properly addressed on the Drawings or as specified herein, notify the  
41 Architect immediately prior to performing any structural steel restoration work.  
42 C. Clean all existing structural steel to remain in-place as required to receive the new structural steel  
43 coating (primer and finish coat) in strict conformance with the Manufacturer's specifications.  
44 D. Provide and install new structural steel coating (primer and finish coat) to all structural steel  
45 (including new and existing structural steel that is to be left in-place) in strict conformance with the  
46 Manufacturer's specifications.  
47 E. Provide and install new membrane flashings as shown on the Drawings on properly prepared  
48 surfaces in strict conformance with the Manufacturer's specifications.  
49 F. Provide and install all contingent materials as shown on the Drawings, including but not limited to,  
50 membrane flashing end-dams, stainless steel end-dams, stainless steel drip edges, new stainless  
51 steel termination bars, termination bar fasteners, termination bar sealant, and all other materials not  
52 specifically described but as required for a complete and proper installation of the Work in this  
53 Section.  
54 G. All new materials shall be installed in strict conformance with the Manufacturer's specifications.

55  
56 **END OF SECTION**



**SECTION 05 31 00  
STEEL DECK**

1  
2  
3  
4 PART 1 – GENERAL  
5 1.1 DESCRIPTION  
6 1.2 QUALITY ASSURANCE  
7 1.3 QUALIFICATIONS  
8 1.4 SUBMITTALS  
9 1.5 PRODUCT DELIVERY, STORAGE AND HANDLING  
10 1.6 COORDINATION  
11 PART 2 – PRODUCTS  
12 2.1 STEEL ROOF DECK  
13 2.2 NON-COMPOSITE FORM DECK  
14 2.3 FASTENERS  
15 2.4 ACCESSORIES  
16 2.5 LEED CREDIT  
17 PART 3 – EXECUTION  
18 3.1 ERECTION  
19 3.2 ROOF DECK  
20 3.3 FLOOR DECK  
21 3.4 FIELD TOUCH UP

22 **PART 1 - GENERAL**

23 **1.1 DESCRIPTION**

- 24 A. The General and Supplementary Conditions of the Construction Contract and Division 1 - General  
25 Requirements apply to the work specified in this section.
- 26 B. This section includes the fabrication and erection of steel deck. The Work shall include, but not be  
27 limited to the following:
- 28 1. Roof deck, roof deck accessories, and roof deck fasteners.  
29 2. Noncomposite form deck.
- 30 C. Structural notes indicated on the drawings regarding steel decking shall be considered a part of this  
31 specification.

32 **1.2 QUALITY ASSURANCE**

- 33 A. Codes and Standards: Comply with the provisions of the following codes, specifications and  
34 standards, except where more stringent requirements are shown or specified.
- 35 1. AISI - Specification for the Design of Cold-Formed Steel Structural Members.  
36 2. ANSI/AWS D1.1 - Structural Welding Code.  
37 3. ANSI/AWS D1.3 - Structural Welding Code - Sheet Steel.  
38 4. ASTM A1008- Standard Specification for Structural Steel (SS), Sheet, Carbon, Cold-Rolled  
39 5. ASTM A36 – Standard Specification for Carbon Structural Steel.  
40 6. ASTM A653 - Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron  
41 Alloy-Coated (Galvannealed) by the Hot Dip Process.  
42 7. ASTM A924 - Standard Specification for General Requirements for Steel Sheet, Metallic-  
43 Coated by the Hot-Dip Process  
44 8. SDI - Design Manual for Composite Decks, Form Decks, Roof Decks by the Steel Deck  
45 Institute.

- 1 B. Manufacture steel decking in accordance with the Steel Deck Institute's (SDI) "Design Manual for  
2 Composite Decks, Form Decks and Roof Decks".
- 3 C. All steel deck shall be designed and fabricated in accordance with the above AISI and SDI  
4 specifications. The gauges and section moduli indicated on the drawings or specified herein are  
5 minimum and the gauge and section modules of the deck furnished shall meet or exceed these  
6 minimum requirements. All gauges are United States standard, measured prior to coating.
- 7 D. Contractor to verify that the manufacturer's steel deck type selected is listed on the UL fire rated roof  
8 assembly specified by the Architect for this project.
- 9 E. Where any provisions of other pertinent codes and standards conflict with this specification, the more  
10 stringent provision shall govern.
- 11 F. Contractor to have pre-installation meeting where installer demonstrates workmanship by conducting  
12 representative fastenings at pre-installation meeting, subject to guidance from mechanical fastener  
13 manufacturer representative.

14 **1.3 QUALIFICATIONS**

- 15 A. Fabricator: Company specializing in performing the work of this section with minimum five (5) years  
16 documented experience at manufacturing steel deck. Fabrication Company shall be a current  
17 member of the Steel Deck Institute (SDI).
- 18 B. Erector: Company specializing in performing the work of this section with minimum five (5) years  
19 documented experience at erecting steel deck.

20 **1.4 SUBMITTALS**

- 21 A. Prepare and submit shop drawings for Engineer's approval. Shop drawings shall indicate deck  
22 layout, depth, uncoated metal thickness, framing and supports with unit dimensions and sections and  
23 complete end jointing.
- 24 B. Provide details of all accessories.
- 25 C. Shop drawings shall also indicate typical welding or mechanical anchoring pattern for steel deck and  
26 accessories.
- 27 D. Prepare and submit allowable construction span tables and allowable total load tables for Engineer's  
28 approval. Tables shall be accompanied with a letter of certification from the manufacturer stating the  
29 tabulated design values were determined in accordance with the steel deck institute's "Design  
30 Manual for Composite Decks, Form Decks, and Roof Decks."
- 31 E. Provide manufacturer's latest recommendations and installation instructions.
- 32 F. Prepare and submit product data of proposed materials.
- 33 G. LEED Certification: Submit manufacturer's certification for each steel product including the following:
- 34 1. LEED Credit MRc 4.1/4.2 – Recycled content, including percentage of pre-consumer (post-  
35 industrial) and post-consumer recycled content. Also provide manufacturer's name, product  
36 cost and steel processing furnace type.
- 37 2. LEED Credit MRc 5.1/5.2 – Location of manufacturing plant, manufacturer's name, product  
38 cost and location of extraction or harvest of raw materials.

39 **1.5 PRODUCT DELIVERY, STORAGE AND HANDLING**

- 40 A. All decking materials shall be transported, stored and erected in a manner that will prevent damage  
41 or deformation of sheets. Damaged material shall not be erected or repaired without Structural  
42 Engineer's approval.

- 1 B. Deck panels shall be stored clear of the ground, elevated on one end, and protected from weather  
2 with waterproof covering.

3 **1.6 COORDINATION**

- 4 A. Portions of decking to receive spray applied fireproofing shall be galvanized finish. Contractor shall  
5 certify compatibility of any shop primer with field applied finishes or fireproofing required for this  
6 project.

7 **PART 2 - PRODUCTS**

8 **2.1 STEEL ROOF DECK**

- 9 A. Standard Steel Roof Deck: Fabricate panels to comply with "SDI Specification and Commentary for  
10 Steel Roof Deck," and the following:

- 11 1. Steel decking sheet material, minimum yield strength, depth, gage, profile, and finish are  
12 indicated on the Drawings, as classified by Steel Deck Institute (SDI). Panels shall be  
13 formed with integral ribs and overlapping side flanges.

14 **2.2 NON-COMPOSITE FORM DECK**

- 15 A. Non-Composite Form Deck: Fabricate panels to comply with "SDI Specification and Commentary for  
16 Non-Composite Steel Floor Deck," and the following:

- 17 1. Steel decking sheet material, minimum yield strength, depth, gage, profile, and finish are  
18 indicated on the Drawings, as classified by Steel Deck Institute (SDI). Panels shall be  
19 formed with integral ribs and overlapping side flanges.

20 **2.3 FASTENERS**

- 21 A. Support Fasteners:

- 22 1. Welded: 5/8" diameter electric arc spot (puddle) welds. Refer to Drawings for weld spacing  
23 requirements. Welds spaced at 12"O.C.

- 24 a. Weld washers required for material less than 0.028" thick. Welding washers shall  
25 a minimum thickness of 0.0598 inches and be applicable to AWS D1.3 type  
26 welding and of type as recommended by the deck manufacturer.

- 27 b. Weld metal shall penetrate all layers of deck material and shall have good fusion  
28 to the supporting steel. Fasten ribbed deck to steel support members at ends and  
29 intermediate supports.

- 30 1) All welding shall be in conformance with previously cited AWS  
31 recommendations in appearance and quality of welds, and the methods  
32 used in correcting welding work.

- 33 B. Side Lap Fasteners:

- 34 1. Mechanical: Zinc coated self-drilling, self-tapping type (minimum No. 10) steel screws.  
35 Refer to Drawings for fastener spacing requirements. Side lap fasteners shall be placed at  
36 mid-span or 36 inch intervals, whichever is smaller.

37 **2.4 ACCESSORIES**

- 38 A. Provide all closers, fillers, starters, metal cant strips, pour stops, column closures, girder fillers, and  
39 similar accessories required for a complete installation. Provide cover plates at all locations where  
40 direction of deck span changes. Unless otherwise noted, accessories shall be of the same steel  
41 sheet material, finish, and thickness as the deck sections.

1 B. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.

2 **2.5 LEED CREDIT**

3 A. LEED Credit MRc 4.1/4.2:

4 1. Steel products shall be made using an Electric Arc Furnace and shall have a minimum  
5 recycled content of 80%, including at least 65% post-consumer recycled content and 15%  
6 post-industrial recycled content.

7 2. Steel products made using a Basic Oxygen Furnace shall have a minimum recycled content  
8 of 25%, including at least 20% post-consumer recycled content and 5% post-industrial  
9 recycled content.

10 B. LEED Credit MRc 5.1/5.2:

11 1. Steel products shall be manufactured within 500 miles of project site. Recycled scrap  
12 products shall be procured from within 500 miles of the project site.

13 **PART 3 - EXECUTION**

14 **3.1 ERECTION**

15 A. Verify that field conditions are acceptable and are ready to receive work.

16 B. Deck units and deck accessories herein specified shall be thoroughly and securely erected by  
17 experienced workmen fastening to supporting steel members as herein specified. All work shall be  
18 in conformance with manufacturer's latest printed recommendations and approved shop drawings.

19 C. Beginning of installation means installer accepts existing conditions.

20 D. The finished work shall be true, flat planes and to slopes indicated with end joints flush and without  
21 sharp protruding edges. Exposed underside of deck shall be true without defect.

22 E. Erector shall cut all openings in deck for piping and equipment furnished by other trades. Wherever  
23 ribs are cut and are not supported by supplemental framing, the erector shall provide steel angles of  
24 adequate size on all sides of the opening welded to the underside of each rib.

25 F. Burning of holes in decking will not be permitted.

26 G. Steel decking shall be installed to span supporting steel members at right angles. Panels shall be  
27 securely anchored to each structural support it rests on or passes.

28 **3.2 ROOF DECK**

29 A. Fasten roof deck panels to steel supporting members using welds, mechanical fasteners, drive pins  
30 as specified herein and on the Drawings.

31 B. Unless noted otherwise, secure side laps and perimeter edges of units with fasteners at mid-span  
32 between supports or 36 inches on center, whichever distance is smaller.

33 C. Deck shall be fastened through the bottom of the deck rib to all structural supports for the specific  
34 deck sections.

35 D. End bearing of roof decking shall have a minimum of 1-1/2 inches of bearing occurring over structural  
36 supports

37 E. End joints shall be lapped 2 inches minimum.

- 1 F. Install sound absorbing insulation into the topside ribs of the acoustical deck as specified in the deck  
2 manufacturer's installation instructions. Coordinate with the roofing installation to protect the  
3 insulation from damage.
- 4 G. Place deck panels on structural supports and adjust to final position with ends aligned. Attach to  
5 supports immediately after placement.
- 6 H. Roof sump pans shall be installed over openings provided in roof deck with flanges welded to the top  
7 of the deck. Space welds at 12 inches apart with at least 1 weld in each corner.
- 8 I. Install all roof deck accessories in accordance with the roof deck manufacturer's written instructions.

9 **3.3 FLOOR DECK**

- 10 A. Fasten steel floor deck to supporting steel with 5/8" diameter electric arc spot (puddle) welds spaced  
11 at 12" O.C. minimum. Secure side laps and perimeter edges of units with fasteners at mid-span  
12 between supports or 36 inches on center, whichever distance is smaller.
- 13 B. Place deck panels on structural supports and adjust to final position with ends aligned. Attach to  
14 supports immediately after placement.
- 15 C. Install deck ends over supports with a minimum end bearing of 1-1/2 inches.
- 16 D. Non-composite decks end joints shall be lapped a minimum of 2 inches.
- 17 E. Install pour stops and girder fillers to supporting structure according to manufacturer's  
18 recommendations.
- 19 F. Fasten column closures and cell closures to deck to provide a tight fit. Provide cell closures at  
20 changes of direction of deck units, unless otherwise noted.
- 21 G. Install all floor deck accessories in accordance with the floor deck manufacturer's written instructions.

22 **3.4 FIELD TOUCH UP**

- 23 A. After erection, all weld burn marks and abraded spots shall be cleaned and field painted with a rust-  
24 inhibiting metal primer matching formulations and color of shop coat or a zinc-rich rust inhibiting paint  
25 for galvanized deck surfaces.

26 **END OF SECTION**

SECTION 05 40 00  
COLD-FORMED STEEL FRAMING (CFSF) SYSTEM

1  
2  
3  
4 PART 1 – GENERAL  
5 1.1 DESCRIPTION  
6 1.2 QUALITY ASSURANCE  
7 1.3 SUBMITTALS  
8 1.4 QUALIFICATIONS  
9 1.5 PRODUCT DELIVERY, STORAGE AND HANDLING  
10 PART 2 – PRODUCTS  
11 2.1 MATERIALS  
12 2.2 FABRICATION  
13 2.3 LEED CREDIT  
14 PART 3 – EXECUTION  
15 3.1 INSPECTION  
16 3.2 INSTALLATION

17 **PART 1 - GENERAL**

18 **1.1 DESCRIPTION**

- 19 A. The General and Supplementary Conditions of the Construction Contract and Division 1 - General  
20 Requirements apply to the work specified in this section.
- 21 B. Load bearing structural steel studs and joist framing system of 20 to 12 gauge (33 mil to 97 mil)  
22 members along with fasteners and related accessories.
- 23 C. Furnish and install cold-formed steel framing system as shown on Drawings and herein specified.
- 24 1. Work shall include, but not be limited to the following items:
- 25 a. Non-load bearing formed steel stud exterior wall framing.
- 26 b. Formed steel joist framing and bridging.
- 27 c. Provide tracks, blocking, lintels, clips angles, bridging, shoes, reinforcements,  
28 fasteners and accessories to construct a complete steel framing system.
- 29 D. Structural notes indicated on Drawings regarding cold-formed steel framing system shall be  
30 considered a part of this Specification.
- 31 E. Refer to Division 9 for non-load bearing studs of 20 gauge (30 mil) or lighter.

32 **1.2 QUALITY ASSURANCE**

- 33 A. Workmen Qualifications:
- 34 1. For the actual erection of cold-formed steel framing system, use only skilled journeymen  
35 steel framing erectors who are thoroughly experienced with the materials and methods  
36 specified.
- 37 2. Use qualified welders and comply with AWS standards.
- 38 B. Codes and Standards: Comply with the provisions of the following codes, specifications, and  
39 standards, except where more stringent requirements are shown or specified:
- 40 1. AISI - Specification for the Design of Cold Formed Steel Structural Members, Current  
41 Edition.
- 42 2. AISI General Provisions 2004 Edition.

- 1 3. AWCI - Association of Wall and Ceiling Industries, Current Edition.
- 2 4. AWS D1.3 - Structural Welding Code - Sheet Steel
- 3 5. ASTM A653 - Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy-Coated  
4 (Galvannealed) by the Hot Dip Process.
- 5 6. ASTM A1008 -Structural Steel (SS), Sheet, Carbon, Cold-Rolled
- 6 7. ASTM C955 - Load Bearing (Transverse and Axial) Steel Studs, Runners (Track) and  
7 Bracing or Bridging for Screw Applications of Gypsum Board and Metal Plaster Base.
- 8 8. ASTM C1007 - Installation of Load Bearing Steel Studs and Related Accessories.
- 9 9. SSMA - Steel Stud Manufacturers Association.
- 10 C. Where any provisions of other pertinent codes and standards conflict with this specification, the more  
11 stringent provision shall govern.
- 12 D. Performance Requirement:
- 13 1. Provide CFSF capable of withstanding design loads indicated on the plans.
- 14 2. Design CFSF to withstand design loads meeting the following deflection limits:
  - 15 a. Exterior walls backing up brick or stone veneer: Horizontal deflection of 1/600 of  
16 wall height.
  - 17 b. Exterior walls clad with metal siding, exterior insulated finish systems or other  
18 flexible non-brittle finishes: Horizontal deflection of 1/240 of wall height.
  - 19 c. Floor Joist Framing: Vertical deflection of 1/480 for live load and 1/360 for total  
20 loads of the span.
- 21 3. Design CFSF to provide for movement of framing members without damage or  
22 overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors,  
23 or other detrimental effects when subject to a maximum ambient temperature change of  
24 120°F.
- 25 4. Design system to accommodate construction tolerances, deflection of building structural  
26 members (1 inch maximum), and clearances of intended openings.
- 27 5. CFSF shall be designed in accordance with "Standard for Cold-Formed Steel Framing -  
28 General Provisions", current edition.

29 **1.3 SUBMITTALS**

- 30 A. Shop Drawings:
  - 31 1. Prepare and submit complete erection and detailed shop drawings for Engineer's approval,  
32 including framing plans indicating size, gauge, weight and location of all framing members.  
33 Shop drawings shall indicate the following:
    - 34 a. Component details, framed openings, bearing, anchorage, loading, welds, type  
35 and location of fasteners, bracing, bridging, strapping, connections, and  
36 accessories or items required of other related work. Provide stud and ceiling joist  
37 layout.
    - 38 b. Describe method for securing studs to tracks and for bolted/welded framing  
39 connections.

1 c. Provide calculations for loadings and stresses of steel framing system, including  
2 specially fabricated components and roof trusses, shall be prepared by a  
3 registered professional engineer, with registration from the state in which the  
4 building is located.

5 d. Detail size and location of all bridging, strapping, bracing, splices, and accessories  
6 required for installation.

7 B. Product Data:

8 1. Provide product data on standard framing members. Describe materials and finish, product  
9 criteria and limitations. Submit manufacturer's installation instructions.

10 C. LEED Certification: Submit manufacturer's certification for each steel product including the following:

11 1. LEED Credit MRc 4.1/4.2 – Recycled content, including percentage of pre-consumer (post-  
12 industrial) and post-consumer recycled content. Also provide manufacturer's name, product  
13 cost and steel processing furnace type.

14 2. LEED Credit MRc 5.1/5.2 – Location of manufacturing plant, manufacturer's name, product  
15 cost and location of extraction or harvest of raw materials.

16 **1.4 QUALIFICATIONS**

17 A. MANUFACTURER: Company specializing in performing the work of this section with a minimum of  
18 five (5) years documented experience at manufacturing cold-formed steel and framing systems and  
19 related accessories. Manufacturer shall be a current and "full" member of the Steel Stud  
20 Manufacturers Association (SSMA).

21 B. All steel studs and track furnished under this section shall be supplied by a manufacturer who is a  
22 current member of the Steel Stud Manufacturers Association (SSMA).

23 C. All steel studs and tracks used for this project shall meet the minimum section properties published  
24 by the Steel Stud Manufacturers Association (SSMA).

25 D. Preparation of shop drawings, design calculations, and other structural data by a qualified  
26 Professional Engineer licensed in the State of Wisconsin.

27 **1.5 PRODUCT DELIVERY, STORAGE AND HANDLING**

28 A. Steel members shall be transported, stored and erected in a manner that will avoid any damage or  
29 deformation. Bent or deformed members will be rejected and shall be replaced or repaired at the  
30 expense of the responsible party. Store clear of ground and in such a manner so as to eliminate  
31 excessive handling.

32 **PART 2 - PRODUCTS**

33 **2.1 MATERIALS**

34 A. Framing Materials:

35 1. Studs shall be minimum 20 gauge (33 mil) thick sheet steel conforming to ASTM A653  
36 Grade 33 for 18 gauge and thinner and/or Grade 50 for 16 gauge and thicker, formed to  
37 channel shape, punched web, with nominal size as indicated on Drawings.

38 2. Joists shall be minimum 20 gauge (33 mil) thick sheet steel conforming to ASTM A653  
39 Grade 33 for 18 gauge and thinner and/or Grade 50 for 16 gauge and thicker, formed to  
40 channel of open box shape, solid or punched web with nominal depths as noted on  
41 Drawings. All joists shall be single length span (without splices) with a minimum 8 inch  
42 bearing on each end, unless otherwise indicated.



- 1 3. Track shall be minimum 20 gauge (33 mil) thick sheet steel, channel shaped, solid web,  
2 same width as above studs. Track shall provide a tight fit for studs.
- 3 B. Accessories:
- 4 1. Bracing, furring and bridging shall consist of formed sheet steel with thickness determined  
5 for conditions encountered. Provide manufacturer's standard shapes, complete with finish  
6 same as framing members.
- 7 2. Plates, gussets and clips shall consist of formed sheet steel with thickness determined for  
8 conditions encountered. Provide manufacturer's standard shapes, complete with finish  
9 same as framing members.
- 10 C. Fasteners:
- 11 1. Self-drilling, self-tapping screws, bolts nuts and washers shall conform to ASTM A90,  
12 complete with hot-dip galvanized minimum size: 1/4-14.
- 13 2. Expansion anchors shall be "Kwik" bolts, as manufactured by Hilti, Inc.
- 14 3. All other fasteners shall be as indicated on Drawings or as recommended by the above stud  
15 manufacturer.
- 16 4. Welding connections are to be performed in accordance with American Welding Society  
17 (AWS) D1.3 latest edition "Specification for Welded Sheet Steel in Structures." Consult AWS  
18 D19.0 latest edition "Welding Zinc Coated Sheet" and ANSI Standard Z49.1 for information  
19 regarding welding procedures.
- 20 D. Finishes:
- 21 1. Furnish all stud and joist system components with a factory galvanized (G60) finish.

22 **2.2 FABRICATION**

- 23 A. Fabricate assemblies of framed sections, of sizes and profiles required with framing members fitted,  
24 reinforced and braced to suit design requirements.
- 25 B. Fit and assemble in largest practical sections for delivery to Worksite, ready for installation.
- 26 C. Bearing studs must be fabricated with full stud end seated against track web. Do not use studs that  
27 have been cut at punchouts.

28 **2.3 LEED CREDIT**

- 29 A. LEED Credit MRc 4.1/4.2:
- 30 1. Steel products shall be made using an Electric Arc Furnace and shall have a minimum  
31 recycled content of 80%, including at least 65% post-consumer recycled content and 15%  
32 post-industrial recycled content.
- 33 2. Steel products made using a Basic Oxygen Furnace shall have a minimum recycled content  
34 of 25%, including at least 20% post-consumer recycled content and 5% post-industrial  
35 recycled content.
- 36 B. LEED Credit MRc 5.1/5.2:
- 37 1. Steel products shall be manufactured within 500 miles of project site. Recycled scrap  
38 products shall be procured from within 500 miles of the project site.

1 **PART 3 - EXECUTION**

2 **3.1 INSPECTION**

- 3 A. Verify that substrate surfaces and building framing components are ready to receive work.  
4 B. Beginning of installation means acceptance of existing conditions and substrate.

5 **3.2 INSTALLATION**

6 A. General:

7 1. Cold-formed steel framing system shall consist of structural steel studs and joists with  
8 locations as shown on Drawings. All work shall be in accordance with approved shop  
9 drawings and manufacturer's latest printed specifications. Framing members shall be  
10 securely attached by mechanical fasteners as indicated on Drawings and as recommended  
11 by the manufacturer.

- 12 a. All field welding shall be in accordance with AWS previously cited.  
13 b. Wire tying of stud or components in system will not be allowed.  
14 c. Complete framing system ready to receive subsequent facing material.

15 2. Provision shall be made in studs for rigid fastening of all blocking and special braces or  
16 framing and for attachment and support of electrical outlets or other equipment indicated to  
17 be supported by stud construction.

18 a. All anchorage, bracing and blocking shall be in accordance with approved shop  
19 drawings and as recommended by the manufacturer.

20 3. Surfaces abraded by handling, weld locations and other miscellaneous defects shall be  
21 touched-up with zinc-rich galvanizing compound (ZRC) coating.

22 B. Erection Of Studding:

23 1. Top and bottom runner members shall be the same size and gauge as the stud and be  
24 continuous for the total length of framing system or as long as practical and shall be securely  
25 attached a maximum of 24 inches on centers with approved fastening devices. Studs shall  
26 extend in one piece full height vertically between runners, spaced no greater than 24 inches  
27 on centers, with all web cut-outs in perfect alignment. Studs shall provide solid backing at  
28 corners and jambs. Install joists with all components property aligned and braced with all  
29 work plumb and true ready and acceptable to receive surface materials.

- 30 a. Coordinate installation of sealant with floor and ceiling tracks.  
31 b. Field cutting of studs shall be done by sawing.  
32 c. Splices in axial load studs will not be permitted.  
33 d. Erect load bearing studs, brace and reinforce to develop full strength to meet  
34 design requirements.  
35 e. Extend stud framing through ceiling to underside of floor or roof structure above.  
36 f. Install intermediate studs above and below openings with studs equally spaced to  
37 correspond to adjacent stud spacing.  
38 g. Provide deflection allowance in stud track, directly below horizontal building  
39 framing for non-load bearing framing.  
40 h. Framing fabricator shall ensure punchout alignment when assembling framing and  
41 field cutting to length.  
42 i. All framing components shall be cut squarely for attachment to perpendicular  
43 members.  
44 j. In the event a track butt joint occurs within a panel, abutting pieces of track shall  
45 be butt welded or spliced together. No such splices shall occur at any head or sill  
46 condition.



**SECTION 054500**  
**EQUIPMENT SUPPORT SYSTEMS**

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22 **PART 1 - GENERAL**

23 **1.1 RELATED DOCUMENTS**

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

26 **1.2 SUMMARY**

- 27 A. Section includes:  
28 1. Continuous slot, bolted metal framing channels and all associated fittings and hardware.  
29 2. Design and engineering to provide code compliant support framing fabricated to performance  
30 standards specified.  
31 3. Installation of design/build fabricated bolted metal framing as support for ceiling mounted medical  
32 equipment.

33 **1.3 REFERENCES**

- 34 A. ASTM A123 - Specification for Zinc (Hot-Galvanized) Coatings on Products Fabricated from Rolled,  
35 Pressed, and Forged Steel Shapes, Plates, Bars, and Strip  
36 B. ASTM A653 - General Requirements for Steel Sheet, Zinc-Coated Galvanized by the Hot-Dip Process  
37 C. ASTM A1011 - Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-  
38 Alloy and High-Strength Low-Alloy with Improved Formability (Formerly ASTM A570)  
39 D. ASTM F1136 – Standard Specification for Chromium/Zinc Corrosion Protective Coatings for Fasteners  
40 E. ASTM A907 - Standard Specification for Steel, Sheet and Strip, Heavy-Thickness Coils, Carbon, Hot-Rolled,  
41 Structural Quality  
42 F. ASTM B633 - Specification for Electrodeposited Coatings of Zinc on Iron and Steel  
43 G. MFMA - Metal Framing Manufacturers Association  
44 H. ANSI/NFPA 70– National Fire Protection Association (National Electrical Code)  
45 I. AISI - American Iron and Steel Institute

46 **1.4 ACTION SUBMITTALS**

- 47 A. Submit manufacturer's product data on strut channels including, but not limited to, types, materials, finishes,  
48 gauge thickness, and hole patterns. For each different strut cross-section, submit cross sectional properties  
49 including Section Modulus (Sx) and Moment of Inertia (Ix).  
50 1. Submit drawings of strut and accessories including clamps, brackets, hanger rods, and fittings.  
51

- 1 B. Submit Shop Drawings which show methods of suspending and anchoring equipment, station details,  
2 equipment locations and detailed dimensions of all major components. Medical equipment supports shall  
3 be shown on an accurate 3-D model.  
4 1. Final support system shop drawings and submittal information shall incorporate coordination  
5 drawings information of plenum space utilization.  
6 2. Provide structural calculations and engineering seals to further ensure that support system design  
7 meets the requirements.  
8 C. Delegated-Design Submittal: For equipment support systems indicated to comply with performance  
9 requirements and design criteria, including analysis data signed and sealed by the qualified professional  
10 engineer licensed in the State of Wisconsin responsible for their preparation.

11 **1.5 INFORMATIONAL SUBMITTALS**

- 12 A. Field quality-control reports.  
13 B. Warranties: Sample of special warranties.

14 **1.6 QUALITY ASSURANCE**

- 15 A. Material and installation shall be provided by a qualified contractor, with at least ten years experience in the  
16 manufacture and installation of metal framing medical equipment supports. Vendor shall demonstrate  
17 experience of projects of similar scope and size, and shall maintain a continuing quality assurance program  
18 for both its material and installation crews.  
19 B. Manufacturers: Firms regularly engaged in the manufacture of bolted metal framing of the types required,  
20 whose products have been in satisfactory use in similar service for not less than 5 years.  
21 C. Contractor shall provide the single source responsibility for design, materials and workmanship, and shall  
22 provide a warranty period of one year from date of acceptance by Owner.  
23 D. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for  
24 installation of bolted metal support framing required for this Project.  
25 E. MFMA Compliance: Comply with the latest revision of MFMA Standards Publication Number MFMA-3,  
26 "Metal Framing Standards Publication".  
27 F. NEC Compliance: Comply with the latest revision NFPA 70 - Article 352 "Surface Metal Raceways and  
28 Surface Nonmetallic Raceways".  
29 G. UL Compliance: Comply with UL "Standard for Surface Metal Raceway and Fittings", UL 5.  
30 H. Bolted framing channels and fittings shall have the manufacturers name, part number, and material heat  
31 code identification number stamped in the part itself for identification. Material certification sheets and test  
32 reports shall be made available by the manufacturer upon request.  
33 I. Product Options: Information on Drawings and in Specifications establishes requirements for performance  
34 characteristics. Performance characteristics are indicated by criteria subject to verification by one or more  
35 methods including testing conducted by an independent testing agency and in-service performance.  
36 J. Preinstallation Conference: Conduct conference at Project site.  
37 K. Mockup: Refer to Section 01 43 39 – Mockups for description of construction required to complete a mockup  
38 submittal for review.  
39 1. Typical ACT-3 and ESS-1 assembly in open office bay, min. full structural bay x 4ft wide panels each  
40 side of ESS-1. Location to be south-east corner of open office at Ground Level.  
41

- 1 **1.7 COORDINATION**  
2 A. Ceiling Plenum Coordination:  
3 1. Submit an accurate 3-D model of the equipment support system to the Contractor, who will use the  
4 3-D model for MEPT clash detection. The HVAC contractor will develop and analyze the 3-D model,  
5 based on electronic 3-D information furnished by other MEP contractors who will share the ceiling  
6 plenum space.  
7 2. Design/Builder shall modify support design based on MEPT clash detection and resolution  
8 coordination.  
9 3. Design/Builder shall directly coordinate with Owner to obtain final purchased equipment information  
10 necessary to accurately coordinate, design, fabricate and install equipment supports.  
11 4. Contractor will furnish one set of digital data files of Drawings for use in preparing coordination digital  
12 data files.  
13 5. Content: Include the following information, as applicable:  
14 a. Indicate space requirements for equipment support systems.  
15 b. Show location and size of access required for installation.  
16 c. Indicate required installation sequences.  
17 d. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be  
18 in conflict with submitted equipment and minimum clearance requirements. Provide alternate  
19 sketches indicating proposed resolution of such conflicts.  
20 e. Minor dimension changes and difficult installations will not be considered changes to the  
21 Contract.

- 22 **1.8 DELIVERY, STORAGE, AND HANDLING**  
23 A. Deliver strut systems and components carefully to avoid breakage, denting, and scoring finishes. Do not  
24 install damaged equipment.  
25 B. Store strut systems and components in original cartons and in clean dry space; protect from weather and  
26 construction traffic.

- 27 **1.9 WARRANTY**  
28 A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace  
29 components of that fail in materials or workmanship within specified warranty period.  
30 1. Failures include, but are not limited to, the following:  
31 a. Structural failures including, but not limited to, excessive deflection.  
32 b. Noise or vibration caused by support framing movement from equipment operation.  
33 2. Warranty Period: Twenty years from date of Substantial Completion.

34 **PART 2 - PRODUCTS**

- 35 **2.1 ACCEPTABLE MANUFACTURERS**  
36 A. Product Manufacturer: Subject to compliance with these specifications, strut systems to be installed shall  
37 be as manufactured by Unistrut, Inc. or Design/Builder approved equal. Framing system shall be equal to:  
38 1. Unistrut Metal Framing.  
39 2. Telestrut Telescoping Strut.  
40 3. Telespar Telescoping Tubing.  
41 B. Approved Design/Builder:  
42 1. Unistrut Wisconsin  
43 15350 W National Avenue  
44 New Berlin, WI 53151-5158  
45 Contact: Carl Pfeifer  
46 Phone: (262)796-8707  
47 Phone: 262-796-8710  
48 Fax: 262-796-8712  
49 Email: cpfeifer@unistrut.com  
50 2. Equipment Support Systems™  
51 2390 Capitol Landing Drive  
52 Ballwin, MO 63017  
53 Phone: (505) 401-1234  
54 website: www.EquipmentSS.com  
55 e-mail: ess@equipmentss.com

- 1           3.     Vertex Steel Inc. Home Office  
2                     2175 Fyke Dr. Milford, MI 48381  
3                     Phone : (248) 684-4177  
4                     Fax : (248) 684-9327

5     **2.2     PERFORMANCE REQUIREMENTS**

- 6     A.     Delegated Design: Design metal-framed equipment supports, including comprehensive engineering  
7             analysis by a qualified professional engineer licensed in the State of Wisconsin, using performance  
8             requirements and design criteria indicated.  
9     B.     General:  
10            1.     The ceiling tile flanges shall be installed directly on the metal support framing flush with the bottom  
11                of the channel opening creating a clean, unobtrusive look consistent with the room aesthetics.  
12     C.     Metal-framed equipment supports shall withstand the effects of the following without failure due to defective  
13             manufacture, fabrication, installation, or other defects in construction:  
14             1.     Structural loads.  
15             2.     Movements of supporting structure.  
16             3.     Dimensional tolerances of support system and other adjacent construction.  
17             4.     Failure includes, but is not limited to, the following:  
18                a.     Deflection exceeding specified limits.  
19                b.     Noise or vibration created by equipment operation.  
20                c.     Loosening or weakening of fasteners, attachments, and other components.  
21     D.     Structural Loads:  
22             1.     Static and Dynamic Loads: As provided by-the structural engineer.  
23             2.     Seismic Loads: None.  
24     E.     Deflection of Framing Members: as follows:  
25             1.     System shall be true, plumb and level to the tolerances indicated, with no more than 1/720th of the  
26                span maximum deflection in either plane, when maximum loading conditions are applied due to  
27                equipment operation.  
28     F.     Lateral Bracing of Framing Members:

29     **2.3     SUPPORT SYSTEM (ESS-1)**

- 30     A.     The support system shall lend itself to a rational structural analysis with section properties of framing  
31             members demonstrated by calculations. Structural calculations and drawings shall be furnished with a stamp  
32             by a licensed engineer licensed in the State of Wisconsin complying with all applicable codes and regulatory  
33             requirements.  
34     B.     Design:  
35             1.     Support Structure: The support members at the ceiling plane shall be located as indicated on the  
36                drawings. The spacing shall allow installation of standard modular ceiling tiles, fixtures and  
37                equipment. It shall be possible to attach the equipment at any point on the support system.  
38             2.     Ceiling Anchorage: Whenever possible, attachment to ceiling structure above shall be done by  
39                means of imbedded concrete inserts, through bolts, or by direct attachment to the structural framing  
40                of the building.  
41             3.     Vertical supports: The exposed rails and the ceiling anchorage shall be connected by a series of  
42                vertical supports as indicated on the drawings. Vertical supports shall provide for both basic and  
43                micro vertical adjustment.  
44             4.     Loading: The support structure shall be designed to support the equipment manufacturer's  
45                equipment load at any single point along the exposed rails. The concentrated load shall be the  
46                maximum that will be encountered by positioning the equipment at the extremities of its travel  
47                (maximal load configuration).  
48             5.     Safety Factor: The system shall be designed with a minimum safety factor of 2 based on ultimate  
49                strength under static and dynamic conditions.

50     **2.4     STRUT CHANNELS AND COMPONENTS**

- 51     A.     Made from easy-to-assemble systems  
52             1.     Unistrut Metal Framing.  
53             2.     Telestrut Telescoping Strut.  
54             3.     Telespar Telescoping Tubing.  
55             4.     Similar from other manufacturers.  
56             5.     Anchors: Hilti KB-TZ anchors  
57     B.     General: Strut shall be 1-5/8 inches wide in varying heights and shop welded combinations as required to  
58             meet load capacities and designs indicated on the drawings.  
59     C.     Materials and Finish: Material and finish specifications for each strut type are as follows:

- 1 1. Pre-galvanized Steel: Strut shall be made from steel meeting the minimum mechanical properties of  
2 ASTM A653 SS, Grade 33, and mill galvanized in accordance with coating designation G90. Fittings  
3 shall be manufactured from steel meeting the minimum requirements of ASTM A907 SS, Grade 33.  
4 All fittings and hardware shall be zinc plated in accordance with ASTM B633 (SC3 for fittings, SC1  
5 for threaded hardware).

6 **2.5 FABRICATION**

- 7 A. Where practical, fit and assemble metal-framed in manufacturer's plant. To ensure proper assembly at  
8 Project site, clearly identify work that cannot be permanently factory assembled before shipment.  
9 B. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

10 **PART 3 - EXECUTION**

11 **3.1 EXAMINATION**

- 12 A. Examine areas and conditions, with Installer present, for compliance with requirements for installation  
13 tolerances and other conditions affecting performance of the Work.  
14 B. Installation / Substrate Conditions / Acceptance:  
15 1. Installation of product shall constitute acceptance of existing conditions / substrates for compatibility  
16 with specified products unless the architect and Contractor are both notified in writing prior to the  
17 start of installation.  
18 C. Proceed with installation only after unsatisfactory conditions have been corrected.  
19 D. Field Measurements:  
20 1. The contractor shall make field measurements to assure that the medical support can be installed  
21 according to plans, and without  
22 2. Interference with structural framing, mechanical systems, plumbing or other obstructions. Any  
23 interference shall be reported to the architect.  
24 E. Sequencing:  
25 1. The contractor shall assure that the support system is installed in a timely and practical sequence,  
26 ahead of any extensive electrical, mechanical or HVAC work in the area, and prior to any ceiling  
27 framing or room finishes.  
28 F. Modifications:  
29 1. Any changes or modifications from approved shop drawings shall require approval from the architect  
30 and engineer, and shall be noted on the final drawings.

31 **3.2 INSTALLATION**

- 32 A. General:  
33 1. Comply with manufacturer's written instructions.  
34 2. Do not install damaged components.  
35 3. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration.  
36 4. Galvanized components cut on site shall be coated with corrosion-prevention paint at cut ends after  
37 grinding sharp burrs from cut ends.  
38 B. Install components plumb and true in alignment with established lines and elevations.  
39 C. Erection Tolerances: Install metal-framed equipment supports to comply with the following maximum  
40 tolerances:  
41 1. Alignment: Limit offset from true alignment to 1/32 inch where surfaces abut in line, edge to edge,  
42 at corners, or where a reveal or protruding element separates aligned surfaces by less than 3 inches;  
43 otherwise, limit offset to 1/16 inch.

44 **END OF SECTION**



SECTION 05 50 00  
METAL FABRICATIONS

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35 **PART 1 - GENERAL**

36 **1.1 SUMMARY**

- 37 A. Section Includes:
  - 38 1. Metal fabrications (MTLFAB-1)
    - 39 a. Miscellaneous steel framing and supports.
    - 40 b. Shelf angles.
    - 41 c. Metal floor plate and supports.
    - 42 d. Miscellaneous steel trim.
    - 43 e. Metal bollards.
  - 44 2. Downspout guards (GUARD-1).
  - 45 3. Madison Fire Department KNOX Box.
- 46 B. Products furnished, but not installed, under this Section include the following:
  - 47 1. Loose steel lintels.
  - 48 2. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast
  - 49 into concrete or built into unit masonry.

50 **1.2 COORDINATION**

- 51 A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating
- 52 manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one
- 53 another.
- 54

- 1 B. Coordinate installation of metal fabrications that are anchored to or that receive other work. Furnish setting  
2 drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor  
3 bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items  
4 to Project site in time for installation.

5 **1.3 ACTION SUBMITTALS**

- 6 A. Product Data: For the following:  
7 1. Paint products.  
8 2. Grout.  
9 B. Sustainable Design Submittals:  
10 1. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and  
11 cost.  
12 C. Shop Drawings: Show fabrication and installation details. Include plans, elevations, sections, and details of  
13 metal fabrications and their connections. Show anchorage and accessory items.  
14 D. Samples for Verification: For each type and finish of extruded nosing and tread.  
15 E. Delegated-Design Submittal: For ladders, including analysis data signed and sealed by the qualified  
16 professional engineer responsible for their preparation.

17 **1.4 INFORMATIONAL SUBMITTALS**

- 18 A. Qualification Data: For professional engineer.  
19 B. Mill Certificates: Signed by stainless-steel manufacturers, certifying that products furnished comply with  
20 requirements.  
21 C. Welding certificates.  
22 D. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that  
23 shop primers are compatible with topcoats.  
24 E. Research/Evaluation Reports: For post-installed anchors, from ICC-ES.

25 **1.5 QUALITY ASSURANCE**

- 26 A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural  
27 Welding Code - Steel."  
28 B. Welding Qualifications: Qualify procedures and personnel according to the following:  
29 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."  
30 2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."  
31 3. AWS D1.6/D1.6M, "Structural Welding Code - Stainless Steel."

32 **1.6 FIELD CONDITIONS**

- 33 A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal  
34 fabrications by field measurements before fabrication.

35 **PART 2 - PRODUCTS**

36 **2.1 PERFORMANCE REQUIREMENTS**

- 37 A. Delegated Design: Engage a qualified professional engineer licensed in the State of Wisconsin, as defined  
38 in Section 01 40 00 "Quality Requirements," to design ladders.  
39 B. Structural Performance of Aluminum Ladders: Aluminum ladders shall withstand the effects of loads and  
40 stresses within limits and under conditions specified in ANSI A14.3.  
41 C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting  
42 on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure  
43 of connections, and other detrimental effects.  
44 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.  
45

- 1     **2.2     METALS**
- 2     A.     Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal
- 3     fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks,
- 4     rolled trade names, or blemishes.
- 5     B.     Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled
- 6     content not less than 25 percent.
- 7     C.     Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- 8     D.     Stainless-Steel Bars and Shapes: ASTM A 276, Type 316L.
- 9     E.     Steel Tubing: ASTM A 500/A 500M, cold-formed steel tubing.
- 10    F.     Steel Pipe: ASTM A 53/A 53M, Standard Weight (Schedule 40) unless otherwise indicated.
- 11    **2.3     FASTENERS**
- 12    A.     General: Unless otherwise indicated, provide **Type 316** stainless-steel fasteners for exterior use and zinc-
- 13    plated fasteners with coating complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, at exterior walls.
- 14    Select fasteners for type, grade, and class required.
- 15    1.     Provide stainless-steel fasteners for fastening aluminum.
- 16    2.     Provide stainless-steel fasteners for fastening stainless steel.
- 17    B.     Cast-in-Place Anchors in Concrete: Either threaded type or wedge type unless otherwise indicated;
- 18    galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel.
- 19    Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F 2329.
- 20    C.     Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors.
- 21    1.     Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or
- 22    ASTM F 1941, Class Fe/Zn 5, unless otherwise indicated.
- 23    2.     Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 2 stainless-steel
- 24    bolts, ASTM F 593, and nuts, ASTM F 594.
- 25    D.     Slotted-Channel Inserts: Cold-formed, hot-dip galvanized-steel box channels (struts) complying with MFMA-
- 26    4, 1-5/8 by 7/8 inches by length indicated with anchor straps or studs not less than 3 inches long at not more
- 27    than 8 inches o.c. Provide with temporary filler and tee-head bolts, complete with washers and nuts, all zinc-
- 28    plated to comply with ASTM B 633, Class Fe/Zn 5, as needed for fastening to inserts.
- 29    **2.4     MISCELLANEOUS MATERIALS**
- 30    A.     Shop Primers (Exposed to view locations): Provide primers that comply with Section 09 91 13 "Exterior
- 31    Painting," and Section 09 91 23 "Interior Painting".
- 32    B.     Water-Based Primer (interior concealed locations): Emulsion type, anticorrosive primer for mildly corrosive
- 33    environments that is resistant to flash rusting when applied to cleaned steel, complying with MPI#107 and
- 34    compatible with topcoat.
- 35    C.     Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with
- 36    paints specified to be used over it.
- 37    D.     Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.
- 38    E.     Nonsrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying
- 39    with ASTM C 1107/C 1107M. Provide grout specifically recommended by manufacturer for interior and
- 40    exterior applications.
- 41    F.     Concrete for steel bollards, bollard footings: Comply with requirements in Section 03 30 00 "Cast-in-Place
- 42    Concrete" for normal-weight, air-entrained, concrete with a minimum 28-day compressive strength of 3000
- 43    psi.
- 44    **2.5     FABRICATION, GENERAL**
- 45    A.     Shop Assembly: Preassemble items in the shop to greatest extent possible. Use connections that maintain
- 46    structural value of joined pieces.
- 47    B.     Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges. Remove sharp or rough
- 48    areas on exposed surfaces.
- 49    C.     Weld corners and seams continuously to comply with the following:
- 50    1.     Use materials and methods that minimize distortion and develop strength and corrosion resistance
- 51    of base metals.
- 52    2.     Obtain fusion without undercut or overlap.
- 53    3.     Remove welding flux immediately.
- 54    4.     At exposed connections, finish exposed welds and surfaces smooth and blended.
- 55    D.     Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where
- 56    possible. Locate joints where least conspicuous.
- 57    E.     Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide
- 58    weep holes where water may accumulate.

- 1 F. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel  
2 strap anchors not less than 8 inches from ends and corners of units and 24 inches o.c.
- 3 **2.6 MISCELLANEOUS FRAMING AND SUPPORTS**
- 4 A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.  
5 B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated.  
6 Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.
- 7 **2.7 SHELF ANGLES**
- 8 A. Fabricate shelf angles from steel angles of sizes indicated and for attachment to concrete framing. Provide  
9 horizontally slotted holes to receive 3/4-inch bolts, spaced not more than 6 inches from ends and 24 inches  
10 o.c., unless otherwise indicated.  
11 B. For cavity walls, provide vertical channel brackets to support angles from backup masonry and concrete.  
12 C. Galvanize shelf angles located in exterior walls.  
13 D. Furnish wedge-type concrete inserts, complete with fasteners, to attach shelf angles to cast-in-place  
14 concrete.
- 15 **2.8 METAL FLOOR PLATE**
- 16 A. Fabricate from abrasive-surface floor plate of thickness indicated below:  
17 1. Thickness: 1/4 inch.  
18 B. Provide steel angle supports as indicated.  
19 C. Provide flush steel bar drop handles for lifting removable sections, one at each end of each section.
- 20 **2.9 MISCELLANEOUS STEEL TRIM**
- 21 A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with  
22 continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where  
23 possible.  
24 B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.
- 25 **2.10 METAL BOLLARDS (BOLLARD-1)**
- 26 A. Fabricate metal bollards from Schedule 40 steel pipe  
27 1. Cap bollards with 1/4-inch-thick steel plate.  
28 B. Fabricate bollards with 3/8-inch-thick steel baseplates for bolting to concrete slab. Drill baseplates at all four  
29 corners for 3/4-inch anchor bolts.  
30 C. Fabricate sleeves for bollard anchorage from steel pipe or tubing with 1/4-inch-thick steel plate welded to  
31 bottom of sleeve.  
32 D. Prime bollards with **zinc-rich primer**.
- 33 **2.11 PIPE OR DOWNSPOUT GUARDS (GUARD-1)**
- 34 A. Fabricate pipe and downspout guards from 3/8-inch-thick by 12-inch-wide steel plate, bent to fit flat against  
35 the wall or column at both ends and to fit around pipe with 2-inch clearance between pipe and pipe guard.  
36 Drill each end for two 3/4-inch anchor bolts.  
37 B. Galvanize pipe and downspout guards.
- 38 **2.12 METAL GRATES (GRATE-#)**
- 39 A. Construction: Grate 1.  
40 1. Welded bar grating, plain steel painted black, smooth, welded construction, 1-1/4 inches x 3/16 inch  
41 bearing bars, 1-3/16 inches on center, regular cross bars 4 inches on center, 24. Inches width x  
42 240.0000" length (span). Provide banding and bearing angles.  
43 B. Construction: Grate 2 (service grate). Hughes Bros C4270.13  
44 1. Rectangular tri-section lift sections of 1/4 inch thick diamond pattern plates. Set in angle frame with  
45 1/2 inch anchor rods for concrete installation. Galvanized steel material.  
46 C. Construction: Grate 3. (manhole cover) Hughes Bros C4270.13  
47 1. Rectangular bi-parting manual lift access doors with steel bar grating. Safety bar with latch and tie-  
48 rod for opened doors. Angle frame with 1/2 anchor rods for concrete installation. Keyed lock bar for  
49 grate release. Galvanized steel material.  
50

1     **2.13     COUNTER SUPPORTS**

- 2     A.     Counter Support Brackets: Rakks counter support brackets, clear anodized aluminum by Rangine Corp.,  
3     Needham, MA, as follows:
- 4         1.     Anodized aluminum face plates with adhesive backing, Model No. EHFP-0202.
  - 5         2.     Bracket Model No. EH-1818, for countertops up to 25-inch depth, 18" x 18", 450-pound capacity,  
6         surface-mounted.
  - 7         3.     Bracket Model No. EH-1824, for countertops up to 30-inch depth, 18" x 24", 450-pound capacity,  
8         surface-mounted.
  - 9         4.     Bracket Model No. EH-1818-FM, for countertops up to 25-inch depth, 18" x 20", 300-pound capacity,  
10         flush-mounted for countertops.
  - 11        5.     Bracket Model No. EH-1824-FM, for countertops up to 30-inch depth, 18" x 26", 300-pound capacity,  
12         flush-mounted for countertops.
  - 13        6.     Bracket Model No. EH-1212, for shelf supports

14     **2.14     MADISON FIRE DEPARTMENT KNOX BOX**

- 15     A.     Key Vaults: A key box shall be installed and incorporated into the entry access bollard as located on plan  
16     and as detailed. Fabrication and installation shall comply with Madison City Ordinance 918.
- 17     B.     Provide and place Fire Department alert decals (e.g. Knox Company stock #1001) on each exterior door or  
18     door frame of the building near the lock cylinder. Regarding label placement for a group of doors, one label  
19     for each pair of doors or a group of contiguous doors shall be required.

20     **2.15     LOOSE BEARING AND LEVELING PLATES**

- 21     A.     Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill  
22     plates to receive anchor bolts and for grouting.

23     **2.16     LOOSE STEEL LINTELS**

- 24     A.     Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in  
25     masonry walls and partitions at locations indicated.
- 26     B.     Galvanize loose steel lintels located in exterior walls.
- 27     C.     Prime loose steel lintels located in exterior walls with **zinc-rich primer**.

28     **2.17     STEEL WELD PLATES AND ANGLES**

- 29     A.     Provide steel weld plates and angles not specified in other Sections, for items supported from concrete  
30     construction as needed to complete the Work. Provide each unit with no fewer than two integrally welded  
31     steel strap anchors for embedding in concrete.

32     **2.18     FINISHES, GENERAL**

- 33     A.     Finish metal fabrications after assembly.

34     **2.19     STEEL AND IRON FINISHES**

- 35     A.     Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron  
36     hardware and with ASTM A 123/A 123M for other steel and iron products.
- 37     B.     Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete,  
38     sprayed-on fireproofing, or masonry, or unless otherwise indicated.
- 39     C.     Preparation for Shop Priming: Prepare surfaces to comply with requirements indicated below:
- 40         1.     Exterior Items: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
  - 41         2.     Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
  - 42         3.     Other Items: SSPC-SP 3, "Power Tool Cleaning."

43     **PART 3 - EXECUTION**

44     **3.1     INSTALLATION, GENERAL**

- 45     A.     Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications.  
46     Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb,  
47     true, and free of rack; and measured from established lines and levels.
- 48     B.     Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left  
49     as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or  
50     abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or  
51     screwed field connections.

- 1 C. Field Welding: Comply with the following requirements:
- 2 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance
- 3 of base metals.
- 4 2. Obtain fusion without undercut or overlap.
- 5 3. Remove welding flux immediately.
- 6 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness
- 7 shows after finishing and contour of welded surface matches that of adjacent surface.
- 8 D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are
- 9 required to be fastened to in-place construction.
- 10 E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or
- 11 similar construction.

12 **3.2 INSTALLING METAL BOLLARDS**

- 13 A. Anchor pedestrian control bollards as indicated on the drawings.
- 14 B. Anchor vehicle drive bollards in place with concrete footings. Place concrete and vibrate or tamp for
- 15 consolidation. Support and brace bollards in position until concrete has cured.
- 16 C. Fill bollards solidly with concrete, mounding top surface to shed water.

17 **3.3 INSTALLING BEARING AND LEVELING PLATES**

- 18 A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to
- 19 surfaces. Clean bottom surface of plates.
- 20 B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been
- 21 positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush
- 22 with edge of bearing plate before packing with nonshrink grout. Pack grout solidly between bearing surfaces
- 23 and plates to ensure that no voids remain.

24 **3.4 ADJUSTING AND CLEANING**

- 25 A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas.
- 26 Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-
- 27 PA 1 for touching up shop-painted surfaces.
- 28 B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to
- 29 comply with ASTM A 780/A 780M.

30 **END OF SECTION**

**SECTION 05 51 13**  
**METAL PAN STAIRS**

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24 **PART 1 - GENERAL**

25 **1.1 RELATED DOCUMENTS**

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

28 **1.2 SUMMARY**

- 29 A. Section Includes:  
30 1. Preassembled steel stairs with precast terrazzo treads.  
31 2. Steel tube railings attached to metal stairs.  
32 3. Steel tube handrails attached to walls adjacent to metal stairs.

33 B. Related Sections:

- 34 1. 09 66 13 "Portland Cement Terrazzo Flooring": Match of terrazzo stair treads to flooring.

35 **1.3 COORDINATION**

- 36 A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating  
37 manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one  
38 another.  
39 B. Coordinate installation of anchorages for metal stairs. Furnish setting drawings, templates, and directions  
40 for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors,  
41 that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.  
42 C. Coordinate locations of hanger rods and struts with other work so that they do not encroach on required stair  
43 width and are within the fire-resistance-rated stair enclosure.

44 **1.4 ACTION SUBMITTALS**

- 45 A. Product Data: For metal pan stairs and the following:  
46 1. Precast concrete terrazzo treads.  
47 2. Paint products.  
48 B. Sustainable Design Submittals:  
49 1. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and  
50 cost.  
51 C. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.  
52 D. Delegated-Design Submittal: For stairs and railings, including analysis data signed and sealed by the  
53 qualified professional engineer licensed in the State of Wisconsin responsible for their preparation.

1 **1.5 INFORMATIONAL SUBMITTALS**

- 2 A. Welding certificates.  
3 B. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers certifying that  
4 shop primers are compatible with topcoats.

5 **1.6 QUALITY ASSURANCE**

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

10 **PART 2 - PRODUCTS**

11 **2.1 PERFORMANCE REQUIREMENTS**

- 12 A. Delegated Design: Engage a qualified professional engineer licensed in the State of Wisconsin, as defined  
13 in Section 01 40 00 "Quality Requirements," to design stairs and railings.  
14 B. Structural Performance of Stairs: Metal stairs shall withstand the effects of gravity loads and the following  
15 loads and stresses within limits and under conditions indicated:  
16 1. Uniform Load: 100 lbf/sq. ft.  
17 2. Concentrated Load: 300 lbf applied on an area of 4 sq. in.  
18 3. Uniform and concentrated loads need not be assumed to act concurrently.  
19 4. Stair Framing: Capable of withstanding stresses resulting from railing loads in addition to loads  
20 specified above.  
21 C. Structural Performance of Railings: Railings shall withstand the effects of gravity loads and the following  
22 loads and stresses within limits and under conditions indicated:  
23 1. Handrails and Top Rails of Guards:  
24 a. Uniform load of 50 lbf/ft. applied in any direction.  
25 b. Concentrated load of 200 lbf applied in any direction.  
26 c. Uniform and concentrated loads need not be assumed to act concurrently.  
27 2. Infill of Guards:  
28 a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft..  
29 b. Infill load and other loads need not be assumed to act concurrently.  
30 3. Component Importance Factor: 1.5.

31 **2.2 METALS**

- 32 A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For  
33 components exposed to view in the completed Work, provide materials without seam marks, roller marks,  
34 rolled trade names, or blemishes.  
35 B. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled  
36 content not less than 25 percent.  
37 C. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.  
38 D. Steel Tubing: ASTM A 500 (cold formed).  
39 E. Uncoated, Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, either commercial steel, Type B, or structural  
40 steel, Grade 25, unless another grade is required by design loads; exposed.

41 **2.3 FASTENERS**

- 42 A. Provide zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 12 for  
43 exterior use, and Class Fe/Zn 5 where built into exterior walls. Select fasteners for type, grade, and class  
44 required.

45 **2.4 MISCELLANEOUS MATERIALS**

- 46 A. Shop Primers: Provide primers that comply with Section 09 91 23 "Interior Painting,"  
47 B. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.  
48 C. Welded Wire Reinforcement: ASTM A 185/A 185M, 6 by 6 inches, W1.4 by W1.4, unless otherwise  
49 indicated.

50 **2.5 PRECAST CONCRETE TREADS**

- 51 A. Concrete Materials and Properties: Comply with requirements in Section 03 30 00 "Cast-in-Place Concrete"  
52 for normal-weight, ready-mixed concrete with a minimum 28-day compressive strength of 5000 psi and a  
53 total air content of not less than 4 percent or more than 6 percent.



- 1 B. Reinforcement: Galvanized, welded wire reinforcement, 2 by 2 inches by 0.062-inch-diameter wire; comply  
2 with ASTM A 185/A 185M and ASTM A 82/A 82M, except for minimum wire size.  
3 C. Color, Pattern, and Finish: Color based on Tectura TZ-03: Foggy Day. Use inset non-slip strips per the  
4 drawings.

5 **2.6 FABRICATION, GENERAL**

- 6 A. Provide complete stair assemblies, including metal framing, hangers, struts, railings, clips, brackets, bearing  
7 plates, and other components necessary to support and anchor stairs and platforms on supporting structure.  
8 1. Join components by welding unless otherwise indicated.  
9 2. Use connections that maintain structural value of joined pieces.  
10 B. Preassembled Stairs: Assemble stairs in shop to greatest extent possible. Disassemble units only as  
11 necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated  
12 installation.  
13 C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of  
14 approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.  
15 D. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing  
16 work.  
17 E. Weld connections to comply with the following:  
18 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance  
19 of base metals.  
20 2. Obtain fusion without undercut or overlap.  
21 3. Remove welding flux immediately.  
22 4. Weld exposed corners and seams continuously unless otherwise indicated.  
23 5. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish  
24 Standards" for Type 3 welds: partially dressed weld with spatter removed.  
25 F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible.  
26 Locate joints where least conspicuous.

27 **2.7 STEEL-FRAMED STAIRS**

- 28 A. NAAMM Stair Standard: Comply with "Recommended Voluntary Minimum Standards for Fixed Metal Stairs"  
29 in NAAMM AMP 510, "Metal Stairs Manual," Commercial Class, unless more stringent requirements are  
30 indicated.  
31 B. Stair Framing:  
32 1. Fabricate stringers of steel channels.  
33 a. Provide closures for exposed ends of channel stringers.  
34 2. Construct platforms of steel channel headers and miscellaneous framing members as needed to  
35 comply with performance requirements.  
36 3. Weld stringers to headers; weld framing members to stringers and headers.  
37 4. Where stairs are enclosed by gypsum board assemblies, provide hanger rods or struts to support  
38 landings from floor construction above or below. Locate hanger rods and struts where they do not  
39 encroach on required stair width and are within the fire-resistance-rated stair enclosure.  
40 5. Where masonry walls support metal stairs, provide temporary supporting struts designed for erecting  
41 steel stair components before installing masonry.  
42 C. Metal Pan Stairs: Form risers, subtread pans, and subplatforms to configurations shown from steel sheet of  
43 thickness needed to comply with performance requirements, but not less than 0.067 inch.  
44 D. Abrasive-Coating-Finished, Formed-Metal Stairs: Form risers, treads, and platforms to configurations shown  
45 from steel sheet of thickness needed to comply with performance requirements, but not less than 0.097 inch.

46 **2.8 STAIR RAILINGS**

- 47 A. Steel Tube Railings: Fabricate railings to comply with requirements indicated for design, dimensions, details,  
48 finish, and member sizes, including wall thickness of tube, post spacings, and anchorage, but not less than  
49 that needed to withstand indicated loads.  
50 1. Rails and Posts: 1-1/2-inch-square top and bottom rails and 1-1/2-inch-square posts.  
51 B. Welded Connections: Fabricate railings with welded connections. Cope components at connections to  
52 provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.  
53 1. Finish welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 1 welds: no  
54 evidence of a welded joint as shown in NAAMM AMP 521.  
55 C. For changes in direction made by bending, use jigs to produce uniform curvature for each repetitive  
56 configuration required. Maintain cross section of member throughout entire bend without buckling, twisting,  
57 cracking, or otherwise deforming exposed surfaces of components.  
58 D. Close exposed ends of railing members with prefabricated end fittings.  
59 E. Provide wall returns at ends of wall-mounted handrails.

- 1 F. Connect posts to stair framing by direct welding.
- 2 G. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, end closures, flanges, miscellaneous
- 3 fittings, and anchors for interconnecting components and for attaching to other work.
- 4 H. Fillers: Provide fillers made from steel plate, or other suitably crush-resistant material, where needed to
- 5 transfer wall bracket loads through wall finishes to structural supports. Size fillers to suit wall finish
- 6 thicknesses.

7 **2.9 FINISHES**

- 8 A. Finish metal stairs after assembly.
- 9 B. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 3, "Power
- 10 Tool Cleaning."
- 11 C. Apply shop primer to uncoated surfaces of metal stair components, except those with galvanized finishes
- 12 and those to be embedded in concrete or masonry unless otherwise indicated. Comply with SSPC-PA 1,
- 13 "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

14 **PART 3 - EXECUTION**

15 **3.1 INSTALLING METAL PAN STAIRS**

- 16 A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal stairs. Set
- 17 units accurately in location, alignment, and elevation, measured from established lines and levels and free
- 18 of rack.
- 19 B. Install metal stairs by welding stair framing to steel structure or to weld plates cast into concrete unless
- 20 otherwise indicated.
- 21 C. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left
- 22 as exposed joints.
- 23 D. Field Welding: Comply with requirements for welding in "Fabrication, General" Article.
- 24 E. Place and finish concrete fill for treads and platforms to comply with Section 03 30 00 "Cast-in-Place
- 25 Concrete."
- 26 1. Install abrasive nosings with anchors fully embedded in concrete.
- 27 F. Install precast concrete treads with adhesive supplied by manufacturer.

28 **3.2 INSTALLING RAILINGS**

- 29 A. Adjust railing systems before anchoring to ensure matching alignment at abutting joints. Space posts at
- 30 spacing indicated or, if not indicated, as required by design loads. Plumb posts in each direction. Secure
- 31 posts and rail ends to building construction as follows:
- 32 1. Anchor posts to steel by welding to steel supporting members.
- 33 2. Anchor handrail ends to concrete and masonry with steel round flanges welded to rail ends and
- 34 anchored with postinstalled anchors and bolts.
- 35 B. Attach handrails to wall with wall brackets. Locate brackets as indicated or, if not indicated, at spacing
- 36 required to support structural loads. Secure wall brackets to building construction as required to comply with
- 37 performance requirements.

38 **3.3 ADJUSTING AND CLEANING**

- 39 A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of
- 40 shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-
- 41 PA 1 for touching up shop-painted surfaces.

42 **END OF SECTION**

SECTION 05 51 16  
METAL FLOOR PLATE STAIRS

- 1  
2  
3 PART 1 – GENERAL  
4 1.1 [SUMMARY](#)  
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21 **PART 1 - GENERAL**

22 **1.1 SUMMARY**

- 23 A. Section includes industrial-type, straight-run stairs with steel floor plate treads and railings attached to metal  
24 floor plate stairs.

25 **1.2 COORDINATION**

- 26 A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating  
27 manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one  
28 another.  
29 B. Coordinate installation of anchorages for metal stairs. Furnish setting drawings, templates, and directions  
30 for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors,  
31 that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

32 **1.3 ACTION SUBMITTALS**

- 33 A. Product Data: For metal floor plate stairs.  
34 B. Sustainable Design Submittals:  
35 1. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and  
36 cost.  
37 C. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.  
38 D. Delegated-Design Submittal: For stairs, including analysis data signed and sealed by the qualified  
39 professional engineer responsible for their preparation.

40 **1.4 INFORMATIONAL SUBMITTALS**

- 41 A. Welding certificates.  
42 B. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers certifying that  
43 shop primers are compatible with topcoats.

44 **1.5 QUALITY ASSURANCE**

- 45 A. Installer Qualifications: Fabricator of products.  
46 B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural  
47 Welding Code - Steel."

1 **PART 2 - PRODUCTS**

2 **2.1 PERFORMANCE REQUIREMENTS**

- 3 A. Delegated Design: Engage a qualified professional engineer licensed in the State of Wisconsin, as defined  
4 in Section 01 40 00 "Quality Requirements," to design stairs.  
5 B. Structural Performance of Stairs: Metal stairs shall withstand the effects of gravity loads and the following  
6 loads and stresses within limits and under conditions indicated:  
7 1. Uniform Load: 100 lbf/sq. ft..  
8 2. Concentrated Load: 300 lbf applied on an area of 4 sq. in.  
9 3. Uniform and concentrated loads need not be assumed to act concurrently.  
10 4. Stair Framing: Capable of withstanding stresses resulting from railing loads in addition to loads  
11 specified above.

12 **2.2 METALS**

- 13 A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For  
14 components exposed to view in the completed Work, provide materials without seam marks, roller marks,  
15 rolled trade names, or blemishes.  
16 B. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of pre-consumer recycled  
17 content not less than 25 percent.  
18 C. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.  
19 D. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or  
20 ASTM A 283/A 283M, Grade C or D.

21 **2.3 FASTENERS**

- 22 A. Provide zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 12 for  
23 exterior use, and Class Fe/Zn 5 where built into exterior walls. Select fasteners for type, grade, and class  
24 required.

25 **2.4 MISCELLANEOUS MATERIALS**

- 26 A. Shop Primers: Provide primers that comply with Section 09 91 13 "Exterior Painting" and Section 09 91 23  
27 "Interior Painting."  
28 B. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying  
29 with MPI#79 and compatible with topcoat.  
30 C. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with  
31 paints specified to be used over it.

32 **2.5 FABRICATION, GENERAL**

- 33 A. Provide complete stair assemblies, including metal framing, hangers, clips, brackets, bearing plates, and  
34 other components necessary to support and anchor stairs and platforms on supporting structure.  
35 1. Join components by welding unless otherwise indicated.  
36 2. Use connections that maintain structural value of joined pieces.  
37 3. Fabricate treads and platforms of exterior stairs so finished walking surfaces slope to drain.  
38 B. Weld connections to comply with the following:  
39 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance  
40 of base metals.  
41 2. Obtain fusion without undercut or overlap.  
42 3. Remove welding flux immediately.  
43 4. Weld exposed corners and seams continuously unless otherwise indicated.  
44 5. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish  
45 Standards" for Type 4 welds: good quality, uniform undressed weld with minimal splatter.  
46 C. Fabricate joints that will be exposed to weather in a manner to exclude water. Provide weep holes where  
47 water may accumulate.  
48

- 1 **2.6 STEEL-FRAMED STAIRS**  
2 A. NAAMM Stair Standard: Comply with "Recommended Voluntary Minimum Standards for Fixed Metal Stairs"  
3 in NAAMM AMP 510, "Metal Stairs Manual," industrial class, unless more stringent requirements are  
4 indicated.  
5 B. Stair Framing:  
6 1. Fabricate stringers of steel channels  
7 a. Provide closures for exposed ends of channel stringers.  
8 2. Construct platforms of steel channel headers and miscellaneous framing members as needed to  
9 comply with performance requirements indicated.  
10 3. Weld or bolt stringers to headers; weld or bolt framing members to stringers and headers.  
11 C. Metal Floor Plate Stairs: Form treads and platforms to configurations shown from rolled-steel abrasive-  
12 surface floor plate of thickness needed to comply with performance requirements, but not less than 3/16  
13 inch.  
14 1. Form treads with integral nosing and back edge stiffener and with open risers.  
15 a. NOSING-1: Non-slip aluminum nosing with abrasive treads.  
16 2. Weld steel supporting brackets to stringers and weld treads to brackets.  
17 3. Fabricate platforms with integral nosing matching treads and weld to platform framing.

- 18 **2.7 STAIR RAILINGS**  
19 A. Comply with applicable requirements in Section 05 52 13 "Pipe and Tube Railings."  
20 1. Rails may be bent at corners, rail returns, and wall returns, instead of using prefabricated fittings.  
21 2. Connect posts to stair framing by direct welding unless otherwise indicated.

- 22 **2.8 FINISHES**  
23 A. Finish metal stairs after assembly.  
24 B. Exterior: Galvanized.  
25 C. Interior: Uncoated steel.  
26 D. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron  
27 hardware and with ASTM A 123/A 123M for other steel and iron products.  
28 E. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 3, "Power  
29 Tool Cleaning."  
30 F. Apply shop primer to uncoated surfaces of metal stair components, except those with galvanized finishes  
31 and those to be embedded in concrete or masonry unless otherwise indicated. Comply with SSPC-PA 1,  
32 "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

33 **PART 3 - EXECUTION**

- 34 **3.1 INSTALLATION**  
35 A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal stairs. Set  
36 units accurately in location, alignment, and elevation, measured from established lines and levels and free  
37 of rack.  
38 B. Field Welding: Comply with requirements for welding in "Fabrication, General" Article.

- 39 **3.2 ADJUSTING AND CLEANING**  
40 A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of  
41 shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-  
42 PA 1 for touching up shop-painted surfaces.  
43 B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to  
44 comply with ASTM A 780/A 780M.

45 **END OF SECTION**

SECTION 05 52 13  
PIPE AND TUBE RAILINGS

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25 **PART 1 - GENERAL**

26 **1.1 SUMMARY**

- 27 A. Section Includes:  
28 1. Steel pipe and tube railings (RAIL-4).  
29 B. Related Requirements:  
30 1. Section 05 51 16 "Metal Floor Plate Stairs" for steel tube railings associated with metal plate stairs.

31 **1.2 COORDINATION**

- 32 A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating  
33 manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with  
34 one another.  
35 B. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for  
36 installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors,  
37 that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.  
38 C. Schedule installation so wall attachments are made only to completed walls. Do not support railings  
39 temporarily by any means that do not satisfy structural performance requirements.

40 **1.3 ACTION SUBMITTALS**

- 41 A. Product Data: For the following:  
42 1. Manufacturer's product lines of mechanically connected railings.  
43 2. Railing brackets.  
44 3. Grout, anchoring cement, and paint products.  
45 B. Sustainable Design Submittals:  
46 1. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content  
47 and cost.  
48 C. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.  
49 D. Samples: For each type of exposed finish required.  
50 E. Delegated-Design Submittal: For railings, including analysis data signed and sealed by the qualified  
51 professional engineer licensed in the State of Wisconsin responsible for their preparation.

52 **1.4 INFORMATIONAL SUBMITTALS**

- 53 A. Product Test Reports: For pipe and tube railings, for tests performed by a qualified testing agency,  
54 according to ASTM E 894 and ASTM E 935.

1 **1.5 QUALITY ASSURANCE**

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

4 **1.6 DELIVERY, STORAGE, AND HANDLING**

- 5 A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary  
6 protective covering before shipping.

7 **1.7 FIELD CONDITIONS**

- 8 A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal  
9 fabrications by field measurements before fabrication.

10 **PART 2 - PRODUCTS**

11 **2.1 MANUFACTURERS**

- 12 A. Steel Pipe and Tube Railings [RAIL-4]:  
13 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products  
14 that may be incorporated into the Work include, but are not limited to, the following:  
15 2. Basis-of-Design Product: Subject to compliance with requirements, provide or comparable product  
16 by one of the following:  
17 a. Wagner, R & B, Inc.  
18 b. McMaster-Carr  
19 c. Steele Solutions, Inc.

20 **2.2 PERFORMANCE REQUIREMENTS**

- 21 A. Delegated Design: Engage a qualified professional engineer licensed in the State of Wisconsin, as defined  
22 in Section 01 40 00 "Quality Requirements," to design railings, including attachment to building  
23 construction.  
24 B. Structural Performance: Railings, including attachment to building construction, shall withstand the effects  
25 of gravity loads and the following loads and stresses within limits and under conditions indicated:  
26 1. Handrails and Top Rails of Guards:  
27 a. Uniform load of 50 lbf/ ft. applied in any direction.  
28 b. Concentrated load of 200 lbf applied in any direction.  
29 c. Uniform and concentrated loads need not be assumed to act concurrently.  
30 2. Infill of Guards:  
31 a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft..  
32 b. Infill load and other loads need not be assumed to act concurrently.

33 **2.3 METALS, GENERAL**

- 34 A. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported  
35 rails unless otherwise indicated.  
36 1. Provide type of bracket with flange tapped for concealed anchorage to threaded hanger bolt and  
37 that provides 1-1/2-inch clearance from inside face of handrail to finished wall surface.

38 **2.4 STEEL AND IRON**

- 39 A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer  
40 recycled content not less than 25 percent.  
41 B. Tubing: ASTM A 500 (cold formed) or ASTM A 513.  
42 C. Pipe: ASTM A 53/A 53M, Type F or Type S, Grade A, Standard Weight (Schedule 40), unless another  
43 grade and weight are required by structural loads.  
44 1. Provide galvanized finish for exterior installations and where indicated.  
45 D. Plates, Shapes, and Bars: ASTM A 36/A 36M.  
46 E. Cast Iron: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/A 47M, unless otherwise  
47 indicated.  
48

- 1     **2.5     FASTENERS**
- 2     A.     General: Provide the following:
- 3         1.     Ungalvanized-Steel Railings: Plated steel fasteners complying with ASTM B 633 or ASTM F 1941,  
4             Class Fe/Zn 5 for zinc coating.
- 5         2.     Hot-Dip Galvanized Railings: Type 304 stainless-steel.
- 6     B.     Post-Installed Anchors: Torque-controlled expansion anchors capable of sustaining, without failure, a load  
7             equal to 6 times the load imposed when installed in unit masonry and 4 times the load imposed when  
8             installed in concrete, as determined by testing according to ASTM E 488/E 488M, conducted by a qualified  
9             independent testing agency.
- 10        1.     Material for Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B 633 or  
11             ASTM F 1941, Class Fe/Zn 5, unless otherwise indicated.
- 12     **2.6     MISCELLANEOUS MATERIALS**
- 13     A.     Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- 14     B.     Etching Cleaner for Galvanized Metal: Complying with MPI#25.
- 15     C.     Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with  
16             paints specified to be used over it.
- 17     D.     Field Finish Painted interior Railings:
- 18         1.     Shop Primers: Provide primers that comply with Section 09 91 23 "Interior Painting."
- 19     E.     Shop Finish Painted Exterior Railings:
- 20         1.     Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and  
21             compatible with finish paint systems indicated.
- 22         2.     Epoxy Intermediate Coat: Complying with MPI #77 and compatible with primer and topcoat.
- 23         3.     Polyurethane Topcoat: Complying with MPI #72 and compatible with undercoat.
- 24     F.     Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.
- 25     G.     Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying  
26             with ASTM C 1107/C 1107M. Provide grout specifically recommended by manufacturer for interior and  
27             exterior applications.
- 28     **2.7     FABRICATION**
- 29     A.     Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of  
30             approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- 31     B.     Form work true to line and level with accurate angles and surfaces.
- 32     C.     Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this  
33             purpose. Weld all around at connections, including at fittings.
- 34         1.     Use materials and methods that minimize distortion and develop strength and corrosion resistance  
35             of base metals.
- 36         2.     Obtain fusion without undercut or overlap.
- 37         3.     Remove flux immediately.
- 38         4.     At exposed connections, finish exposed surfaces smooth and blended so no roughness shows  
39             after finishing and welded surface matches contours of adjoining surfaces.
- 40     D.     Nonwelded Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate  
41             members and fittings to produce flush, smooth, rigid, hairline joints.
- 42     E.     Form changes in direction by bending or by inserting prefabricated elbow fittings.
- 43     F.     For changes in direction made by bending, use jigs to produce uniform curvature for each repetitive  
44             configuration required. Maintain cross section of member throughout entire bend without buckling, twisting,  
45             cracking, or otherwise deforming exposed surfaces of components.
- 46     G.     Close exposed ends of railing members with prefabricated end fittings.
- 47     H.     Provide wall returns at ends of wall-mounted handrails unless otherwise indicated.
- 48     I.     Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and  
49             anchors to interconnect railing members to other work unless otherwise indicated.
- 50         1.     At brackets and fittings fastened to plaster or gypsum board partitions, provide crush-resistant  
51             fillers or other means to transfer loads through wall finishes to structural supports and prevent  
52             bracket or fitting rotation and crushing of substrate.
- 53



- 1 **2.8 STEEL AND IRON FINISHES**
- 2 A. Galvanized Railings:
- 3 1. Hot-dip galvanize exterior steel railings, including hardware, after fabrication.
- 4 2. Comply with ASTM A 123/A 123M for hot-dip galvanized railings.
- 5 3. Comply with ASTM A 153/A 153M for hot-dip galvanized hardware.
- 6 B. Preparing Galvanized Railings for Shop Priming: After galvanizing, thoroughly clean railings of grease, dirt,
- 7 oil, flux, and other foreign matter, and treat with etching cleaner.
- 8 C. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 6/NACE
- 9 No. 3, "Commercial Blast Cleaning."
- 10 D. Primer Application: Apply shop primer to prepared surfaces of railings unless otherwise indicated. Comply
- 11 with requirements in SSPC-PA 1, "Shop, Field, and Maintenance Painting of Steel," for shop painting.
- 12 Primer need not be applied to surfaces to be embedded in concrete or masonry.
- 13 E. High-Performance Coating: Apply epoxy intermediate and polyurethane topcoats to prime-coated
- 14 surfaces. Comply with coating manufacturer's written instructions and with requirements in SSPC-PA 1,
- 15 "Shop, Field, and Maintenance Painting of Steel," for shop painting. Apply at spreading rates
- 16 recommended by coating manufacturer.
- 17 1. Color: As selected by Architect from manufacturer's full range.

18 **PART 3 - EXECUTION**

- 19 **3.1 INSTALLATION, GENERAL**
- 20 A. Set railings accurately in location, alignment, and elevation; measured from established lines and levels
- 21 and free of rack.
- 22 1. Do not weld, cut, or abrade surfaces of railing components that are coated or finished after
- 23 fabrication and that are intended for field connection by mechanical or other means without further
- 24 cutting or fitting.
- 25 2. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
- 26 3. Align rails so variations from level for horizontal members and variations from parallel with rake of
- 27 steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.
- 28 B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other
- 29 materials from direct contact with incompatible materials.
- 30 1. Coat, with a heavy coat of bituminous paint, concealed surfaces of aluminum that are in contact
- 31 with grout, concrete, masonry, wood, or dissimilar metals.

- 32 **3.2 ANCHORING POSTS**
- 33 A. Use metal sleeves preset and anchored into concrete for installing posts. After posts are inserted into
- 34 sleeves, fill annular space between post and sleeve with nonshrink, nonmetallic grout or anchoring
- 35 cement, mixed and placed to comply with anchoring material manufacturer's written instructions.
- 36 B. Form or core-drill holes not less than 5 inches deep and 3/4 inch larger than OD of post for installing posts
- 37 in concrete. Clean holes of loose material, insert posts, and fill annular space between post and concrete
- 38 with nonshrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring
- 39 material manufacturer's written instructions.
- 40 C. Anchor posts to metal surfaces with oval flanges, angle type, or floor type as required by conditions,
- 41 connected to posts and to metal supporting members.

- 42 **3.3 ATTACHING RAILINGS**
- 43 A. Attach railings to wall with wall brackets, except where end flanges are used. Locate brackets as indicated
- 44 or, if not indicated, at spacing required to support structural loads.
- 45 B. Secure wall brackets and railing end flanges to building construction as follows:
- 46 1. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag
- 47 bolts.
- 48 2. For hollow masonry anchorage, use toggle bolts.
- 49 3. For steel-framed partitions, use hanger or lag bolts set into fire-retardant-treated wood backing
- 50 between studs. Coordinate with stud installation to locate backing members.
- 51

- 1 **3.4 ADJUSTING AND CLEANING**  
2 A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of  
3 shop paint, and paint exposed areas with the same material as used for shop painting to comply with  
4 SSPC-PA 1 requirements for touching up shop-painted surfaces.  
5 B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas, and repair galvanizing to  
6 comply with ASTM A 780/A 780M.  
7

**END OF SECTION**

**SECTION 05 70 00**  
**DECORATIVE METAL**

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- 19 2.8 [STAINLESS-STEEL FINISHES](#) (for wall corner guards: GUARD-2)
- 20 2.9 [STEEL AND IRON FINISHES](#)
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- 24 3.3 [CLEANING AND PROTECTION](#)

25 **PART 1 - GENERAL**

26 **1.1 RELATED DOCUMENTS**

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

29 **1.2 SUMMARY**

- 30 A. Section Includes:
  - 31 1. Decorative mechanical grilles and frames.
  - 32 2. Wall corner guards.
- 33 B. Related Requirements:
  - 34 1. Section 05 73 00 "Decorative Metal Railings" for decorative metal railings.
  - 35 2. Section 05 75 00 "Decorative Formed Metal" for decorative metal items made from shop formed
  - 36 custom sheet metal.

37 **1.3 COORDINATION**

- 38 A. Coordinate installation of anchorages for decorative metal items. Furnish setting drawings, templates, and
- 39 directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral
- 40 anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for
- 41 installation.

42 **1.4 PREINSTALLATION MEETINGS**

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

44 **1.5 ACTION SUBMITTALS**

- 45 A. Product Data: For each type of product, including finishing materials.
- 46 B. Sustainable Design Submittals:
  - 47 1. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and
  - 48 cost.
- 49 C. Shop Drawings: Show fabrication and installation details for decorative metal.
  - 50 1. Indicate materials, finishes, fasteners, anchorages, and accessory items.
- 51 D. Patterns, Models, or Plaster Castings: For each custom casting required.
- 52 E. Samples: For each type of exposed finish.

- 1 **1.6 INFORMATIONAL SUBMITTALS**  
2 A. Qualification Data: For fabricator.  
3 B. Mill Certificates: Signed by manufacturers of stainless-steel certifying that products furnished comply with  
4 requirements.  
5 C. Welding certificates.
- 6 **1.7 QUALITY ASSURANCE**  
7 A. Fabricator Qualifications: A firm experienced in producing decorative metal similar to that indicated for this  
8 Project and with a record of successful in-service performance, as well as sufficient production capacity to  
9 produce required units.  
10 B. Installer Qualifications: Fabricator of products.  
11 C. Organic-Coating Applicator Qualifications: A firm experienced in successfully applying organic coatings, of  
12 type indicated, to aluminum extrusions and employing competent control personnel to conduct continuing,  
13 effective quality-control program to ensure compliance with requirements.  
14 D. Anodic Finisher Qualifications: A firm experienced in successfully applying anodic finishes of type indicated  
15 and employing competent control personnel to conduct continuing, effective quality-control program to  
16 ensure compliance with requirements.  
17 E. Powder-Coating Applicator Qualifications: A firm experienced in successfully applying powder coatings of  
18 type indicated and employing competent control personnel to conduct continuing, effective quality-control  
19 program to ensure compliance with requirements.  
20 F. Mockup: Refer to Section 01 43 39 – Mockups for description of construction required to complete a  
21 mockup submittal for review.  
22 1. Build mockups for the following types of decorative metal:  
23 a. GR-1 and GR-2.
- 24 **1.8 DELIVERY, STORAGE, AND HANDLING**  
25 A. Store decorative metal in a well-ventilated area, away from uncured concrete and masonry, and protected  
26 from weather, moisture, soiling, abrasion, extreme temperatures, and humidity.  
27 B. Deliver and store cast-metal products in wooden crates surrounded by enough packing material to ensure  
28 that products are not cracked or otherwise damaged.
- 29 **PART 2 - PRODUCTS**
- 30 **2.1 METALS, GENERAL**  
31 A. Metal Surfaces, General: Use materials with smooth, flat surfaces unless otherwise indicated. Use materials  
32 without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.
- 33 **2.2 STEEL AND IRON**  
34 A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled  
35 content not less than 25 percent.
- 36 **2.3 FASTENERS**  
37 A. Fastener Materials: Unless otherwise indicated, provide the following:  
38 B. Provide square or hex socket flat-head machine screws for exposed fasteners unless otherwise indicated.  
39 C. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having  
40 jurisdiction, based on ICC-ES AC193.  
41 1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or  
42 ASTM F 1941, Class Fe/Zn 5 unless otherwise indicated.
- 43 **2.4 MISCELLANEOUS MATERIALS**  
44 A. Shop Primers: Provide primers that comply with Section 09 91 23 "Interior Painting."
- 45 **2.5 FABRICATION, GENERAL**  
46 A. Form decorative metal to required shapes and sizes, true to line and level with true curves and accurate  
47 angles and surfaces. Finish exposed surfaces to smooth, sharp, well-defined lines and arris.  
48 B. Mill joints to a tight, hairline fit. Cope or miter corner joints. Fabricate connections that will be exposed to  
49 weather in a manner to exclude water.  
50

- 1     **2.6     DECORATIVE MECHANICAL GRILLES (GR-1 and GR-2)**
- 2     A.     Refer to Material Tag Index for product.
- 3     B.     Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may  
4     be incorporated into the Work include, but are not limited to the following:
- 5         1.     Architectural Grille.
- 6         2.     Beaux-Artes.
- 7         3.     Harrington & King Perforating Company, Inc.
- 8         4.     Precision Metal Fabricators, Inc.
- 9         5.     Reggio Register Company, Inc.
- 10        6.     Register & Grille Mfg. Co., Inc.
- 11     C.     Fabricate decorative grilles from perforated steel sheet or plate of thickness, size, and pattern indicated.  
12     Form perforations by punching, cutting, or drilling to produce openings of sizes and shapes indicated. Roll,  
13     press, and grind perforated metal to flatten and to remove burrs and deformations.
- 14        1.     Drawings indicate perforated metal patterns required and are based on products of one  
15        manufacturer. Perforated metal patterns produced by other manufacturers may be considered,  
16        provided deviations are minor and do not change design concept as judged solely by Architect.
- 17     **2.7     FINISHES, GENERAL**
- 18     A.     Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations  
19     for applying and designating finishes.
- 20     **2.8     STAINLESS-STEEL FINISHES (for wall corner guards: GUARD-2)**
- 21     A.     Directional Satin Finish: No. 4.
- 22     **2.9     STEEL AND IRON FINISHES**
- 23     A.     Preparing Nongalvanized Items for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with  
24     SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
- 25     B.     Powder-Coat Finish: Prepare, treat, and coat nongalvanized ferrous metal to comply with resin  
26     manufacturer's written instructions and as follows:
- 27         1.     Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial  
28         Blast Cleaning."
- 29         2.     Treat prepared metal with iron-phosphate pretreatment, rinse, and seal surfaces.
- 30         3.     Apply thermosetting polyester or acrylic urethane powder coating with cured-film thickness not less  
31         than 1.5 mils.
- 32         4.     Color: Match Architect's sample
- 33     **PART 3 - EXECUTION**
- 34     **3.1     EXAMINATION**
- 35     A.     Examine substrates and conditions, with Installer present, for compliance with requirements for installation  
36     tolerances and other conditions affecting performance of decorative metal.
- 37     B.     Proceed with installation only after unsatisfactory conditions have been corrected.
- 38     **3.2     INSTALLATION**
- 39     A.     Provide anchorage devices and fasteners where needed to secure decorative metal to in-place construction.
- 40     B.     Set products accurately in location, alignment, and elevation, measured from established lines and levels.
- 41     C.     Fit exposed connections accurately together to form tight, hairline joints or, where indicated, uniform reveals  
42     and spaces for sealants and joint fillers.
- 43     D.     Do not cut or abrade finishes that cannot be completely restored in the field. Return items with such finishes  
44     to the shop for required alterations, followed by complete refinishing, or provide new units as required.
- 45     E.     Restore protective coverings that have been damaged during shipment or installation. Remove protective  
46     coverings only when there is no possibility of damage from other work.
- 47     **3.3     CLEANING AND PROTECTION**
- 48     A.     Unless otherwise indicated, clean metals by washing thoroughly with clean water and soap, rinsing with  
49     clean water, and drying with soft cloths.
- 50     B.     Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of  
51     shop paint and paint exposed areas with same material as used for shop painting to comply with SSPC-  
52     PA 1 for touching up shop-painted surfaces.
- 53         1.     Apply by brush or spray to provide a minimum 2.0-mil (0.05-mm) dry film thickness.

- 1 C. Protect finishes of decorative metal from damage during construction period with temporary protective  
2 coverings approved by decorative metal fabricator. Remove protective covering at time of Substantial  
3 Completion.  
4 D. Restore finishes damaged during installation and construction period so no evidence remains of correction  
5 work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish  
6 entire unit, or provide new units.  
7

**END OF SECTION**

SECTION 05 73 00  
DECORATIVE METAL RAILINGS

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25 **PART 1 - GENERAL**

26 **1.1 RELATED DOCUMENTS**

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

29 **1.2 SUMMARY**

- 30 A. Section Includes:
  - 31 1. Steel guardrails and handrails at exterior stairs and exterior light wells (RAIL-1).
  - 32 2. Steel handrails at existing interior stairs (RAIL-2).
  - 33 3. Steel handrails at new interior stairs (RAIL-3).

34 **1.3 DEFINITIONS**

- 35 A. Railings: Guards, handrails, and similar devices used for protection of occupants at open-sided floor areas
- 36 and for pedestrian guidance and support, visual separation, or wall protection.

37 **1.4 COORDINATION AND SCHEDULING**

- 38 A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating
- 39 manufacturers' written instructions to ensure that shop primers and topcoats are compatible.
- 40 B. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for
- 41 installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that
- 42 are to be embedded in concrete or masonry. Deliver items to Project site in time for installation.
- 43 C. Schedule installation so wall attachments are made only to completed walls. Do not support railings
- 44 temporarily by any means that do not meet structural performance requirements.

45 **1.5 PREINSTALLATION MEETINGS**

- 46 A. Preinstallation Conference: Conduct conference at Project site.
- 47

- 1 **1.6 ACTION SUBMITTALS**  
2 A. Product Data: For the following:  
3 1. Material alloy, tempering and finish for components.  
4 2. Grout, anchoring cement, and paint products.  
5 B. Sustainable Design Submittals:  
6 1. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and  
7 cost.  
8 C. Shop Drawings: Include plans, elevations, sections, and attachment details.  
9 D. Samples: For each type of exposed finish required.  
10 E. Delegated-Design Submittal: For installed products indicated to comply with performance requirements and  
11 design criteria, including analysis data signed and sealed by the qualified professional engineer licensed in  
12 the State of Wisconsin responsible for their preparation.

- 13 **1.7 INFORMATIONAL SUBMITTALS**  
14 A. Qualification Data: For professional engineer.  
15 B. Mill Certificates: Signed by manufacturers of steel products certifying that products furnished comply with  
16 requirements.  
17 C. Welding certificates.  
18 D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency,  
19 according to ASTM E 894 and ASTM E 935.  
20 E. Preconstruction test reports.  
21 F. Evaluation Reports: For post-installed anchors, from ICC-ES.

- 22 **1.8 QUALITY ASSURANCE**  
23 A. Welding Qualifications: Qualify procedures and personnel according to the following:  
24 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."  
25 B. Mockup: Refer to Section 01 43 39 – Mockups for description of construction required to complete a  
26 mockup submittal for review.  
27 1. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate  
28 aesthetic effects, and to set quality standards for fabrication and installation.  
29 a. New exterior railing RAIL-1 installation detail at corner of existing light well / areaway, min. 4ft  
30 long from each corner. Location: New expanded areaway at north-west corner of building.  
31 b. New interior stair railing RAIL-3 at new stair: 4ft long railing at floor opening plus 4ft long railing  
32 including handrail at stair flight including anchoring detail to floor opening and stair stringer.

- 33 **1.9 FIELD CONDITIONS**  
34 A. Field Measurements: Verify actual locations of walls and other construction contiguous with railings by field  
35 measurements before fabrication and indicate measurements on Shop Drawings.

36 **PART 2 - PRODUCTS**

- 37 **2.1 PERFORMANCE REQUIREMENTS**  
38 A. Delegated Design: Engage a qualified professional engineer licensed in the State of Wisconsin, as defined  
39 in Section 01 40 00 "Quality Requirements," to design railings, including attachment to building construction.  
40 B. General: In engineering railings to withstand structural loads indicated, determine allowable design working  
41 stresses of railing materials based on the following:  
42 1. Steel: 72 percent of minimum yield strength.  
43 C. Structural Performance: Railings, including attachment to building construction, shall withstand the effects  
44 of gravity loads and the following loads and stresses within limits and under conditions indicated:  
45 1. Handrails and Top Rails of Guards:  
46 a. Uniform load of 50 lbf/ft. applied in any direction.  
47 b. Concentrated load of 200 lbf applied in any direction.  
48 c. Uniform and concentrated loads need not be assumed to act concurrently.  
49 2. Infill of Guards:  
50 a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft.  
51 b. Infill load and other loads need not be assumed to act concurrently.

- 52 **2.2 METALS, GENERAL**  
53 A. Brackets, Flanges, and Anchors: Same metal and finish as supported rails unless otherwise indicated.  
54 B. Tubing: ASTM A 500/A 500M (cold formed).



- 1 C. Bars: Hot-rolled, carbon steel complying with ASTM A 29/A 29M, Grade 1010.
- 2 D. Plates, Shapes, and Bars: ASTM A 36/A 36M.
- 3 E. Cast Iron: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/A 47M, unless otherwise
- 4 indicated.
- 5 F. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled
- 6 content not less than 25 percent.

7 **2.3 STEEL GUARD RAILS AND HANDRAILS**

- 8 A. Steel guardrails and handrails at exterior stairs and exterior light wells (RAIL-1).
- 9 1. Refer to Drawings for profile, materials and finish.
- 10 B. Steel handrails at existing interior stairs (RAIL-2).
- 11 1. Refer to Drawings for profile, materials and finish.
- 12 C. Steel handrails at new interior stairs (RAIL-3).
- 13 1. Refer to Drawings for profile, materials and finish.
- 14 D. Handrail Bracket and sub rail to support coped wood handrail:

15 **2.4 FASTENERS**

- 16 A. Fastener Materials: Unless otherwise indicated, provide the following:
- 17 1. Uncoated Steel Components: Plated-steel fasteners complying with ASTM B 633, Class Fe/Zn 25
- 18 for electrodeposited zinc coating where concealed; Type 304 stainless-steel fasteners where
- 19 exposed.
- 20 2. Galvanized-Steel Components: Plated-steel fasteners complying with ASTM B 633, Class Fe/Zn 25
- 21 for electrodeposited zinc coating.
- 22 3. Dissimilar Metals: Type 316 stainless-steel fasteners.
- 23 B. Post-Installed Anchors: Fastener systems with working capacity greater than or equal to the design load,
- 24 according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC193.
- 25 1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or
- 26 ASTM F 1941, Class Fe/Zn 5, unless otherwise indicated.
- 27 2. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 2 stainless-steel
- 28 bolts, ASTM F 593, and nuts, ASTM F 594.

29 **2.5 MISCELLANEOUS MATERIALS**

- 30 A. Interior Materials:
- 31 1. Shop Primers: Provide primers that comply with Section 09 91 23 "Interior Painting.
- 32 B. Exterior materials:
- 33 1. Etching Cleaner for Galvanized Metal: Complying with MPI#25.
- 34 2. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and
- 35 compatible with paints specified to be used over it.
- 36 3. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.
- 37 4. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with intermediate and topcoat.
- 38 5. Epoxy Intermediate Coat: Complying with MPI#77 and compatible with primer and topcoat.
- 39 6. Polyurethane Topcoat: Complying with MPI#72 and compatible with undercoat.
- 40 C. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying
- 41 with ASTM C 1107/C 1107M. Provide grout specifically recommended by manufacturer for interior and
- 42 exterior applications.

43 **2.6 FABRICATION**

- 44 A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and
- 45 spacing, details, finish, and anchorage, but not less than that required to support structural loads.
- 46 B. Connections: Fabricate railings with welded connections unless otherwise indicated.
- 47 C. Welded Connections: Cope components at connections to provide close fit. Weld all around at connections,
- 48 including at fittings.
- 49 1. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish
- 50 Standards" for Type 1 welds; no evidence of a welded joint.
- 51 D. Form changes in direction by bending
- 52 E. Bend members in jigs to produce uniform curvature for each configuration required; maintain cross section
- 53 of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed
- 54 surfaces of components.
- 55 F. Close exposed ends of hollow handrail members with prefabricated end fittings.
- 56 G. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated.

- 1 H. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors  
2 to interconnect railing members to other work unless otherwise indicated.

3 **2.7 STEEL AND IRON FINISHES**

- 4 A. Preparing Nongalvanized Items for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with  
5 SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."  
6 1. Primer Application: Apply shop primer to prepared surfaces of railings unless otherwise indicated.  
7 Comply with requirements in SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and  
8 Maintenance Painting of Steel," for shop painting.  
9 B. Hot-dip galvanize exterior steel and iron railings, including hardware, after fabrication.  
10 1. Comply with ASTM A 123/A 123M for hot-dip galvanized railings.  
11 2. Comply with ASTM A 153/A 153M for hot-dip galvanized hardware.  
12 3. Do not quench or apply post-galvanizing treatments that might interfere with paint adhesion.  
13 4. Preparing Galvanized Railings for Shop Priming: After galvanizing, thoroughly clean railings of  
14 grease, dirt, oil, flux, and other foreign matter, and treat with etching cleaner.  
15 5. High-Performance Coating: Apply epoxy intermediate and polyurethane topcoats to prime-coated  
16 surfaces. Comply with coating manufacturer's written instructions and with requirements in SSPC-  
17 PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for  
18 shop painting. Apply at spreading rates recommended by coating manufacturer.  
19 a. Color: Refer to Material Tag Index and Drawings.

20 **PART 3 - EXECUTION**

21 **3.1 INSTALLATION**

- 22 A. Fit exposed connections together to form tight, hairline joints.  
23 B. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location,  
24 alignment, and elevation; measured from established lines and levels and free of rack.  
25 1. Set posts plumb within a tolerance of 1/16 inch in 3 feet.  
26 2. Align rails so variations from level for horizontal members and variations from parallel with rake of  
27 steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.  
28 C. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other  
29 materials from direct contact with incompatible materials.  
30 1. Coat concealed surfaces that will be in contact with grout, concrete, masonry, wood, or dissimilar  
31 metals, with a heavy coat of bituminous paint.  
32 D. Post anchorage: Refer to Drawings for type indicated.  
33 1. Use steel pipe sleeves preset and anchored into concrete for installing posts. After posts have been  
34 inserted into sleeves, fill annular space between post and sleeve with nonshrink, nonmetallic grout.  
35 2. Anchor posts to existing surfaces with baseplates as required by conditions, connected to posts and  
36 to supporting surfaces. Fasten to support surfaces with stainless steel bolts and post installed  
37 sleeves.  
38 E. Anchor railing ends to concrete and masonry with sleeves concealed within railing ends and anchored to  
39 wall construction with anchors and bolts.  
40 F. Attach handrails to walls with wall brackets except where end flanges are used.  
41 1. Use type of bracket with flange tapped for concealed anchorage to threaded hanger bolt.  
42 2. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.

43 **3.2 CLEANING**

- 44 A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of  
45 shop paint, and paint exposed areas with the same material used for shop painting to comply with SSPC-  
46 PA 1 for touching up shop-painted surfaces.  
47 1. Apply by brush or spray to provide a minimum 2.0-mil (0.05-mm) dry film thickness.  
48 B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to  
49 comply with ASTM A 780/A 780M.  
50

- 1 **3.3 PROTECTION**  
2 A. Protect finishes of railings from damage during construction period with temporary protective coverings  
3 approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.  
4 B. Restore finishes damaged during installation and construction period so no evidence remains of correction  
5 work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish  
6 entire unit, or provide new units.  
7

**END OF SECTION**

SECTION 05 75 00  
DECORATIVE FORMED METAL

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27 **PART 1 - GENERAL**

- 28 **1.1 RELATED DOCUMENTS**  
29 A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and  
30 Division 01 Specification Sections, apply to this Section.
- 31 **1.2 SUMMARY**  
32 A. Section Includes:  
33 1. Closures and trim.  
34 2. Filler panels between dissimilar construction.  
35 3. Pockets for window treatment.  
36 4. Window stools.  
37 B. Related Requirements:  
38 1. Section 05 70 00 "Decorative Metal" for decorative items made primarily from plate, bars, extrusions,  
39 tubes, castings, and other forms of metal, but which may include sheet metal components.
- 40 **1.3 COORDINATION**  
41 A. Coordinate installation of anchorages for decorative formed metal items. Furnish setting drawings,  
42 templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and  
43 items with integral anchors, that are to be embedded in concrete or masonry. Deliver items to Project site in  
44 time for installation.  
45 B. Coordinate installation of decorative formed metal with adjacent construction to ensure that wall assemblies,  
46 flashings, trim, and joint sealants, are protected against damage from the effects of weather, age, corrosion,  
47 and other causes of deterioration.
- 48 **1.4 PREINSTALLATION MEETINGS**  
49 A. Preinstallation Conference: Conduct conference at Project site.
- 50 **1.5 ACTION SUBMITTALS**  
51 A. Product Data: For each type of product, including finishing materials.  
52 B. Sustainable Design Submittals:

- 1 1. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and  
2 cost.
- 3 C. Shop Drawings: Show fabrication and installation details for decorative formed metal.  
4 1. Include plans, elevations, component details, and attachment details.  
5 2. Indicate materials and profiles of each decorative formed metal member, fittings, joinery, finishes,  
6 fasteners, anchorages, and accessory items.
- 7 D. Samples: For each type of exposed finish required, prepared on 6-inch-square Samples of metal of same  
8 thickness and material indicated for the Work.
- 9 **1.6 INFORMATIONAL SUBMITTALS**
- 10 A. Coordination Drawings: For decorative formed metal elements that house items specified in other Sections.  
11 Show dimensions of housed items, including locations of housing penetrations and attachments, and  
12 necessary clearances.
- 13 B. Evaluation Reports: For post-installed anchors, from ICC-ES.
- 14 **1.7 CLOSEOUT SUBMITTALS**
- 15 A. Maintenance Data: For finish to include in maintenance manuals.
- 16 **1.8 QUALITY ASSURANCE**
- 17 A. Fabricator Qualifications: A firm experienced in producing decorative formed metal similar to that indicated  
18 for this Project and with a record of successful in-service performance as well as sufficient production  
19 capacity to produce required units.
- 20 B. Organic-Coating Applicator Qualifications: A firm experienced in successfully applying organic coatings of  
21 type indicated to metals of types indicated and that employs competent control personnel to conduct  
22 continuing, effective quality-control program to ensure compliance with requirements.
- 23 C. Powder-Coating Applicator Qualifications: A firm experienced in successfully applying powder coatings of  
24 type indicated to metals of types indicated and that employs competent control personnel to conduct  
25 continuing, effective quality-control program to ensure compliance with requirements.
- 26 D. Installer Qualifications: Fabricator of products.
- 27 E. Mockup: Refer to Section 01 43 39 – Mockups for description of construction required to complete a mockup  
28 submittal for review.
- 29 1. Room 260: Typical historic vent grille within wood panel zone, re-finishing and acoustic fabric behind.  
30 2. Room 260: Typical radiator grille refinishing – both the main upper portion and the wall base portion.  
31 3. Subject to compliance with requirements, approved mockups may become part of the completed  
32 Work if undisturbed at time of Substantial Completion.
- 33 **1.9 DELIVERY, STORAGE, AND HANDLING**
- 34 A. Deliver decorative formed metal products wrapped in protective coverings and strapped together in suitable  
35 packs or in heavy-duty cartons. Remove protective coverings before they stain or bond to finished surfaces.  
36 B. Store products on elevated platforms in a dry location.
- 37 **1.10 FIELD CONDITIONS**
- 38 A. Field Measurements: Verify actual locations of walls, columns, beams, and other construction contiguous  
39 with decorative formed metal by field measurements before fabrication and indicate measurements on Shop  
40 Drawings.

41 **PART 2 - PRODUCTS**

42 **2.1 SHEET METAL**

- 43 A. General: Fabricate products from sheet metal without pitting, seam marks, roller marks, stains,  
44 discolorations, or other imperfections where exposed to view on finished units.
- 45 B. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled  
46 content not less than 25 percent.
- 47 C. Aluminum Sheet: Flat sheet complying with ASTM B 209, alloy and temper recommended by aluminum  
48 producer and finisher for type of use and finish indicated, and with strength and durability properties of not  
49 less than Alloy 5005-H32.

50 **2.2 MISCELLANEOUS MATERIALS**

- 51 A. Gaskets: As required to seal joints in decorative formed metal and remain weathertight; light tight as  
52 recommended in writing by decorative formed metal manufacturer.

- 1 1. ASTM D 1056, Type 1, Class A, grade as recommended by gasket manufacturer to obtain seal for
- 2 application indicated.
- 3 2. Closed-cell polyurethane foam, adhesive on two sides, release paper protected.
- 4 B. Sealants, Interior: Nonsag, paintable sealant complying with Section 07 92 00 "Joint Sealants" and as
- 5 recommended in writing by decorative formed metal manufacturer.
- 6 C. Filler Metal and Electrodes: Provide type and alloy of filler metal and electrodes as necessary for strength,
- 7 corrosion resistance, and compatibility in fabricated items.
- 8 1. Use filler metals that will match the color of metal being joined.
- 9 D. Fasteners: Fabricated from same basic metal and alloy as fastened metal unless otherwise indicated.
- 10 1. Provide **square or hex socket** flat-head machine screws for exposed fasteners unless otherwise
- 11 indicated.
- 12 E. Anchors: Provide fastener systems with an evaluation report acceptable to authorities having jurisdiction,
- 13 based on ICC-ES AC193.
- 14 F. Anchor Materials:
- 15 1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or
- 16 ASTM F 1941, Class Fe/Zn 5, unless otherwise indicated.
- 17 G. Sound-Deadening Materials:
- 18 1. Insulation: Unfaced, mineral-fiber blanket insulation complying with ASTM C 665, Type I, and
- 19 passing ASTM E 136 test.
- 20 2. Mastic: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.
- 21 H. Laminating Adhesive: Adhesive recommended by metal fabricator that will fully bond metal to metal and is
- 22 noncombustible after curing.

### 23 2.3 PAINTS AND COATINGS

- 24 A. Shop Primers: Comply with Section 09 91 23 "Interior Painting."

### 25 2.4 FABRICATION, GENERAL

- 26 A. Shop Assembly: Preassemble decorative formed metal items in shop to greatest extent possible to minimize
- 27 field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations.
- 28 Clearly mark units for reassembly and coordinated installation.
- 29 B. Fold back exposed edges of unsupported sheet metal to form a 1/2-inch-wide hem on the concealed side,
- 30 or ease edges to a radius of approximately 1/32 inch and support with concealed stiffeners.
- 31 C. Increase metal thickness or reinforce with concealed stiffeners, backing materials, or both, as needed to
- 32 provide surface flatness and sufficient strength for indicated use.
- 33 1. Support joints with concealed stiffeners as needed to hold exposed faces of adjoining sheets in flush
- 34 alignment.
- 35 D. Where welding or brazing is indicated, weld or braze joints and seams continuously. Grind, fill, and dress to
- 36 produce smooth, flush, exposed surfaces in which joints are not visible after finishing is completed.

### 37 2.5 CLOSURES AND TRIM (MTL-1)

- 38 A. Form closures and trim from metal of type and thickness indicated below. Fabricate to fit tightly to adjoining
- 39 construction.
- 40 1. Aluminum Sheet: **0.063 inch**.
- 41 a. Finish: Baked enamel or powder coat.

### 42 2.6 POCKETS FOR WINDOW TREATMENT (MTL-2)

- 43 A. Form pockets from metal of type and thickness indicated below, with end closures. Coordinate dimensions
- 44 and attachment methods with window treatment equipment, window frames, ceiling suspension system, and
- 45 other related construction to produce a coordinated, closely fitting assembly.
- 46 1. Aluminum Sheet: **0.063 inch**.
- 47 a. Finish: Baked enamel or powder coat.

### 48 2.7 WINDOW STOOLS (MTL-3)

- 49 A. Form window stools from metal of type and thickness indicated below, with end closures:
- 50 1. Aluminum Sheet: **0.063 inch**.
- 51 a. Finish: Baked enamel or powder coat.

### 52 2.8 ALUMINUM FINISHES

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



SECTION 06 03 12

HISTORIC WOOD REPAIR AND NEW WOOD HANDRAILS

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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, apply to this Section.

1.2 SUMMARY

- A. Section includes historic treatment of wood in the form of repairing wood features as follows:
  - 1. Repairing existing and adding new interior wood wainscot, paneling, judges bench, base/shoe, handrails and trim.
  - 2. Replacing interior wood wainscot, paneling, base/shoe, railings and trim.
  - 3. Repairing, refinishing, and replacing hardware.
  - 4. Repairing and replacing wood base & shoe.
- B. Related Requirements:
  - 1. Section 06 20 00 – Finish Carpentry.
  - 2. Section 08 21 10 - Wood Doors Rehabilitation
  - 3. Section 09 64 29 - Wood Floors
  - 7. Section 09 90 00- Painting and Coating
  - 8. Section 09 93 00- Stains and Varnishes

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference Project site minimum of one week in advance of starting work of this Section.
  - 1. Review methods and procedures related to historic wood repair, including, but not limited to, the following:



- 1 a. Historic treatment specialist's personnel, equipment, and facilities needed to  
2 make progress and avoid delays.  
3 b. Materials, material application, sequencing, tolerances, and required clearances.  
4 c. Fire-protection plan.  
5 d. Wood historic treatment program.  
6  
7  
8 1.4 SEQUENCING AND SCHEDULING  
9  
10 A. Perform historic wood repair in the following sequence, which includes work specified in this and other  
11 Sections:  
12  
13 1. Before removing wood components for on-site or off-site repair, tag each component with location-  
14 identification numbers. Indicate on tags and building plans the locations of each component, such as  
15 "Baseboard on North Side of Room 207."  
16 2. Dismantle hardware, tag and bag with location-identification numbers.  
17 3. In the shop, label each repaired component and whole or partial replacement with permanent location-  
18 identification number in inconspicuous location and remove site- applied tags.  
19 4. Sort units by condition, separating those that need extensive repair.  
20 5. Clean surfaces.  
21 6. General Wood-Repair Sequence:  
22 a. Remove paint or stain to bare wood.  
23 b. Repair wood by consolidation, replacement, partial replacement, infill and patching.  
24 c. Sand, prime, fill, sand again, and prepare surfaces for refinishing.  
25 7. Refinish, and replace hardware if required. Reinstall operating hardware.  
26 8. Reinstall components.  
27 9. Apply finish coats.  
28 10. Install remaining hardware.  
29  
30  
31 1.5 ACTION SUBMITTALS  
32  
33 A. Product Data: For each type of product.  
34  
35 1. Include recommendations for product application and use. Include test data substantiating  
36 that products comply with requirements.  
37  
38 B. Shop Drawings:  
39  
40 1. Include plans, elevations, and sections showing locations and extent of repair and replacement  
41 work, with enlarged details of replacement parts indicating materials, profiles, joinery, reinforcing,  
42 method of splicing or attaching wood members to other surfaces, accessory items, and finishes.  
43 2. Include field-verified dimensions and the following:  
44  
45 a. Full-size shapes and profiles with complete dimensions for replacement components and  
46 their jointing, showing relationship of existing components to new components.  
47 b. Templates and directions for installing hardware and anchorages.  
48 c. Identification of each new unit and its corresponding location in the building on  
49 annotated plans and elevations.  
50  
51 C. Samples for Initial Selection: For each type of exposed wood and finish.  
52  
53 1. Identify wood species, cut, and other features.  
54 2. Include Samples of hardware and accessories involving color selection.  
55  
56  
57 1.6 INFORMATIONAL SUBMITTALS  
58  
59 A. Qualification Data: For historic treatment specialist including workers and wood-repair-  
60 material manufacturer.  
61  
62 B. Wood Historic Treatment Program: Submit before work begins.  
63

- 1 1.7 QUALITY ASSURANCE  
2  
3 A. Historic Treatment Specialist Qualifications: Engage an experienced and qualified historic wood-repair  
4 specialist to perform work of this Section. Firm shall have completed work similar in materials, design, and  
5 extent to that indicated for this Project with a record of successful in-service performance. Firm must have  
6 successfully completed five similar projects in the last five years. Experience only in fabricating and installing  
7 new woodwork is insufficient experience for wood historic treatment work.  
8  
9 B. Worker Qualifications. Persons who are experienced and specialize in rehabilitation work of types they will be  
10 performing. Workers shall have minimum of three years of documented experience. Key staff shall be of  
11 sufficient number to accomplish the required work with the required project schedule.  
  
12 C. Submit documentation of firm experience, qualifications and worker resumes. Submittals shall be in an indexed three  
13 ring binder and shall include:  
14 1. Name of firm and location of office.  
15 2. Description and location of a minimum of five required projects.  
16 3. References for five required projects including contact information.  
17 4. Name of individuals that worked on the five required projects that will work on this project.  
18 5. Brief resumes of individual Rehabilitation workers, including supervisors, proposed for this project.  
19  
20  
21 B. Wood-Repair-Material Manufacturer Qualifications: A firm regularly engaged in producing wood consolidant  
22 and wood-patching compound that have been used for similar historic wood- treatment applications with  
23 successful results, and with factory-authorized service representatives who are available for consultation,  
24 Project-site inspection, and on-site assistance.  
25  
26 C. Wood Historic Treatment Program: Submit a written Historic Treatment Plan. Submittals shall be in an  
27 indexed three ring binder and shall include: detailed description of materials, methods, equipment, and  
28 sequence of operations to be used for historic treatment work, including protection of surrounding  
29 materials and Project site.  
30  
31 1. If materials and methods other than those indicated are proposed for any phase of historic treatment  
32 work, add a written description of such materials and methods, including evidence of successful  
33 use on comparable projects, and demonstrations to show their effectiveness for this Project  
34  
35 D. Mockups: Refer to Section 01 43 39. Prepare mockups of historic treatment repair processes  
36 to demonstrate aesthetic effects and to set quality standards for materials and execution, and for fabrication  
37 and installation. Prepare mockups so they are as inconspicuous as practicable. Mock-ups shall be full panels  
38 or sections.  
39  
40 1. Locate mockups on existing surfaces where directed by Architect in locations that enable viewing under  
41 same conditions as the completed Work.  
42 2. Approval of mockups does not constitute approval of deviations from the Contract  
43 Documents contained in mockups unless Architect specifically approves such deviations in writing.  
44 3. Subject to compliance with requirements, approved mockups may become part of the  
45 completed Work if undisturbed at time of Substantial Completion.  
46  
47  
48 1.8 DELIVERY, STORAGE, AND HANDLING  
49  
50 A. Pack, deliver, and store products in suitable packs, heavy-duty cartons, or wooden crates; surround with  
51 sufficient packing material to ensure that products will not be deformed, broken, or otherwise damaged.  
52  
53 B. Until installed, store products inside a well-ventilated area and protect from weather, moisture, soiling,  
54 abrasion, extreme temperatures, and humidity, and where environmental conditions comply with  
55 manufacturer's requirements.  
56  
57  
58  
59 1.9 FIELD CONDITIONS  
60  
61 A. Temperature and humidity limitations: Proceed with historic wood repair only when conditions are within  
62 the environmental limits set by each manufacturer's written instructions and specified requirements.  
63

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**PART 2 - PRODUCTS**

2.1 HISTORIC WOOD REPAIR, GENERAL

- A. Quality Standard: Comply with applicable requirements in AWI/A'MMC/MI's "Architectural Woodwork Standards" for construction, finishes, grade rules, and other requirements unless otherwise indicated.

2.2 REPLICATED WOOD ITEMS

- A. Replicated Wood Paneling moldings and Trim: Custom-fabricated replacement wood units and components.
  - 1. Joint Construction: Joints matching existing joints.
  - 2. Wood Species: Match species of existing wood.
  - 3. Wood Cut: Match cut of existing wood.
  - 4. Veneer: Match gain pattern, color, width and thickness of existing veneer flitch.
  - 5. Wood Member and Trim Profiles: Match profiles and detail of existing.
  - 6. Hardware: Reuse existing unless otherwise indicated.

2.3 WOOD-REPLACEMENT MATERIALS

- A. Painted Wood, General: Clear fine-grained lumber; kiln dried to a moisture content of 6 to 12 percent at time of fabrication; free of visible finger joints, blue stain, knots, pitch pockets, and surface checks larger than 1/32 inch deep by 2 inches wide.
  - 1. Species:
    - a. Match species of each existing type of wood component or assembly unless otherwise indicated.
    - b. **WD-3**: Solid White Oak hand rails to new and existing interior stairs. See drawings for profile. Finish per spec 099300.
- B. Stained/Varnished wood: Clear, kiln dried to a moisture content of 6 to 12 percent at time of fabrication; free of visible imperfections. Profile, gain pattern, figuring and color to match existing wood.
- B. Wainscot: Match existing species.
- C. Moldings: Match existing species and profile.
- D. Paneling: Match existing species.
- E. Interior Trim: Match existing species.
- F. Base/shoe: Match existing species.

2.4 WOOD-REPAIR MATERIAL FOR PAINTED WOOD

- A. Source Limitations: Obtain wood consolidant and wood-patching compound from single source from single manufacturer.
- B. Wood Consolidant: Ready-to-use product designed to penetrate, consolidate, and strengthen soft fibers of wood materials that have deteriorated due to decay and designed specifically to enhance the bond of wood-patching compound to existing wood.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
    - a. Abatron, Inc.; LiquidWood or approved equal.

1 C. Wood-Patching Compound: Two-part, epoxy-resin, wood-patching compound; knife-grade formulation as  
2 recommended in writing by manufacturer for type of wood repair indicated, tooling time required for the  
3 detail of work, and site conditions. Compound shall be designed for filling voids in damaged wood materials  
4 that have deteriorated due to weathering and decay. Compound shall be capable of filling deep holes and  
5 spreading to featheredge.

6  
7 1. Manufacturers: Subject to compliance with requirements, provide products by the following:

8  
9 a. Abatron, Inc.; WoodEpoxy or approved equal.

10  
11  
12 2.5 HARDWARE

13  
14 A. Hardware, General: Provide hardware required for each type of replicated or repaired wood, including but  
15 not limited to, hinges, pulls, latches, fasteners, and accessories indicated or required for proper operation.  
16 Hardware shall smoothly operate, tightly close, and secure units appropriately for frequency of use, unit  
17 weight, and dimensions.

18  
19 B. Replacement Hardware: Replace existing damaged or missing hardware with new hardware to match original.

20  
21 C. Material and Design:

22  
23 1. Material: match existing.

24 2. Design: Match type, finish and appearance of existing hardware.

25 3. Replacement Hardware: Regardless of mechanisms within, match existing, exposed  
26 Hardware.

27  
28 D. Hardware Finishes: Comply with BHMAA156.18 for base material and finish  
29 requirements indicated by the following:

30 1. Match existing hardware finishes.

31  
32  
33 2.6 MISCELLANEOUS MATERIALS

34  
35 A. Cleaning Materials:

36  
37 1. Detergent Solution: Solution prepared by mixing 2 cups of tetrasodium pyrophosphate (TSP), 1/2  
38 cup of laundry detergent that contains no ammonia, 5 quarts of 5 percent sodium hypochlorite bleach,  
39 and 15 quarts of warm water for each 5 gal. of solution required.

40 2. Mildewcide: Commercial, proprietary mildewcide or a solution prepared by mixing 1/3 cup of household  
41 detergent that contains no ammonia, 1 quart of 5 percent sodium  
42 hypochlorite bleach, and 3 quarts of warm water.

43  
44 B. Stripper:

45  
46 1. Nonvolatile, biodegradable, water based, low odor type product.

47 2. 3M Safest Stripper

48 3. Rinse as recommended by stripper manufacturer

49  
50 C. Adhesives: Wood adhesives with minimum 15-to 45-minute cure at 70 deg F, in gunnable and liquid  
51 formulations as recommended in writing by adhesive manufacturer for each type of repair and exposure  
52 condition.

53  
54 D. Bleach: Oxalic acid solution or similar solution.

55  
56 E. Filler/sealer: Compatible with wood and finish coatings.

57  
58 F. Fasteners: Use fastener metals that are noncorrosive and compatible with each material joined.

59  
60 1. Match existing fasteners in material and type of fastener unless otherwise indicated.

61 2. Use concealed fasteners for interconnecting wood components.

62 3. Use concealed fasteners for attaching items to other work unless exposed fasteners are unavoidable or  
63 the existing fastening method.

64 4. For exposed fasteners, use Flat-tip-type machine screws of head profile flush with metal surface unless

1 otherwise indicated.

2 5. Finish exposed fasteners to match finish of metal fastened unless otherwise indicated.

3  
4 G. Leather: New Leather: 4-5 oz, Aniline dyed, full grain leather. Single piece for entire top surface, no splices  
5 or joints. Masters of Barge adhesive as recommended for this use.

6  
7 2.7 WOOD FINISHES

8  
9 A. Unfinished Replacement Units: Provide exposed interior wood surfaces of replacement units unfinished;  
10 smooth, filled, and suitably prepared for on-site priming and finishing.

11  
12  
13 **PART 3 - EXECUTION**

14  
15  
16 3.1 PREPARATION

17  
18 A. Protect adjacent materials from damage by historic wood repair.

19  
20 B. Clean wood of mildew, loose paint, grease, dirt, and other debris by scrubbing with bristle brush or sponge and  
21 detergent solution. Scrub mildewed areas with mildewcide. After cleaning, rinse thoroughly with fresh water.  
22 Allow to dry before repairing or painting.

23  
24 C. Condition replacement wood members and replacement units to prevailing conditions at installation  
25 areas before installing.

26  
27  
28 3.2 HISTORIC WOOD REPAIR, GENERAL

29  
30 A. Historic Treatment Appearance Standard: Completed work is to have a uniform appearance as  
31 viewed by Architect from 5 feet away for interior work and shall blend in with adjacent wood components  
32 for a uniform overall appearance.

33  
34 B. General: In treating historic items, disturb them as minimally as possible and as follows:

35 1. Stabilize and repair wood to reestablish structural integrity and durability while maintaining the existing  
36 form of each item.

37 2. Remove coatings.

38 3. Repair items in place where possible.

39 4. Install temporary protective measures to protect wood-treatment work that is indicated to  
40 be completed later and all adjacent surfaces.

41 5. Refinish historic wood according to Section 09 930 - Stains and Varnishes unless otherwise  
42 indicated.

43  
44 C. Mechanical Abrasion: Where mechanical abrasion is needed for the work, use only the gentlest mechanical  
45 methods, such as scraping and natural-fiber bristle brushing, that will not abrade wood substrate, reducing  
46 clarity of detail. Do not use abrasive methods, such as sanding, wire brushing, or power tools, except as  
47 indicated as part of the historic treatment program and as approved by Architect.

48  
49 D. Repair and Refinish Existing Hardware: Dismantle hardware; strip finish, repair, and refinish it to match finish  
50 samples; and lubricate moving parts just enough to function smoothly.

51  
52 E. Repair Wood: Match existing materials and features, retaining as much original material as possible to  
53 perform repairs.

54  
55 1. Unless otherwise indicated, repair wood by consolidating, patching, splicing, Dutchman, or otherwise  
56 reinforcing wood with new wood matching existing wood or with salvaged, sound, original wood.

57 2. Where indicated, repair wood by limited replacement matching existing material.

58  
59 F. Replace Wood: Where indicated, duplicate and replace units with units made from salvaged, sound,  
60 original wood or with new wood matching existing wood. Use surviving prototypes to create patterns for  
61 duplicate replacements.

62  
63 1. Do not use substitute materials unless otherwise indicated.

- 1
- 2
- 3 G. Identify removed items with numbering system corresponding to item locations, to ensure reinstallation in
- 4 same location. Key items to Drawings showing location of each removed unit. Permanently label units in a
- 5 location that will be concealed after reinstallation.
- 6
- 7
- 8 3.3 WOOD PATCH-TYPE REPAIR FOR PAINTED SURFACES
- 9
- 10 A. General: Patch wood that exhibits depressions, gouges, holes, or similar voids, and that has limited
- 11 amounts of deteriorated wood.
- 12
- 13 1. Verify that surfaces are sufficiently clean and free of finish residue prior to patching.
- 14 2. Treat wood with wood consolidant prior to application of patching compound. Coat wood surfaces by
- 15 brushing, applying multiple coats until wood is saturated and refuses to absorb more. Allow treatment
- 16 to harden before filling void with patching compound.
- 17
- 18
- 19 b. Apply wood-patching compound to fill depressions, nicks, cracks, and other voids created by removed or
- 20 missing wood.
- 21 1. Prime patch area with application of wood consolidant or manufacturer's recommended primer.
- 22 2. Mix only as much patching compound as can be applied according to manufacturer's
- 23 written instructions.
- 24 3. Apply patching compound in layers as recommended in writing by manufacturer until the
- 25 void is completely filled.
- 26 4. Sand patch surface smooth and flush with adjacent wood, without voids in patch material,
- 27 and matching contour of wood member.
- 28 5. Clean spilled compound from adjacent materials immediately.
- 29
- 30
- 31 3.4 WOOD-REPLACEMENT/REPAIR FOR STAINED & VARNISH SURFACES
- 32
- 33 A. General: Repair and patch. Replace only if damage is too extensive to repair.
- 34
- 35 1. Remove surface-attached items from wood surface before performing wood-replacement /repairs unless
- 36 otherwise indicated.
- 37 2. Verify that surfaces are sufficiently clean and free of finish residue prior to repair.
- 38 3. Remove damaged, broken, rotted, and decayed wood down to sound wood.
- 39 4. Custom fabricate new wood to replace missing wood; utilize splices, Dutchman, infill repairs or if severe
- 40 damage replace entire wood member.
- 41 5. Secure new wood using biscuits, multiple dowels, or splines with adhesive and nailing to ensure
- 42 maximum structural integrity at each repair. Use only concealed fasteners. Fill nail holes and patch
- 43 surface to match surrounding sound wood.
- 44
- 45
- 46 B. Repair remaining depressions, holes, or similar voids.
- 47 D. Clean spilled materials from adjacent surfaces immediately.
- 48 C. Reinstall items removed for repair into original locations.
- 49
- 50
- 51 3.5 ADJUSTMENT
- 52
- 53 A. Adjust existing and replacement operating items, hardware, and accessories for a tight fit at contact points
- 54 and for smooth operation and tight closure. Lubricate hardware and moving parts.
- 55
- 56
- 57 3.6 CLEANING AND PROTECTION
- 58
- 59 A. Protect wood surfaces from contact with contaminating substances resulting from construction operations.
- 60 Monitor wood surfaces adjacent to and below exterior concrete and masonry during construction for presence
- 61 of dirt, scum, alkaline deposits, stains, or other contaminants. If contaminating substances contact wood
- 62 surfaces, remove contaminants immediately.
- 63

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- 1        B. Clean exposed surfaces immediately after historic wood repair. Avoid damage to coatings and
- 2            finishes. Remove excess sealants, patching materials, dirt, and other substances.
- 3
- 4        C. Protect all finished surfaces until substantial completion.
- 5
- 6

**END OF SECTION 06 03 12**

**SECTION 06 10 00**  
**ROUGH CARPENTRY**

- 1
- 2
- 3 PART 1 – GENERAL
- 4 1.1 [RELATED DOCUMENTS](#)
- 5 1.2 [SUMMARY](#)
- 6 1.3 [DEFINITIONS](#)
- 7 1.4 [ACTION SUBMITTALS](#)
- 8 1.5 [INFORMATIONAL SUBMITTALS](#)
- 9 1.6 [QUALITY ASSURANCE](#)
- 10 1.7 [DELIVERY, STORAGE, AND HANDLING](#)
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- 12 2.1 [WOOD PRODUCTS, GENERAL](#)
- 13 2.2 [WOOD-PRESERVATIVE-TREATED LUMBER](#)
- 14 2.3 [FIRE-RETARDANT-TREATED MATERIALS](#)
- 15 2.4 [MISCELLANEOUS LUMBER](#)
- 16 2.5 [PLYWOOD BACKING PANELS](#)
- 17 2.6 [FASTENERS](#)
- 18 2.7 [MISCELLANEOUS MATERIALS](#)
- 19 PART 3 – EXECUTION
- 20 3.1 [INSTALLATION, GENERAL](#)
- 21 3.2 [PROTECTION](#)

22 **PART 1 - GENERAL**

23 **1.1 RELATED DOCUMENTS**

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

26 **1.2 SUMMARY**

- 27 A. Section Includes:
  - 28 1. Rooftop equipment bases and support curbs. Indicated as CURB-2.
  - 29 2. Wood blocking, cants, and nailers.
  - 30 3. Wood furring and grounds.
  - 31 4. Wood sleepers.
  - 32 5. Plywood backing panels.

33 **1.3 DEFINITIONS**

- 34 A. Boards or Strips: Lumber of less than 2 inches nominal (38 mm actual) size in least dimension.
- 35 B. Dimension Lumber: Lumber of 2 inches nominal (38 mm actual) size or greater but less than 5 inches
- 36 nominal (114 mm actual) size in least dimension.
- 37 C. Exposed Framing: Framing not concealed by other construction.
- 38 D. OSB: Oriented strand board.

39 **1.4 ACTION SUBMITTALS**

- 40 A. Product Data: For each type of process and factory-fabricated product.
  - 41 1. Include data for wood-preservative treatment from chemical treatment manufacturer and
  - 42 certification by treating plant that treated materials comply with requirements. Indicate type of
  - 43 preservative used and net amount of preservative retained.
  - 44 2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by
  - 45 treating plant that treated materials comply with requirements. Include physical properties of treated
  - 46 materials based on testing by a qualified independent testing agency.
  - 47 3. For fire-retardant treatments, include physical properties of treated lumber both before and after
  - 48 exposure to elevated temperatures, based on testing by a qualified independent testing agency
  - 49 according to ASTM D 5664.
  - 50 4. For products receiving a waterborne treatment, include statement that moisture content of treated
  - 51 materials was reduced to levels specified before shipment to Project site.
  - 52



- 1 B. Sustainable Design Submittals:  
2 1. Product Certificates: For regional materials, indicating location of material manufacturer and point  
3 of extraction, harvest, or recovery for each raw material. Include distance to Project and cost for  
4 each regional material.  
5 2. Chain-of-Custody Certificates: For certified wood products. Include statement of costs.  
6 3. Chain-of-Custody Qualification Data: For manufacturer and vendor.  
7 4. Product Data: For composite wood products, indicating that product contains no urea  
8 formaldehyde.  
9 5. Laboratory Test Reports: For composite wood products, indicating compliance with requirements  
10 for low-emitting materials.  
11 6. Product Data: For installation adhesives, indicating VOC content.  
12 7. Laboratory Test Reports: For installation adhesives, indicating compliance with requirements for  
13 low-emitting materials.

14 **1.5 INFORMATIONAL SUBMITTALS**

- 15 A. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses.  
16 Indicate species and grade selected for each use and design values approved by the ALSC Board of  
17 Review.  
18 B. Evaluation Reports: For the following, from ICC-ES:  
19 1. Wood-preservative-treated wood.  
20 2. Fire-retardant-treated wood.  
21 3. Engineered wood products.  
22 4. Power-driven fasteners.  
23 5. Post-installed anchors.

24 **1.6 QUALITY ASSURANCE**

- 25 A. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-  
26 accredited certification body.  
27 B. Vendor Qualifications: A vendor that is certified for chain of custody by an FSC-accredited certification  
28 body.  
29 C. Mockup: Refer to Section 01 43 39 – Mockups for description of construction required to complete a  
30 mockup submittal for review.

31 **1.7 DELIVERY, STORAGE, AND HANDLING**

- 32 A. Stack wood products flat with spacers beneath and between each bundle to provide air circulation. Protect  
33 wood products from weather by covering with waterproof sheeting, securely anchored. Provide for air  
34 circulation around stacks and under coverings.

35 **PART 2 - PRODUCTS**

36 **2.1 WOOD PRODUCTS, GENERAL**

- 37 A. Regional Materials: The following wood products shall be manufactured within 500 miles of Project site  
38 from materials that have been extracted, harvested, or recovered, as well as manufactured, within 500  
39 miles of Project site.  
40 1. Dimension lumber.  
41 2. Laminated-veneer lumber.  
42 B. Certified Wood: The following wood products shall be certified as "FSC Pure" according to FSC STD-01-  
43 00 and FSC STD-40-004.  
44 1. Dimension lumber, except treated materials.  
45 2. Laminated-veneer lumber.  
46

- 1 C. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated,  
2 comply with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Grade  
3 lumber by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules  
4 indicated.
- 5 1. Factory mark each piece of lumber with grade stamp of grading agency.  
6 2. Dress lumber, S4S, unless otherwise indicated.
- 7 D. Maximum Moisture Content of Lumber: 15 percent for 2-inch nominal thickness or less; 19 percent for  
8 more than 2-inch nominal thickness unless otherwise indicated.
- 9 E. Engineered Wood Products: Acceptable to authorities having jurisdiction and for which current model code  
10 research or evaluation reports exist that show compliance with building code in effect for Project.
- 11 1. Allowable design stresses, as published by manufacturer, shall meet or exceed those indicated.  
12 Manufacturer's published values shall be determined from empirical data or by rational engineering  
13 analysis and demonstrated by comprehensive testing performed by a qualified independent testing  
14 agency.

## 15 2.2 WOOD-PRESERVATIVE-TREATED LUMBER

- 16 A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in  
17 contact with ground, Use Category UC3b for exterior construction not in contact with ground, and  
18 Use Category UC4a for items in contact with ground.
- 19 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or  
20 chromium. Do not use inorganic boron (SBX) for sill plates.
- 21 B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is  
22 warped or that does not comply with requirements for untreated material.
- 23 C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
- 24 D. Application: Treat items indicated on Drawings, and the following:
- 25 1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in  
26 connection with roofing, flashing, vapor barriers, and waterproofing.
- 27 a. Lumber treated with wood preservatives such as Pentachlorophenol, Copper Naphthenate  
28 or Copper 8-quinolinolate that adversely affect the membrane when in direct contact not  
29 acceptable.
- 30 2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with  
31 masonry or concrete.
- 32 3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or  
33 concrete walls.

## 34 2.3 FIRE-RETARDANT-TREATED MATERIALS

- 35 A. General: Where fire-retardant-treated materials are indicated, materials shall comply with requirements in  
36 this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics  
37 specified as determined by testing identical products per test method indicated by a qualified testing  
38 agency.
- 39 B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame-spread index of  
40 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive  
41 combustion when the test is extended an additional 20 minutes, and with the flame front not extending  
42 more than 10.5 feet beyond the centerline of the burners at any time during the test.
- 43 1. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested  
44 according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.
- 45 C. Kiln-dry lumber after treatment to maximum moisture content of 19 percent. Kiln-dry plywood after  
46 treatment to maximum moisture content of 15 percent.
- 47 D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.
- 48 E. Application: Treat all rough carpentry unless otherwise indicated.
- 49 1. Framing for raised platforms.  
50 2. Concealed blocking.  
51 3. Plywood backing panels.

## 52 2.4 MISCELLANEOUS LUMBER

- 53 A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other  
54 construction, including the following:
- 55 1. Blocking.  
56 2. Nailers.  
57 3. Rooftop equipment bases and support curbs.  
58 4. Cants.  
59 5. Furring.

- 1 6. Grounds.  
2 B. Dimension Lumber Items: Wood roof curbs and nailers shall be kiln-dried (Southern Pine, Douglas Fir)  
3 structural grade #2 or better.  
4 C. Concealed Boards: 15 percent maximum moisture content and any of the following species and grades:  
5 1. Mixed southern pine or southern pine; No. 2 grade; SPIB.  
6 2. Northern species; No. 2 Common grade; NLGA.

7 **2.5 PLYWOOD BACKING PANELS**

- 8 A. Equipment Backing Panels: Plywood, DOC PS 1, fire-retardant treated, in thickness indicated or, if not  
9 indicated, not less than 3/4-inch nominal thickness.

10 **2.6 FASTENERS**

- 11 A. General: Fasteners shall be of size and type indicated and shall comply with requirements specified in this  
12 article for material and manufacture.  
13 1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or  
14 in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with  
15 ASTM A 153/A 153M.  
16 B. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having  
17 jurisdiction, based on ICC-ES AC70.  
18 C. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having  
19 jurisdiction, based on ICC-ES AC01, ICC-ES AC58, ICC-ES AC193 or ICC-ES AC308 as appropriate for  
20 the substrate.

21 **2.7 MISCELLANEOUS MATERIALS**

- 22 A. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber or  
23 rubberized-asphalt compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded  
24 polyolefin to produce an overall thickness of not less than 0.025 inch.  
25 B. Adhesives for Gluing Furring and Sleepers to Concrete or Masonry: Formulation complying with  
26 ASTM D 3498 that is approved for use indicated by adhesive manufacturer.  
27 1. Adhesives shall have a VOC content of 70 < g/L or less.

28 **PART 3 - EXECUTION**

29 **3.1 INSTALLATION, GENERAL**

- 30 A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough  
31 carpentry accurately to other construction. Locate nailers, blocking, and similar supports to comply with  
32 requirements for attaching other construction.  
33 B. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.  
34 C. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible  
35 flashing separator between wood and metal decking.  
36 D. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with  
37 the following:  
38 1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code (IBC).  
39 2. ICC-ES evaluation report for fastener.

40 **3.2 PROTECTION**

- 41 A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection,  
42 inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution  
43 by spraying to comply with EPA-registered label.

44 **END OF SECTION**

SECTION 06 15 16  
WOOD ROOF DECKING

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- 5 1.2 [SUMMARY](#)
- 6 1.3 [ACTION SUBMITTALS](#)
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- 10 PART 2 – PRODUCTS
- 11 2.1 [WOOD ROOF DECKING, SALVAGED](#)
- 12 2.2 [WOOD ROOF DECKING, GENERAL](#)
- 13 2.3 [GLUED-LAMINATED WOOD ROOF DECKING](#)
- 14 2.4 [ACCESSORY MATERIALS](#)
- 15 PART 3 – EXECUTION
- 16 3.1 [INSTALLATION](#)
- 17 3.2 [ADJUSTING](#)
- 18 3.3 [PROTECTION](#)

19 **PART 1 - GENERAL**

20 **1.1 RELATED DOCUMENTS**

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

23 **1.2 SUMMARY**

- 24 A. Section includes glued-laminated wood roof decking

25 **1.3 ACTION SUBMITTALS**

- 26 A. Product Data: For each type of product.
- 27 B. Sustainable Design Submittals:
  - 28 1. Product Certificates: For regional materials, indicating location of material manufacturer and point of
  - 29 extraction, harvest, or recovery for each raw material. Include distance to Project and cost for each
  - 30 regional material.
  - 31 2. Chain-of-Custody Certificates: For certified wood products. Include statement of costs.
  - 32 3. Chain-of-Custody Qualification Data: For manufacturer and vendor.
  - 33 4. Product Data: For laminating adhesives, indicating that product contains no urea formaldehyde.

34 **1.4 INFORMATIONAL SUBMITTALS**

- 35 A. Research/Evaluation Reports: For glued-laminated wood roof decking indicated to be of diaphragm design
- 36 and construction, from ICC-ES.

37 **1.5 QUALITY ASSURANCE**

- 38 A. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-
- 39 accredited certification body.
- 40 B. Vendor Qualifications: A vendor that is certified for chain of custody by an FSC-accredited certification body.

41 **1.6 DELIVERY, STORAGE, AND HANDLING**

- 42 A. Schedule delivery of wood roof decking to avoid extended on-site storage and to avoid delaying the Work.
- 43 B. Store materials under cover and protected from weather and contact with damp or wet surfaces. Provide for
- 44 air circulation within and around stacks and under temporary coverings. Stack wood roof decking with
- 45 surfaces that are to be exposed in the final Work protected from exposure to sunlight.

1 **PART 2 - PRODUCTS**

2 **2.1 WOOD ROOF DECKING, SALVAGED**

- 3 A. Decking from demolished lower roof shall be salvaged and re-used for repair and infill of upper roof.  
4 B. Refer to Section 02 41 19 – Selective Demolition for salvaging, cleaning and storage requirements.

5 **2.2 WOOD ROOF DECKING, GENERAL**

- 6 A. General: Comply with DOC PS 20 and with applicable grading rules of inspection agencies certified by  
7 ALSC's Board of Review.  
8 B. Regional Materials: Wood products shall be manufactured within 500 miles of Project site from materials  
9 that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of Project site.  
10 C. Regional Materials: Wood products shall be manufactured within 500 miles of Project site.  
11 D. Certified Wood: Wood products shall be certified as "FSC Pure" according to FSC STD-01-00 and FSC STD-  
12 40-004.

13 **2.3 GLUED-LAMINATED WOOD ROOF DECKING**

- 14 A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may  
15 be incorporated into the Work include, but are not limited to the following:  
16 1. Disdero Lumber Company.  
17 2. Filler King Company.  
18 3. Structural Wood Systems; A Division of Harrison Industries.  
19 4. Timberweld.  
20 B. Face Species: Douglas fir-larch or Douglas fir-larch (North).  
21 C. Roof Decking Nominal Size: 2 inch actual depth by width as required.  
22 D. Note that existing framing below deck varies in spacing: 5 feet nominal spacing is typical.  
23 E. Face Grade: Service: Face knot holes, stains, end splits, skips, roller splits, planer burns, and other  
24 nonstrength-reducing characteristics are allowed. Strength-reducing characteristics are not allowed.  
25 F. Moisture Content: Provide wood roof decking with 15 percent maximum moisture content at time of dressing.  
26 G. Face Surface: Rough sanded or wire brushed.  
27 H. Edge Pattern: Beaded edge.  
28 I. Laminating Adhesive: Wet-use type complying with ASTM D 2559.  
29 1. Adhesives: Do not use adhesives that contain urea formaldehyde.

30 **2.4 ACCESSORY MATERIALS**

- 31 A. Fastener Material: Hot-dip galvanized steel.  
32 B. Sealants: Latex, complying with applicable requirements in Section 07 92 00 "Joint Sealants" and  
33 recommended by sealant manufacturer and manufacturer of substrates for intended application.

34 **PART 3 - EXECUTION**

35 **3.1 INSTALLATION**

- 36 A. Install laminated wood roof decking to comply with manufacturer's written instructions.  
37 1. Locate end joints for two-span continuous lay-up.  
38 2. Nail each course of glued-laminated wood roof decking at each support with one nail slant nailed  
39 above the tongue and one nail straight nailed through the face.  
40 a. Use 12d nails for 2-by-6 and 2-by-8 roof decking.  
41 3. Slant nail each course of glued-laminated wood roof decking to the tongue of the adjacent course at  
42 30 inches o.c. and within 12 inches of the end of each unit. Stagger nailing 15 inches in adjacent  
43 courses.  
44 a. Use 6d nails for 2-by-6 and 2-by-8 roof decking.  
45 B. Anchor wood roof decking, where supported on walls, with bolts as indicated.  
46 C. Apply joint sealant to seal roof decking at exterior walls at the following locations:  
47 1. Between roof decking and supports located at exterior walls.  
48 2. Between roof decking and exterior walls that butt against underside of roof decking.  
49 3. Between tongues and grooves of roof decking over exterior walls and supports at exterior walls.

50 **3.2 ADJUSTING**

- 51 A. Repair damaged surfaces and finishes after completing erection. Replace damaged roof decking if repairs  
52 are not approved by Architect.

- 1 **3.3 PROTECTION**
- 2 A. Provide water-resistive barrier over roof decking as the Work progresses to protect roof decking until roofing
- 3 is applied.
- 4

**END OF SECTION**

**SECTION 06 16 00**  
**SHEATHING**

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- 3 PART 1 – GENERAL
- 4 1.1 [RELATED DOCUMENTS](#)
- 5 1.2 [SUMMARY](#)
- 6 1.3 [ACTION SUBMITTALS](#)
- 7 1.4 [INFORMATIONAL SUBMITTALS](#)
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- 9 1.6 [DELIVERY, STORAGE, AND HANDLING](#)
- 10 PART 2 – PRODUCTS
- 11 2.1 [PERFORMANCE REQUIREMENTS](#)
- 12 2.2 [WOOD PANEL PRODUCTS](#)
- 13 2.3 [PRESERVATIVE-TREATED PLYWOOD](#)
- 14 2.4 [FIRE-RETARDANT-TREATED PLYWOOD](#)
- 15 2.5 [WALL SHEATHING \[SHTG-1\]](#)
- 16 2.6 [PARAPET SHEATHING \[SHTG-2\]](#)
- 17 2.8 [FASTENERS](#)
- 18 2.10 [MISCELLANEOUS MATERIALS](#)
- 19 PART 3 – EXECUTION
- 20 3.1 [INSTALLATION, GENERAL](#)

21 **PART 1 - GENERAL**

22 **1.1 RELATED DOCUMENTS**

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

25 **1.2 SUMMARY**

- 26 A. Section Includes:
  - 27 1. Wall sheathing.
  - 28 2. Parapet sheathing.
- 29 B. Related Sections:
  - 30 1. Section 06 15 16 "Wood Roof Decking" for additional decking material at upper roof repair.

31 **1.3 ACTION SUBMITTALS**

- 32 A. Product Data: For each type of process and factory-fabricated product.
- 33 B. Sustainable Design Submittals:
  - 34 1. Chain-of-Custody Certificates: For certified wood products. Include statement of costs.
  - 35 2. Chain-of-Custody Qualification Data: For manufacturer and vendor.
  - 36 3. Product Data: For composite wood products, indicating that product contains no urea
  - 37 formaldehyde.
  - 38 4. Laboratory Test Reports: For composite wood products, indicating compliance with requirements
  - 39 for low-emitting materials.
  - 40 5. Product Data: For installation adhesives, indicating VOC content.
  - 41 6. Laboratory Test Reports: For installation adhesives, indicating compliance with requirements for
  - 42 low-emitting materials.

43 **1.4 INFORMATIONAL SUBMITTALS**

- 44 A. Evaluation Reports: For the following, from ICC-ES:
  - 45 1. Wood-preserved-treated plywood.
  - 46 2. Fire-retardant-treated plywood.
  - 47 3. Foam-plastic sheathing.

48 **1.5 QUALITY ASSURANCE**

- 49 A. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-
- 50 accredited certification body.
- 51 B. Vendor Qualifications: A vendor that is certified for chain of custody by an FSC-accredited certification
- 52 body.

- 1 C. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant-treated  
2 material, an inspection agency acceptable to authorities having jurisdiction that periodically performs  
3 inspections to verify that the material bearing the classification marking is representative of the material  
4 tested.  
5 D. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-  
6 accredited certification body.  
7 E. Vendor Qualifications: A vendor that is certified for chain of custody by an FSC-accredited certification  
8 body.

9 **1.6 DELIVERY, STORAGE, AND HANDLING**

- 10 A. Stack panels flat with spacers beneath and between each bundle to provide air circulation. Protect  
11 sheathing from weather by covering with waterproof sheeting, securely anchored. Provide for air  
12 circulation around stacks and under coverings.

13 **PART 2 - PRODUCTS**

14 **2.1 PERFORMANCE REQUIREMENTS**

- 15 A. Fire-Resistance Ratings: As tested according to ASTM E 119; testing by a qualified testing agency.  
16 Identify products with appropriate markings of applicable testing agency.  
17 1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or  
18 from the listings of another qualified testing agency.

19 **2.2 WOOD PANEL PRODUCTS**

- 20 A. Certified Wood: The following wood products shall be certified as "FSC Pure" according to FSC STD-01-  
21 00 and FSC STD-40-004.  
22 1. Plywood.  
23 2. Oriented strand board.  
24 3. Particleboard underlayment.  
25 4. Hardboard underlayment.

26 **2.3 PRESERVATIVE-TREATED PLYWOOD**

- 27 A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in  
28 contact with ground, Use Category UC3b for exterior construction not in contact with ground, and  
29 Use Category UC4a for items in contact with ground.  
30 B. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities  
31 having jurisdiction.  
32 C. Application: Treat items indicated on Drawings.

33 **2.4 FIRE-RETARDANT-TREATED PLYWOOD**

- 34 A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements  
35 in this article that are acceptable to authorities having jurisdiction and with fire-test-response  
36 characteristics specified as determined by testing identical products per test method indicated by a  
37 qualified testing agency.  
38 B. Fire-Retardant-Treated Plywood by Pressure Process: Products with a flame-spread index of 25 or less  
39 when tested according to ASTM E 84, and with no evidence of significant progressive combustion when  
40 the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet  
41 beyond the centerline of the burners at any time during the test.  
42 1. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-  
43 treated plywood by pressure process after being subjected to accelerated weathering according to  
44 ASTM D 2898. Use for exterior locations and where indicated.  
45 2. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested  
46 according to ASTM D 3201/D 3201M at 92 percent relative humidity. Use where exterior type is not  
47 indicated.  
48 3. Design Value Adjustment Factors: Treated lumber plywood shall be tested according to  
49 ASTM D 5516 and design value adjustment factors shall be calculated according to ASTM D 6305.  
50 Span ratings after treatment shall be not less than span ratings specified.  
51 C. Kiln-dry material after treatment to a maximum moisture content of 15 percent.  
52 D. Identify fire-retardant-treated plywood with appropriate classification marking of qualified testing agency.  
53 E. Application: Treat [all plywood unless otherwise indicated.] [plywood indicated on Drawings.]



- 1 **2.5 WALL SHEATHING (SHTG-1)**  
2 A. Plywood Sheathing: DOC PS 1 Exterior, Structural I sheathing.
- 3 **2.6 PARAPET SHEATHING (SHTG-2)**  
4 A. Plywood Sheathing: DOC PS 1, Exterior, Structural I sheathing.
- 5 **2.7 FASTENERS**  
6 A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article  
7 for material and manufacture.  
8 1. For [roof] [parapet] [and] [wall] sheathing, provide fasteners [with hot-dip zinc coating complying  
9 with ASTM A 153/A 153M] [of Type 304 stainless steel].  
10 2. For [roof] [parapet] [and] [wall] sheathing, provide fasteners with organic-polymer or other  
11 corrosion-protective coating having a salt-spray resistance of more than 800 hours according to  
12 ASTM B 117.
- 13 **2.8 MISCELLANEOUS MATERIALS**  
14 A. Adhesives for Field Gluing Panels to Wood Framing: Formulation complying with [APA AFG-01]  
15 [ASTM D 3498] that is approved for use with type of construction panel indicated by manufacturers of both  
16 adhesives and panels.  
17 1. Adhesive shall have a VOC content of [50] [70] <Insert value> g/L or less.

18 **PART 3 - EXECUTION**

- 19 **3.1 INSTALLATION, GENERAL**  
20 A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with  
21 minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span  
22 between fewer than three support members.  
23 B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction  
24 unless otherwise indicated.  
25 C. Securely attach to substrate by fastening as indicated, complying with the following:  
26 1. Table 2304.9.1, "Fastening Schedule," in the ICC's International Building Code.  
27 2. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate  
28 Attachments," in the ICC's International Residential Code for One- and Two-Family Dwellings.  
29 3. ICC-ES evaluation report for fastener.  
30 D. Coordinate [wall] [parapet] [and] [roof] sheathing installation with flashing and joint-sealant installation so  
31 these materials are installed in sequence and manner that prevent exterior moisture from passing through  
32 completed assembly.  
33 E. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural  
34 support elements.  
35

**END OF SECTION**

**SECTION 06 40 23**  
**INTERIOR ARCHITECTURAL WOODWORK**

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- 7 1.4 [DEFINITIONS](#)
- 8 1.5 [ACTION SUBMITTALS](#)
- 9 1.6 [QUALITY ASSURANCE](#)
- 10 1.7 [DELIVERY, STORAGE, AND HANDLING](#)
- 11 1.8 [FIELD CONDITIONS](#)
- 12 1.9 [COORDINATION](#)
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- 14 2.1 [INTERIOR ARCHITECTURAL WOODWORK, GENERAL](#)
- 15 2.2 [MATERIALS, GENERAL](#)
- 16 2.3 [FIRE-RETARDANT-TREATED MATERIALS](#)
- 17 2.4 [SHELVING AND CLOTHES RODS](#)
- 18 2.5 [MISCELLANEOUS MATERIALS](#)
- 19 PART 3 – EXECUTION
- 20 3.1 [PREPARATION](#)
- 21 3.2 [INSTALLATION, GENERAL](#)
- 22 3.3 [STANDING AND RUNNING TRIM INSTALLATION](#)
- 23 3.4 [PANELING INSTALLATION](#)
- 24 3.5 [SHELVING INSTALLATION](#)
- 25 3.6 [ADJUSTING AND CLEANING](#)

26 **PART 1 - GENERAL**

27 **1.1 RELATED DOCUMENTS**

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

30 **1.2 SUMMARY**

- 31 A. Section Includes:
- 32 1. Interior trim.
  - 33 2. Shelving.
  - 34 3. Window stools.
  - 35 4. Related woodwork accessories.
- 36 B. Related Requirements:
- 37 1. Division 06 Section "Rough Carpentry" for wood furring, blocking, shims, and hanging strips  
38 required for installing woodwork and concealed within other construction before woodwork  
39 installation.
  - 40 2. Section 06 42 14 "Historic Stile and Rail Wood Paneling."

41 **1.3 PREINSTALLATION MEETINGS**

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

43 **1.4 DEFINITIONS**

- 44 A. Interior architectural woodwork includes wood furring, blocking, shims, and hanging strips for installing  
45 woodwork items unless concealed within other construction before woodwork installation.

46 **1.5 ACTION SUBMITTALS**

- 47 A. Product Data: For each type of process and factory-fabricated product.
- 48 B. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating  
49 plant that treated materials comply with requirements.
- 50

- 1 C. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details,  
2 attachment devices, and other components.  
3 1. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and  
4 reinforcement specified in other Sections.  
5 2. Show locations and sizes of cutouts and holes for plumbing fixtures, faucets, soap dispensers, and  
6 other items installed in architectural woodwork.  
7 3. Coordination of adjoining construction, trim and moldings.  
8 D. Sustainable Design Submittals:  
9 1. Product Certificates: For regional materials, indicating location of material manufacturer and point  
10 of extraction, harvest, or recovery for each raw material. Include distance to Project and cost for  
11 each regional material.  
12 2. Chain-of-Custody Certificates: For certified wood products. Include statement of costs.  
13 3. Chain-of-Custody Qualification Data: For manufacturer and vendor.  
14 4. Product Data: For installation adhesives, indicating VOC content.  
15 E. Samples: For each type of trim, board, stool and panel.  
16 F. Woodwork Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

17 **1.6 QUALITY ASSURANCE**

- 18 A. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-  
19 accredited certification body.  
20 B. Vendor Qualifications: A vendor that is certified for chain of custody by an FSC-accredited certification  
21 body.  
22 C. Installer Qualifications: Certified participant in AWI's Quality Certification Program.  
23 D. Source Limitations: Engage a qualified woodworking firm to assume undivided responsibility for  
24 production of interior architectural woodwork with sequence-matched wood veneers.  
25 1. Fabricator Qualifications: Certified participant in AWI's Quality Certification Program with not less  
26 than 10 years experience in projects of similar size.  
27 E. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality  
28 Standards" for grades of interior architectural woodwork indicated for construction, finishes, installation,  
29 and other requirements.  
30 1. Provide AWI Quality Certification Program labels or certificates indicating that woodwork, including  
31 installation, complies with requirements of grades specified.  
32 F. Fire-Test-Response Characteristics: Where fire-retardant materials or products are indicated, provide  
33 materials and products with specified fire-test-response characteristics as determined by testing identical  
34 products per test method indicated by UL, ITS, or another testing and inspecting agency acceptable to  
35 authorities having jurisdiction. Identify with appropriate markings of applicable testing and inspecting  
36 agency in the form of separable paper label or, where required by authorities having jurisdiction, imprint on  
37 surfaces of materials that will be concealed from view after installation.  
38 G. Mockup: Refer to Section 01 43 39 – Mockups for description of construction required to complete a  
39 mockup submittal for review.  
40 H. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic  
41 effects and set quality standards for materials and execution.  
42 1. Build mockups in the location and of the size indicated or, if not indicated, as directed by the  
43 Architect.  
44 2. Notify Architect seven (7) days in advance of dates and times when mockups will be fabricated and  
45 installed.  
46 3. Demonstrate the proposed range of aesthetic effects and workmanship.  
47 4. Obtain Architect's approval of mockups before starting interior architectural woodwork fabrication.  
48 5. Maintain approved mockups throughout construction in an undisturbed condition as the standard  
49 for judging completed work.  
50 6. Approved mockups may become part of the completed Work if undisturbed at time of Substantial  
51 Completion.  
52 I. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01  
53 Section "Project Management and Coordination."

54 **1.7 DELIVERY, STORAGE, AND HANDLING**

- 55 A. Protect woodwork during transit, delivery, storage, and handling to prevent damage, soilage, and  
56 deterioration.  
57 B. Do not deliver woodwork until painting and similar operations that could damage woodwork have been  
58 completed in installation areas. If woodwork must be stored in other than installation areas, store only in  
59 areas where environmental conditions comply with requirements specified in "Project Conditions" Article.

1 **1.8 FIELD CONDITIONS**

- 2 A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is  
3 complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and  
4 relative humidity between 25 and 55 percent during the remainder of the construction period.  
5 B. Field Measurements: Where woodwork is indicated to fit to other construction, verify dimensions of other  
6 construction by field measurements before fabrication, and indicate measurements on Shop Drawings.  
7 Coordinate fabrication schedule with construction progress to avoid delaying the Work.  
8 1. Locate concealed framing, blocking, and reinforcements that support woodwork by field  
9 measurements before being enclosed, and indicate measurements on Shop Drawings.

10 **1.9 COORDINATION**

- 11 A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of  
12 Work specified in other Sections to ensure that interior architectural woodwork can be supported and  
13 installed as indicated.

14 **PART 2 - PRODUCTS**

15 **2.1 INTERIOR ARCHITECTURAL WOODWORK, GENERAL**

- 16 A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for  
17 grades of interior architectural woodwork indicated for construction, finishes, installation, and other  
18 requirements.

19 **2.2 MATERIALS, GENERAL**

- 20 A. Regional Materials: The following wood products shall be manufactured within 500 miles (800 km) of  
21 Project site from materials that have been extracted, harvested, or recovered, as well as manufactured,  
22 within 500 miles (800 km) of Project site.  
23 1. Interior trim.  
24 2. Fire-rated interior door and sidelight frames.  
25 3. Interior plywood paneling.  
26 4. Shelving.  
27 5. Interior railings.  
28 B. Certified Wood: The following wood products shall be certified as "FSC Pure" according to FSC STD-01-  
29 00 and FSC STD-40-004.  
30 1. Interior trim.  
31 2. Fire-rated interior door and sidelight frames.  
32 3. Interior plywood paneling.  
33 4. Shelving.  
34 5. Interior railings.  
35 C. Composite Wood Products: Products shall be made without urea formaldehyde.  
36 D. Wood Species and Cut for Transparent Finish: Provide AWI Premium grade wood of similar grain, texture,  
37 and density to produce uniformity of color and finish throughout the complete installation of furniture,  
38 architectural woodwork, and millwork as follows:  
39 1. (WD-1) Solid: plain sliced. Refer to Material Tag List.  
40 E. Melamine-Faced Particleboard (PLSHLF-1) Particleboard complying with ANSI A208.1, Grade M-2,  
41 finished on both faces with thermally fused, melamine-impregnated decorative paper and complying with  
42 requirements of NEMA LD3, Grade VGL, for test methods 3.3, 3.4, 3.6, 3.8, and 3.10.  
43 1. Color: As selected by Architect from manufacturer's full range.

44 **2.3 FIRE-RETARDANT-TREATED MATERIALS**

- 45 A. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame-spread index of  
46 25 or less when tested according to ASTM E 84, with no evidence of significant progressive combustion  
47 when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5  
48 feet beyond the centerline of the burners at any time during the test.  
49 1. Kiln dry lumber and plywood after treatment to a maximum moisture content of 19 and 15 percent  
50 respectively.  
51 B. Identify fire-retardant-treated wood with appropriate classification marking of testing and inspecting agency  
52 acceptable to authorities having jurisdiction.  
53 1. For exposed lumber and plywood indicated to receive a stained or natural finish, mark back of each  
54 piece.

1 C. Application: All interior lumber and plywood.

2 **2.4 SHELVING AND CLOTHES RODS**

- 3 A. Shelving (WDSHLF-1): Made from one of the following materials, 3/4 inch thick.
- 4 1. Particleboard with solid-wood front edge.
  - 5 2. MDF with solid-wood front edge.
  - 6 3. MDO softwood plywood with solid-wood edge.
  - 7 4. Melamine-faced particleboard with radiused and filled front edge.
  - 8 5. Softwood Boards: Eastern white, Idaho white, lodgepole, ponderosa, radiata, or sugar pine;  
9 C Select (Choice); NeLMA, NLGA, or WWPA; kiln dried.
  - 10 6. Softwood Boards: Douglas fir-larch, Douglas fir south, or hem-fir; Superior or C & Btr finish; NLGA,  
11 WCLIB, or WWPA; or southern pine, B & B finish; SPIB; kiln dried.
- 12 B. Shelf Cleats: 3/4-by-3-1/2-inch boards, as specified above for shelving.
- 13 C. Shelf Brackets with Rod Support: BHMA A156.16, B04051; prime-painted formed steel.
- 14 D. Shelf Brackets without Rod Support: BHMA A156.16, B04041; prime-painted formed steel.
- 15 E. Closet Rods: 1-5/16-inch-diameter, chrome-plated-steel tubes complying with BHMA A156.16, L03131..

16 **2.5 MISCELLANEOUS MATERIALS**

- 17 A. Glue: Aliphatic-resin, polyurethane, or resorcinol wood glue recommended by manufacturer for general  
18 carpentry use.
- 19 1. Adhesives shall have a VOC content of 30 g/L or less.
- 20 B. Paneling Adhesive: Comply with paneling manufacturer's written recommendations for adhesives.
- 21 1. Adhesives shall have a VOC content of [50] <Insert value> g/L or less.

22 **PART 3 - EXECUTION**

23 **3.1 PREPARATION**

- 24 A. Before installing interior finish carpentry, condition materials to average prevailing humidity in installation  
25 areas for a minimum of 24 hours unless longer conditioning is recommended by manufacturer.

26 **3.2 INSTALLATION, GENERAL**

- 27 A. Install interior finish carpentry level, plumb, true, and aligned with adjacent materials. Use concealed shims  
28 where necessary for alignment.
- 29 1. Scribe and cut interior finish carpentry to fit adjoining work. Refinish and seal cuts as recommended  
30 by manufacturer.
  - 31 2. Countersink fasteners, fill surface flush, and sand unless otherwise indicated.
  - 32 3. Install to tolerance of 1/8 inch in 96 inches for level and plumb. Install adjoining interior finish  
33 carpentry with 1/32-inch maximum offset for flush installation and 1/16-inch maximum offset for  
34 reveal installation.

35 **3.3 STANDING AND RUNNING TRIM INSTALLATION**

- 36 A. Install with minimum number of joints practical, using full-length pieces from maximum lengths of lumber  
37 available. Cope at returns, miter at outside corners, and cope at inside corners to produce tight-fitting joints  
38 with full-surface contact throughout length of joint. Use scarf joints for end-to-end joints.

39 **3.4 PANELING INSTALLATION**

- 40 A. Plywood Paneling: Select and arrange panels on each wall to minimize noticeable variations in grain  
41 character and color between adjacent panels. Leave 1/4-inch gap to be covered with trim at top, bottom,  
42 and openings. Install with uniform tight joints between panels.
- 43 1. Attach panels to supports with manufacturer's recommended panel adhesive and fasteners. Space  
44 fasteners and adhesive as recommended by panel manufacturer.
  - 45 2. Conceal fasteners to greatest practical extent.
- 46 B. Hardboard Paneling: Install according to manufacturer's written recommendations. Leave 1/4-inch gap to  
47 be covered with trim at top, bottom, and openings. Butt adjacent panels with moderate contact. Use  
48 fasteners with prefinished heads matching paneling color.
- 49

- 1 C. Board Paneling: Arrange in random-width pattern suggested by manufacturer unless boards or planks are  
2 of uniform width.  
3 1. Stagger end joints in random pattern to uniformly distribute joints on each wall.  
4 2. Select and arrange boards on each wall to minimize noticeable variations in grain character and  
5 color between adjacent boards. Install with uniform tight joints between boards.  
6 3. Fasten paneling by face nailing, setting nails, and filling over nail heads.  
7 4. Fasten paneling with trim screws, set below face and filled.  
8 5. Fasten paneling by blind nailing through tongues.

9 **3.5 SHELVING INSTALLATION**

- 10 A. Cut shelf cleats at ends of shelves about 1/2 inch less than width of shelves and sand exposed ends  
11 smooth.  
12 B. Install shelf cleats by fastening to framing or backing with finish nails or trim screws, set below face and  
13 filled. Space fasteners not more than 16 inches o.c.  
14 C. Install shelf brackets according to manufacturer's written instructions, spaced not more than 32 inches o.c.  
15 Fasten to framing members, blocking, or metal backing, or use toggle bolts or hollow wall anchors.  
16 D. Cut shelves to neatly fit openings with only enough gap to allow shelves to be removed and reinstalled.  
17 Install shelves, fully seated on cleats, brackets, and supports.

18 **3.6 ADJUSTING AND CLEANING**

- 19 A. Repair damaged and defective interior architectural woodwork, where possible, to eliminate functional and  
20 visual defects. Where not possible to repair, replace interior architectural woodwork. Adjust joinery for  
21 uniform appearance.  
22 B. Clean interior architectural woodwork on exposed and semiexposed surfaces. Touch up shop-applied  
23 finishes to restore damaged or soiled areas.

24 **END OF SECTION**

SECTION 06 41 16

PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

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- 3 PART 1 – GENERAL
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24 **PART 1 - GENERAL**

25 **1.1 RELATED DOCUMENTS**

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

28 **1.2 SUMMARY**

- 29 A. Section Includes:
  - 30 1. Plastic-laminate-faced architectural cabinets.
  - 31 2. Wood furring, blocking, shims, and hanging strips for installing plastic-laminate-faced architectural
  - 32 cabinets that are not concealed within other construction.
- 33 B. Related Requirements:
  - 34 1. Section 12 36 61 "Simulated Stone Countertops."

35 **1.3 COORDINATION**

- 36 A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work
- 37 specified in other Sections to support loads imposed by installed and fully loaded cabinets.

38 **1.4 PREINSTALLATION MEETINGS**

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

40 **1.5 ACTION SUBMITTALS**

- 41 A. Product Data: For each type of product.
  - 42 1. Include data for fire-retardant treatment from chemical-treatment manufacturer and certification by
  - 43 treating plant that treated materials comply with requirements.

44

- 1 B. Sustainable Design Submittals:  
2 1. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and  
3 cost.  
4 2. Product Certificates: For regional materials, indicating location of material manufacturer and point of  
5 extraction, harvest, or recovery for each raw material. Include distance to Project and cost for each  
6 regional material.  
7 3. Chain-of-Custody Certificates: For certified wood products. Include statement of costs.  
8 4. Product Data: For adhesives, indicating that product contains no urea formaldehyde.  
9 5. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting  
10 materials.  
11 6. Product Data: For composite wood products, indicating that product contains no urea formaldehyde.  
12 7. Laboratory Test Reports: For composite wood products, indicating compliance with requirements for  
13 low-emitting materials.  
14 C. Shop Drawings: For plastic-laminate-faced architectural cabinets.  
15 1. Include plans, elevations, sections, and attachment details.  
16 2. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and  
17 reinforcement specified in other Sections.  
18 3. Show locations and sizes of cutouts and holes for items installed in plastic-laminate architectural  
19 cabinets.  
20 4. Apply AWI Quality Certification Program label to Shop Drawings.  
21 D. Samples: For each exposed product and for each color and texture specified, in manufacturer's or  
22 fabricator's standard size.  
23 1. Plastic laminates, for each color, pattern, and surface finish.  
24 2. Thermoset decorative panels, for each color, pattern, and surface finish.

25 **1.6 INFORMATIONAL SUBMITTALS**

- 26 A. Qualification Data: For fabricator.  
27 B. Product Certificates: For each type of product.  
28 C. Quality Standard Compliance Certificates: AWI Quality Certification Program.  
29 D. Evaluation Reports: For fire-retardant-treated materials, from ICC-ES.

30 **1.7 QUALITY ASSURANCE**

- 31 A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate products similar to those  
32 required for this Project and whose products have a record of successful in-service performance.  
33 1. Shop Certification: AWI's Quality Certification Program accredited participant.  
34 B. Installer Qualifications: Fabricator of products.

35 **1.8 DELIVERY, STORAGE, AND HANDLING**

- 36 A. Do not deliver cabinets until painting and similar finish operations that might damage architectural cabinets  
37 have been completed in installation areas. Store cabinets in installation areas or in areas where  
38 environmental conditions comply with requirements specified in "Field Conditions" Article.

39 **1.9 FIELD CONDITIONS**

- 40 A. Environmental Limitations: Do not deliver or install cabinets until building is enclosed, wet-work is complete,  
41 and HVAC system is operating and maintaining temperature and relative humidity at levels planned for  
42 building occupants during the remainder of the construction period.

43 **PART 2 - PRODUCTS**

44 **2.1 PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS**

- 45 A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for  
46 grades of cabinets indicated for construction, finishes, installation, and other requirements.  
47 1. Provide inspections of fabrication and installation together with labels and certificates from AWI  
48 certification program indicating that woodwork complies with requirements of grades specified.  
49 2. The Contract Documents contain requirements that are more stringent than the referenced quality  
50 standard. Comply with requirements of Contract Documents in addition to those of the referenced  
51 quality standard.  
52 B. Grade: Premium.  
53



- 1 C. Regional Materials: Wood products shall be manufactured within 500 miles (800 km) of Project site from  
2 materials that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles (800  
3 km) of Project site.
- 4 D. Certified Wood: Wood products shall be certified as "FSC Pure" according to FSC STD-01-001 and FSC  
5 STD-40-004.
- 6 E. Type of Construction: Frameless.
- 7 F. Door and Drawer-Front Style: Flush overlay.
- 8 G. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or if not indicated, as required by  
9 quality standard.
  - 10 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products  
11 that may be incorporated into the Work include, but are not limited to, the following:
    - 12 a. Formica Corporation.
    - 13 b. Pionite: a Panolam Industries International, Inc. brand.
    - 14 c. Wilsonart International Holdings, Inc.
- 15 H. Laminate Cladding for Exposed Surfaces (PLAM-#):
  - 16 1. Refer to Material Tag Index.
  - 17 2. Horizontal Surfaces: Grade HGS.
  - 18 3. Vertical Surfaces: Grade VGS.
- 19 I. Materials for Semiexposed Surfaces:
  - 20 1. Surfaces Other Than Drawer Bodies: Thermoset decorative panels.
  - 21 2. Drawer Sides and Backs: Solid-hardwood lumber.
  - 22 3. Drawer Bottoms: Hardwood plywood.
- 23 J. Dust Panels: 1/4-inch plywood or tempered hardboard above compartments and drawers unless located  
24 directly under tops.
- 25 K. Concealed Backs of Panels with Exposed Plastic-Laminate Surfaces: High-pressure decorative laminate,  
26 NEMA LD 3, Grade BKL.
- 27 L. Drawer Construction: Fabricate with exposed fronts fastened to subfront with mounting screws from interior  
28 of body.
  - 29 1. Join subfronts, backs, and sides with glued rabbeted joints supplemented by mechanical fasteners  
30 or glued dovetail joints.
- 31 M. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed  
32 laminate surfaces complying with the selected material.

## 33 2.2 WOOD MATERIALS

- 34 A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each  
35 type of architectural cabinet and quality grade specified unless otherwise indicated.
  - 36 1. Wood Moisture Content: 5 to 10 percent.
- 37 B. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of referenced  
38 quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.
  - 39 1. Recycled Content of MDF and Particleboard: Postconsumer recycled content plus one-half of  
40 preconsumer recycled content not less than 100 percent.
- 41 C. Composite Wood Products: Products shall be made without urea formaldehyde.
- 42 D. Composite Wood Products: Products shall comply with the testing and product requirements of the California  
43 Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical  
44 Emissions from Indoor Sources Using Environmental Chambers."
  - 45 1. Medium-Density Fiberboard (MDF): ANSI A208.2, Grade 130.
  - 46 2. Particleboard: ANSI A208.1, Grade M-2.
  - 47 3. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1.
  - 48 4. Thermoset Decorative Panels: Particleboard or MDF finished with thermally fused, melamine-  
49 impregnated decorative paper and complying with requirements of NEMA LD 3, Grade VGL, for Test  
50 Methods 3.3, 3.4, 3.6, 3.8, and 3.10.

## 51 2.3 FIRE-RETARDANT-TREATED MATERIALS

- 52 A. Fire-Retardant-Treated Materials, General: Where fire-retardant-treated materials are indicated, use  
53 materials that are acceptable to authorities having jurisdiction and with fire-test-response characteristics  
54 specified as determined by testing identical products per test method indicated by a qualified testing agency.
  - 55 1. Identify fire-retardant-treated materials with appropriate classification marking of qualified testing  
56 agency in the form of removable paper label or imprint on surfaces that will be concealed from view  
57 after installation.

- 1 B. Fire-Retardant-Treated Lumber and Plywood: Products with a flame-spread index of 25 or less when tested  
2 according to ASTM E 84, with no evidence of significant progressive combustion when the test is extended  
3 an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline  
4 of the burners at any time during the test.  
5 1. Kiln-dry lumber and plywood after treatment to a maximum moisture content of 19 and 15 percent,  
6 respectively.

7 **2.4 CABINET HARDWARE AND ACCESSORIES**

- 8 A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets except  
9 for items specified in Section 08 71 00 "Door Hardware."  
10 1. Doug Mockett, DP105A/2.  
11 2. Finish: 26M Matte Chrome.  
12 3. Size 4-3/16" 3/8" profile.  
13 B. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for  
14 BHMA finish numbers indicated:  
15 1. Satin Chrome: BHMA 626 /652.  
16 2. Satin Stainless Steel: BHMA 630.  
17 3. For concealed hardware, provide manufacturer's standard finish that complies with product class  
18 requirements in BHMA A156.9.  
19 C. For concealed hardware, provide manufacturer's standard finish that complies with product class  
20 requirements in BHMA A156.9.  
21 D. Frameless Concealed Hinges (European Type): Totally concealed spring-activated, self-closing European  
22 type cabinet hinges for vertical, horizontal, and depth adjustment, not less than 165 degrees opening, except  
23 provide 90 degree opening where door may strike adjacent walls or cabinets. Nickel plated.  
24 1. Acceptable manufacturers and products:  
25 a. Hafele America, Co; Duomatic #0.329.06.  
26 b. Grass America, Inc.; #3903.  
27 c. Hettich America; Euromat Topsafe #4955.  
28 E. Center Pivot Hinges: Totally concealed spring-activated, self-closing European type cabinet hinges for  
29 Trash / Recycling Containers. Nickel plated.  
30 1. Acceptable manufacturers and products:  
31 a. E.R. Butler & Co Manufacturing.  
32 F. Back-Mounted Pulls: Ives #026 Bar Window Lift; finish Aluminum #A92.  
33 1. Drawers: Horizontal installation.  
34 2. Doors: Vertical installation.  
35 G. Adjustable Shelf Standards and Supports: BHMA A156.9, B04071; with shelf rests, B04081.  
36 H. Drawer Slides: BHMA A156.9, B05091.  
37 1. Heavy Duty (Grade 1HD-100 and Grade 1HD-200): Side mounted; full-extension type; zinc-plated  
38 steel ball-bearing slides.  
39 2. Box Drawer Slides: Grade 1HD-100; for drawers not more than 6 inches high and 24 inches wide.  
40 3. File Drawer Slides: Grade 1HD-200; for drawers more than 6 inches high or 24 inches wide.  
41 4. Pencil Drawer Slides: Grade 1; for drawers not more than 3 inches high and 24 inches wide.  
42 5. Keyboard Slides: Grade 1HD-100; for computer keyboard shelves.  
43 6. Trash Bin Slides: Grade 1HD-200; for trash bins not more than 20 inches high and 16 inches wide.  
44 I. Door Locks: BHMA A156.11, E07121.  
45 J. Drawer Locks: BHMA A156.11, E07041.  
46 K. Hanging Hardware for Wood Ceiling Panels: Refer to Section 05 50 00 for steel rod supports:  
47 1. Provide wire connections and bolts as indicated on drawings capable of supporting panels without  
48 deflection or sway.  
49 L. Grommets for Cable Passage through Countertops (MA-3): Size: 7-3/32" x 1-25/32" overall fitting into a slot  
50 6-7/8" x 1-9/16" square. 3/4" deep.  
51 1. Product: Subject to compliance with requirements, provide product by Doug Mockett & Company,  
52 Inc. Refer to Material Tag Index.  
53 2. Finish: Per Materials List.  
54

- 1 M. Moldings and Trim:  
2 1. 'J' Molding  
3 a. Manufacturer: Fry Reglet.  
4 b. Product Number: JDM-50-50.  
5 c. Finish: Clear Anodized Aluminum.  
6 2. 'X' Molding  
7 a. Manufacturer: Fry Reglet.  
8 b. Product Number: XDM-50-50.  
9 c. Finish: Clear Anodized Aluminum.  
10 3. Reveal Channel Screed  
11 a. Manufacturer: Fry Reglet.  
12 b. Product Number: DCS-50-V-50 (1/2" reveal depth x 1/2" reveal width).  
13 c. Finish: Clear Anodized Aluminum

14 **2.5 MISCELLANEOUS MATERIALS**

- 15 A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln-dried to less than 15  
16 percent moisture content.  
17 B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide  
18 metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip  
19 galvanized anchors and inserts at inside face of exterior walls and at floors.  
20 C. Adhesives: Do not use adhesives that contain urea formaldehyde.  
21 D. Adhesives: Use adhesives that meet the testing and product requirements of the California Department of  
22 Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions  
23 from Indoor Sources Using Environmental Chambers."  
24 E. Adhesive for Bonding Plastic Laminate: Unpigmented contact cement.  
25 1. Adhesive for Bonding Edges: Hot-melt adhesive or adhesive specified above for faces.

26 **2.6 FABRICATION**

- 27 A. Fabricate architectural cabinets to dimensions, profiles, and details indicated.  
28 B. Complete fabrication, including assembly and hardware application, to maximum extent possible before  
29 shipment to Project site. Disassemble components only as necessary for shipment and installation. Where  
30 necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.  
31 1. Notify Architect seven days in advance of the dates and times architectural cabinet fabrication will be  
32 complete.  
33 2. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels,  
34 screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify  
35 that various parts fit as intended and check measurements of assemblies against field measurements  
36 before disassembling for shipment.  
37 C. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar  
38 items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized  
39 and shaped openings. Sand edges of cutouts to remove splinters and burrs.  
40 D. Grade: Unless otherwise indicated, provide Premium-grade interior woodwork complying with referenced  
41 quality standard.  
42 E. Wood Moisture Content: Comply with requirements of referenced quality standard for wood moisture content  
43 in relation to ambient relative humidity during fabrication and in installation areas.  
44 F. Sand fire-retardant-treated wood lightly to remove raised grain on exposed surfaces before fabrication.  
45 G. Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the  
46 following:  
47 1. Corners of Cabinets and Edges of Solid-Wood (Lumber) Members 3/4 Inch Thick or Less: 1/16 inch.  
48 Edges of Rails and Similar Members More Than 3/4 Inch Thick: 1/8 inch.  
49 2. Corners of Cabinets and Edges of Solid-Wood (Lumber) Members and Rails: 1/16 inch.  
50 H. Complete fabrication, including assembly and hardware application, to maximum extent possible before  
51 shipment to Project site. Disassemble components only as necessary for shipment and installation. Where  
52 necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.  
53 I. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar  
54 items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately  
55 sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

1 **PART 3 - EXECUTION**

2 **3.1 PREPARATION**

- 3 A. Before installation, condition cabinets to humidity conditions in installation areas for not less than 72 hours.

4 **3.2 INSTALLATION**

- 5 A. Grade: Install cabinets to comply with quality standard grade of item to be installed.  
6 B. Assemble cabinets and complete fabrication at Project site to extent that it was not completed in the shop.  
7 C. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with wafer-head  
8 cabinet installation screws.  
9 D. Install cabinets level, plumb, and true in line to a tolerance of 1/8 inch in 96 inches using concealed shims.  
10 1. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.  
11 2. Install cabinets without distortion so doors and drawers fit openings and are accurately aligned.  
12 Adjust hardware to center doors and drawers in openings and to provide unencumbered operation.  
13 Complete installation of hardware and accessory items as indicated.  
14 3. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches o.c.  
15 with No. 10 wafer-head screws sized for not less than 1-1/2-inch penetration into wood framing,  
16 blocking, or hanging strips and toggle bolts through metal backing or metal framing behind wall finish  
17 where no blocking.

18 **3.3 ADJUSTING AND CLEANING**

- 19 A. Repair damaged and defective cabinets, where possible, to eliminate functional and visual defects. Where  
20 not possible to repair, replace architectural cabinets. Adjust joinery for uniform appearance.  
21 B. Clean, lubricate, and adjust hardware.  
22 C. Clean cabinets on exposed and semi-exposed surfaces.

23 **END OF SECTION**

SECTION 06 46 00

WOOD TRIM

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- 22 3.3 [ADJUSTING AND CLEANING](#)

23 **PART 1 - GENERAL**

24 **1.1 RELATED DOCUMENTS**

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

27 **1.2 SUMMARY**

- 28 A. Section Includes:
- 29 1. Interior standing and running trim.
  - 30 2. Wood furring, blocking, shims, and hanging strips for installing woodwork items unless concealed  
31 within other construction before woodwork installation.
  - 32 3. Shop finishing of wood trim. Refer to 09 93 00

33 **1.3 ACTION SUBMITTALS**

- 34 A. Product Data: For each type of product, including panel products fire-retardant-treated materials and  
35 finishing materials and processes.
- 36 B. Sustainable Design Submittals:
- 37 1. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content  
38 and cost.
  - 39 2. Product Certificates: For regional materials, indicating location of material manufacturer and point  
40 of extraction, harvest, or recovery for each raw material. Include distance to Project and cost for  
41 each regional material.
  - 42 3. Chain-of-Custody Certificates: For certified wood products. Include statement of costs.
  - 43 4. Product Data: For adhesives, indicating that product contains no urea formaldehyde.
  - 44 5. Product Data: For composite wood products, indicating that product contains no urea  
45 formaldehyde.
  - 46 6. Product Data: For installation adhesives, indicating VOC content.
  - 47 7. Laboratory Test Reports: For installation adhesives, indicating compliance with requirements for  
48 low-emitting materials.
- 49 C. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details,  
50 attachment devices, and other components.
- 51

- 1 D. Samples:
- 2 1. Lumber for transparent finish, for each species and cut, finished on one side and one edge.
- 3 2. Lumber and panel products with shop-applied opaque finish, for each finish system and color, with
- 4 exposed surface finished.
- 5 **1.4 INFORMATIONAL SUBMITTALS**
- 6 A. Woodwork Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.
- 7 **1.5 QUALITY ASSURANCE**
- 8 A. Fabricator Qualifications: Certified participant in AWI's Quality Certification Program.
- 9 B. Installer Qualifications: Certified participant in AWI's Quality Certification Program.
- 10 C. Mockup: Refer to Section 01 43 39 – Mockups for description of construction required to complete a
- 11 mockup submittal for review.
- 12 1. New interior wood feature wall types WDF-1 and AWP-3 and junction with storefront framing: Each
- 13 type to consist of two 4ft wide x 8ft high panels starting at floor finish, with one vertical edge
- 14 intersection with storefront system GLWS-5.
- 15 **1.6 DELIVERY, STORAGE, AND HANDLING**
- 16 A. Do not deliver wood trim until operations that could damage wood trim have been completed in installation
- 17 areas. If wood trim must be stored in other than installation areas, store only in areas where environmental
- 18 conditions comply with requirements specified in "Field Conditions" Article.
- 19 **1.7 FIELD CONDITIONS**
- 20 A. Environmental Limitations for Interior Work: Do not deliver or install interior wood trim until building is
- 21 enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative
- 22 humidity at occupancy levels during the remainder of the construction period.
- 23 **1.8 COORDINATION**
- 24 A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of
- 25 Work specified in other Sections to ensure that wood trim can be supported and installed as indicated.
- 26 **PART 2 - PRODUCTS**
- 27 **2.1 WOOD TRIM, GENERAL**
- 28 A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for
- 29 grades of wood trim indicated for construction, finishes, installation, and other requirements.
- 30 1. Provide labels and certificates from AWI certification program indicating that woodwork, including
- 31 installation, complies with requirements of grades specified.
- 32 **2.2 WOOD MATERIALS**
- 33 A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each
- 34 type of wood trim and quality grade specified unless otherwise indicated.
- 35 1. Wood Moisture Content for Interior Materials: 5 to 10 percent.
- 36 B. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of referenced
- 37 quality standard for each type of wood trim and quality grade specified unless otherwise indicated.
- 38 1. Recycled Content of MDF and Particleboard: Postconsumer recycled content plus one-half of
- 39 preconsumer recycled content not less than 50 percent.
- 40 C. Composite Wood Products: Products shall be made without urea formaldehyde.
- 41 1. Medium-Density Fiberboard: ANSI A208.2, Grade 130
- 42 Particleboard: ANSI A208.1, Grade M-2.
- 43 3. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1.
- 44 4. Thermoset Decorative Panels: Particleboard or medium-density fiberboard finished with thermally
- 45 fused, melamine-impregnated decorative paper and complying with requirements of NEMA LD 3,
- 46 Grade VGL, for test methods 3.3, 3.4, 3.6, 3.8, and 3.10.

1 **2.3 FIRE-RETARDANT-TREATED MATERIALS**

- 2 A. Fire-Retardant-Treated Materials, General: Where fire-retardant-treated materials are indicated, use  
3 materials complying with requirements in this article that are acceptable to authorities having jurisdiction  
4 and with fire-test-response characteristics specified as determined by testing identical products per test  
5 method indicated by a qualified testing agency.  
6 1. Identify fire-retardant-treated materials with appropriate classification marking of qualified testing  
7 agency in the form of removable paper label or imprint on surfaces that will be concealed from view  
8 after installation.  
9 B. Fire-Retardant-Treated Lumber: Products with a flame-spread index of 25 or less when tested according to  
10 ASTM E 84, with no evidence of significant progressive combustion when the test is extended an  
11 additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of  
12 the burners at any time during the test.  
13 1. For exterior applications, use materials that comply with testing requirements after being subjected  
14 to accelerated weathering according to ASTM D 2898.  
15 2. Kiln dry lumber after treatment to a maximum moisture content of 19 percent.

16 **2.4 MISCELLANEOUS MATERIALS**

- 17 A. Interior Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln dried to less than  
18 15 percent moisture content.  
19 B. Provide self-drilling screws for metal-framing supports.  
20 C. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide  
21 metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip  
22 galvanized anchors and inserts at inside face of exterior walls and at floors.  
23 D. Handrail Brackets: Cast from malleable iron with wall flange drilled and tapped for concealed hanger bolt  
24 and with support arm for screwing to underside of rail. Sized to provide 1-1/2-inch clearance between  
25 handrail and wall.  
26 E. Handrail/Bumper Rail Brackets: Pairs of extruded-aluminum channels; one for fastening to back of rail and  
27 one for fastening to face of wall. They are then assembled in overlapping fashion and fastened together  
28 top and bottom with self-tapping screws. Sized to provide 1-1/2-inch clearance between handrail and wall.  
29 F. Adhesives: Do not use adhesives that contain urea formaldehyde.  
30 1. Adhesives shall have a VOC content of 70 g/L or less.

31 **2.5 FABRICATION**

- 32 A. Sand fire-retardant-treated wood lightly to remove raised grain on exposed surfaces before fabrication.  
33 B. Fabricate wood trim to dimensions, profiles, and details indicated. Ease edges to radius indicated for the  
34 following:  
35 1. Edges of Solid-Wood (Lumber) Members: 1/16 inch unless otherwise indicated.  
36 2. Edges of Rails and Similar Members More Than 3/4 Inch Thick: 1/8 inch.  
37 C. Backout or groove backs of flat trim members and kerf backs of other wide, flat members except for  
38 members with ends exposed in finished work.  
39 D. Assemble casings in shop except where shipping limitations require field assembly.

40 **2.6 SHOP PRIMING**

- 41 A. Interior Wood Trim for Transparent Finish: Shop seal with stain (if required), other required pretreatments,  
42 and first coat of finish as specified in Section 09 93 00 "Staining and Transparent Finishing."  
43 B. Preparations for Finishing: Comply with referenced quality standard for sanding, filling countersunk  
44 fasteners, sealing concealed surfaces, and similar preparations for finishing wood trim, as applicable to  
45 each unit of work.  
46 1. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed  
47 surfaces of wood trim. Apply two coats to surfaces installed in contact with concrete or masonry  
48 and to end-grain surfaces.

49 **2.7 SHOP FINISHING**

- 50 A. General: Finish wood trim at fabrication shop as specified in this Section. Defer only final touchup,  
51 cleaning, and polishing until after installation.  
52 B. General: Drawings indicate items that are required to be shop finished. Finish such items at fabrication  
53 shop as specified in this Section. Refer to Section 09 93 00 "Staining and Varnishes" for field finishing  
54 wood trim not indicated to be shop finished.  
55 C. Preparation for Finishing: Comply with referenced quality standard for sanding, filling countersunk  
56 fasteners, sealing concealed surfaces, and similar preparations for finishing wood trim, as applicable to  
57 each unit of work.

- 1 1. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed  
2 surfaces of wood trim. Apply two coats to end-grain surfaces.  
3 D. Transparent Finish for Interior Trim: Refer to Section 09 93 00.  
4 1. Grade: Premium.

5 **PART 3 - EXECUTION**

6 **3.1 PREPARATION**

- 7 A. Before installation, condition wood trim to average prevailing humidity conditions in installation areas.

8 **3.2 INSTALLATION**

- 9 A. Grade: Install wood trim to comply with same grade as item to be installed.  
10 B. Install wood trim level, plumb, true, and straight. Shim as required with concealed shims. Install level and  
11 plumb to a tolerance of 1/8 inch in 96 inches.  
12 C. Scribe and cut wood trim to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.  
13 D. Fire-Retardant-Treated Wood: Handle, store, and install fire-retardant-treated wood to comply with  
14 chemical treatment manufacturer's written instructions, including those for adhesives used to install  
15 woodwork.  
16 E. Preservative-Treated Wood: Where cut or drilled in field, treat cut ends and drilled holes according to  
17 AWPA M4.  
18 F. Anchor wood trim to anchors or blocking built in or directly attached to substrates. Secure with  
19 countersunk, concealed fasteners and blind nailing. Use fine finishing nails or finishing screws for exposed  
20 fastening, countersunk and filled flush with woodwork.  
21 1. For shop-finished items, use filler matching finish of items being installed.  
22 G. Standing and Running Trim: Install with minimum number of joints possible, using full-length pieces (from  
23 maximum length of lumber available) to greatest extent possible. Do not use pieces less than 36 inches  
24 long except where shorter single-length pieces are necessary. Scarf running joints and stagger in adjacent  
25 and related members.  
26 1. Install wall railings on indicated metal brackets securely fastened to wall framing.  
27 2. Install standing and running trim with no more variation from a straight line than 1/8 inch in 96  
28 inches.

29 **3.3 ADJUSTING AND CLEANING**

- 30 A. Repair damaged and defective wood trim, where possible, to eliminate functional and visual defects;  
31 where not possible to repair, replace wood trim. Adjust joinery for uniform appearance.  
32 B. Clean wood trim on exposed and semiexposed surfaces. Touch up shop-applied finishes to restore  
33 damaged or soiled areas.  
34

**END OF SECTION**



SECTION 07 01 50.19  
PREPARATION FOR REROOFING

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- 5 1.2 SUMMARY
- 6 1.3 DEFINITIONS
- 7 1.4 ACTION SUBMITTALS
- 8 1.5 INFORMATIONAL SUBMITTALS
- 9 1.6 QUALITY ASSURANCE
- 10 1.7 PRECONSTRUCTION TESTING
- 11 1.8 FIELD CONDITIONS
- 12 PART 2 – PRODUCTS
- 13 2.1 SUBSTRATE BOARDS (DECK UNDERLAYMENT
- 14 2.2 INFILL AND REPLACEMENT MATERIALS
- 15 2.3 AUXILIARY REROOFING MATERIALS
- 16 PART 3 – EXECUTION
- 17 3.1 PREPARATION
- 18 3.2 ROOF TEAR-OFF
- 19 3.3 DECK PREPARATION
- 20 3.4 BASE FLASHING REMOVAL
- 21 3.5 DISPOSAL

22 **PART 1 - GENERAL**

23 **1.1 RELATED DOCUMENTS**

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

26 **1.2 SUMMARY**

- 27 A. Section Includes:
  - 28 1. Full tear-off of entire roof.
  - 29 2. Removal of base flashings.
- 30 B. Related Requirements:
  - 31 1. Section 06 10 00 – Rough Carpentry: Roof curbs and roof blocking.
  - 32 2. Section 06 15 16 – Wood Roof Decking: Decking replacement material.
  - 33 3. Section 07 52 13 - Modified Bituminous Roofing (APP): New roof system.
  - 34 4. Section 07 52 16 - Modified bituminous Roofing (SBS): New roof system.
  - 35 5. Section 07 71 00 - Roof Specialties: For reglets and counterflashing repair materials.

36 **1.3 DEFINITIONS**

- 37 A. Roofing Terminology: Definitions in ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and
- 38 Waterproofing Manual" apply to work of this Section.
- 39 B. Full Roof Tear-Off: Removal of existing roofing system from deck.

40 **1.4 ACTION SUBMITTALS**

- 41 A. Product Data: For each type of product.
- 42 B. Shop Drawings: Include plans, sections, and details.

43 **1.5 INFORMATIONAL SUBMITTALS**

- 44 A. Photographs or Videotape: Show existing conditions of adjoining construction and site improvements,
- 45 including exterior and interior finish surfaces that might be misconstrued as having been damaged by
- 46 reroofing operations. Submit before Work begins.
- 47 B. Landfill Records: Indicate receipt and acceptance of demolished roofing materials by a landfill facility
- 48 licensed to accept them.
- 49 C. Preconstruction Test Reports.

50 **1.6 QUALITY ASSURANCE**

- 51 A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning roofing
- 52 removal. Comply with hauling and disposal regulations of authorities having jurisdiction.

- 1 B. Reroofing Conference: Conduct conference at Project site.  
2 1. Meet with Owner; Architect; Owner's insurer if applicable; testing and inspecting agency  
3 representative; roofing system manufacturer's representative; roofing Installer, including project  
4 manager, superintendent, and foreman; and installers whose work interfaces with or affects  
5 reroofing, including installers of roof deck, roof accessories, and roof-mounted equipment.  
6 2. Review methods and procedures related to roofing system tear-off, including, but not limited to, the  
7 following:  
8 a. Temporary protection requirements for existing roofing system components that are to  
9 remain.  
10 b. Existing roof drains and roof drainage during each stage of work, and roof-drain plugging and  
11 plug removal.  
12 c. Construction schedule and availability of materials, Installer's personnel, equipment, and  
13 facilities needed to avoid delays.  
14 d. Existing roof deck conditions requiring notification of Architect. Coordination of roof deck  
15 repair required.  
16 e. Condition and acceptance of existing roof deck and base flashing substrate for reuse.  
17 f. Structural loading limitations of roof deck during reroofing.  
18 g. Shutdown of fire-suppression, -protection, and -alarm and -detection systems.  
19 h. Governing regulations and requirements for insurance and certificates if applicable.  
20 i. Existing conditions that may require notification of Architect before proceeding.

21 **1.7 PRECONSTRUCTION TESTING**

- 22 A. Preconstruction Testing Service: Owner shall engage a qualified testing agency to perform preconstruction  
23 testing on the existing wood deck for penetration withdrawal of fasteners.  
24 1. The sections of the substrate where integrity is most in question shall be used for testing. Test areas  
25 shall include corners, drain areas, and perimeters.  
26 2. The minimum number of pullout test shall be 20.  
27 3. Minimum acceptable pull-out resistance is 300 lbs. (136.1 Kg) pullout.  
28 B. Preconstruction Testing: Performed by a qualified testing agency.

29 **1.8 FIELD CONDITIONS**

- 30 A. Existing Roofing System: Built-up asphalt roofing and built-up coal-tar "pitch" roofing.  
31 B. Owner will occupy portions of building immediately below reroofing area. Conduct reroofing so Owner's  
32 operations are not disrupted. Provide Owner with not less than 72 hours' notice of activities that may affect  
33 Owner's operations.  
34 C. Protect building to be reroofed, adjacent buildings, walkways, site improvements, exterior plantings, and  
35 landscaping from damage or soiling from reroofing operations.  
36 D. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities.  
37 E. Conditions existing at time of inspection for bidding shall be maintained by Owner as far as practical.  
38 F. Limit construction loads on roof to 30 PSF for uniformly distributed loads.  
39 G. Weather Limitations: Proceed with reroofing preparation only when existing and forecasted weather  
40 conditions permit Work to proceed without water entering existing roofing system or building.  
41 1. Remove only as much roofing in one day as can be made watertight in the same day.

42 **PART 2 - PRODUCTS**

43 **2.1 SUBSTRATE BOARDS (DECK UNDERLAYMENT)**

- 44 A. Substrate Board (Wood Deck Assembly):

45 **2.2 INFILL AND REPLACEMENT MATERIALS**

- 46 A. Wood blocking, curbs, and nailers are specified in Section 06 10 00 "Rough Carpentry."  
47 B. Lumber roof deck is specified in Section 06 15 16 "Wood Roof Decking."

48 **2.3 AUXILIARY REROOFING MATERIALS**

- 49 A. General: Use auxiliary reroofing preparation materials recommended by roofing system manufacturer for  
50 intended use and compatible with components of new roofing system.

1 **PART 3 - EXECUTION**

2 **3.1 PREPARATION**

- 3 A. Shut off rooftop utilities and service piping before beginning the Work.  
4 B. Test existing roof drains to verify that they are not blocked or restricted. Immediately notify Architect of any  
5 blockages or restrictions.  
6 C. During removal operations, have sufficient and suitable materials on-site to facilitate rapid installation of  
7 temporary protection in the event of unexpected rain.  
8 D. Maintain roof drains in functioning condition to ensure roof drainage at end of each workday. Prevent debris  
9 from entering or blocking roof drains and conductors. Use roof-drain plugs specifically designed for this  
10 purpose. Remove roof-drain plugs at end of each workday, when no work is taking place, or when rain is  
11 forecast.  
12 1. If roof drains are temporarily blocked or unserviceable due to roofing system removal or partial  
13 installation of new roofing system, provide alternative drainage method to remove water and  
14 eliminate ponding.

15 **3.2 ROOF TEAR-OFF**

- 16 A. Remove loose aggregate from aggregate-surfaced built-up bituminous roofing using a power broom.  
17 B. Full Roof Tear-Off: Remove existing roofing and other roofing system components down to the roof deck.  
18 1. Remove fasteners from deck or cut fasteners off slightly above deck surface.

19 **3.3 DECK PREPARATION**

- 20 A. Inspect wood deck after tear-off of roofing system. Obtain Architect's authorization before proceeding.  
21 B. Do not proceed with Work until wood deck repair/construction have been accomplished and approved.

22 **3.4 BASE FLASHING REMOVAL**

- 23 A. Remove existing base flashings. Clean substrates of contaminants, such as asphalt, sheet materials, dirt,  
24 and debris.  
25 B. Do not damage metal counterflashings that are to remain. Replace metal counterflashings damaged during  
26 removal with counterflashings specified in Section 07 71 00 "Roof Specialties."  
27 C. Inspect parapet sheathing, wood blocking, curbs, and nailers for deterioration and damage. If parapet  
28 sheathing, wood blocking, curbs, or nailers have deteriorated, immediately notify Architect.

29 **3.5 DISPOSAL**

- 30 A. Recycling:  
31 1. Contractor shall divert all of the following materials from disposal at the landfill  
32 a. Metals including edge metal, copings, counter flashings, expansion /control joint covers, and  
33 all non-contaminated metal pails.  
34 b. Plastics, including packaging materials, pails, and containers  
35 c. Cardboard, including packaging materials and roll cores  
36 d. Wood, including demolished nailers, demolished plywood, demolished wood plank decking,  
37 damaged pallets, and new wood or plywood scrap and pieces  
38 2. Contractor shall package the debris as required by the recycler  
39 3. Contractor shall transport the debris to approved recyclers.  
40 4. Pallets in a condition to be reused shall not be land filled.  
41 5. Metal or plastic pails and containers that are contaminated with adhesive, mastic, coatings, and  
42 similar materials are excluded.  
43 B. Collect demolished materials and place in containers. Promptly dispose of demolished materials. Do not  
44 allow demolished materials to accumulate on-site.  
45 1. Storage or sale of demolished items or materials on-site is not permitted.  
46 C. Transport and legally dispose of demolished materials off Owner's property.

47 **END OF SECTION**

SECTION 07 01 90.71  
HISTORIC SEALANT REHABILITATION

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PART 1 – GENERAL

- 1.1 SUMMARY OF WORK
- 1.2 QUALITY CONTROL
- 1.3 SUBMITTALS
- 1.4 MATERIAL HANDLING
- 1.5 WARRANTIES

PART 2 – PRODUCTS

- 2.1 MANUFACTURERS
- 2.2 MATERIALS
- 2.3 TYPICAL PERFORMANCE CHARACTERISTICS

PART 3 – EXECUTION

- 3.1 EXAMINATION
- 3.2 SEQUENCING/SCHEDULING
- 3.3 SUBSTRATE PREPARATION
- 3.4 SEALANT APPLICATION – SINGLE STAGE
- 3.5 SEALANT APPLICATION – TWO STAGE

**PART 1 - GENERAL**

**1.1 SUMMARY OF WORK**

- A. This Section includes all labor, materials and equipment necessary to perform the following Work:
  - 1. Removal of all existing caulking/sealant to be replaced.
  - 2. Preparation of all surfaces to receive new sealant work.
  - 3. Application of the joint waterproofing sealant.
  - 4. Clean up.

**1.2 QUALITY CONTROL**

- A. The Manufacturer of the sealant system shall have a minimum of five (5) years experience in the manufacture of waterproof coatings and sealants.

**1.3 SUBMITTALS**

- A. Manufacturer's Literature: Submit three (3) complete sets of Manufacturer's literature and technical data for the sealant system.
- B. Contractor's Certificate: Submit copies of "Licensed Applicator's Certificate" issued by the Manufacturer.
- C. A total of three (3) copies of each submittal is required, unless noted otherwise.

**1.4 MATERIAL HANDLING**

- A. Delivery and Storage of Materials
  - 1. Deliver all materials in their original unopened containers with all markings intact.
  - 2. All materials must be stored in a dry place or otherwise protected from water or extreme humidity.
  - 3. Stack material on pallets at least 4" above the ground and cover with a breathable covering, such as canvas.
  - 4. Store sealants in the manner and temperature range recommended by the Manufacturer.
- B. Handling Materials
  - 1. Do not store or transport materials on the roof in a manner that may exceed the live load capacity of the deck system or the structure. The Architect, during routine inspections, may make recommendations as to loading.
  - 2. Do not transport materials over or store materials on a finished section without prior approval of Architect.

1 **1.5 WARRANTIES**

- 2 A. The sealant Manufacturer and the Contractor shall warrant the performance of the sealant system  
3 for a period of five (5) years starting from the date of acceptance by the Architect. Such warranty  
4 shall include material as well as labor for application. Damage and/or failure due to acts of God  
5 and vandalism, may be excluded from such warranty.  
6

7 **PART 2 - PRODUCTS**

8  
9 **2.1 MANUFACTURERS**

- 10 A. Provide materials from the following Manufacturers:  
11 1. EMSEAL Joint Systems, Ltd.  
12 2. SIKA Corp.  
13 3. BASF Corp.  
14 4. Tremco, Inc.  
15 5. Soudal  
16 B. Materials shall meet all specified standards.  
17 C. All materials shall be new unless noted otherwise.  
18 D. New materials shall not contain asbestos.  
19

20 **2.2 MATERIALS**

- 21 A. Sealant: A hybrid multi-component chemically curing polyurethane joint sealant meeting the  
22 requirements of ASTM C920 Type M or S, Grade NS. Sealant material shall be polyurethane  
23 elastomer based, meeting or exceeding minimum physical properties as listed in Section 2.3, and  
24 capable of producing a seamless waterproof joint seal. Color shall be chosen to most closely  
25 match that of the adjacent limestone/masonry, or, non-staining and no-tack, soft type with high  
26 elongation properties and shall be so designated on the label by the Manufacturer such as "Sikaflex  
27 1a" by SIKA Corp., "Sikaflex - 2c NS" (Class 25) by SIKA Corp., "MasterSeal NP1" (Class 35) by  
28 BASF Corp., "DynaTrol II" (Class 50) by Pecora Corp., "Dymonic" (Class 25) by Tremco, Inc. or  
29 "SoudaSeal AP" (Class 35) by Soudal. Follow all Manufacturers' previously submitted  
30 recommendations for type required at joints. Use non-sag at all joints. All sealants must take latex  
31 and oil base paint.  
32 B. Expandable Acrylic Foam Sealant such as BACKERSEAL, as manufactured by EMSEAL Joint  
33 Systems Ltd, and as indicated on drawings for waterproof wall assembly locations.  
34 1. Preformed sealant shall be preformed, pre-compressed, self-expanding, sealant system.  
35 Expanding foam to be cellular foam impregnated with a water-based, non-drying, polymer-  
36 modified 100% acrylic dispersion.  
37 2. Material shall be capable of movement of +25%, -25% (50% total) of nominal material  
38 size.  
39 3. Expandable Acrylic Foam Sealant to be installed recessed from the substrate faces as  
40 shown on the drawings to receive a primary field-applied coating of low-modulus liquid  
41 sealant.  
42 4. Expandable Acrylic Foam Sealant to be installed at depth sufficient to allow installation of  
43 properly sized backer rod and liquid sealant, with appropriate air space, in front of  
44 material.  
45 5. Consult the architect to determine the sealant system model appropriate to the movement  
46 and design requirements at each joint location.  
47 6. Fabrication: Expandable Acrylic Foam Sealant must be supplied pre-compressed to less  
48 than the joint size, packaged in reels or shrink-wrapped lengths (sticks) with a mounting  
49 adhesive on one face.  
50 C. Joint Cleaning Compound: As recommended by the sealant Manufacturer for the joint surfaces to  
51 be cleaned.  
52 D. Joint Primer/Sealer: As recommended by the sealant Manufacturer for the joint surface to be  
53 primed or sealed. All surfaces to which sealant is intended to bond shall be primed.  
54 E. Bond Breaker Tape: Polyethylene tape or other plastic tape as recommended by the sealant  
55 Manufacturer to be applied to sealant-contact surfaces where bond to the substrate or joint filler  
56 must be avoided for proper performance of sealant. Provide self-adhesive tape where applicable.

1 F. Sealant Backer Rod: Compressible rod stock polyethylene foam, polyethylene jacketed and  
2 polyurethane foam or other flexible, permanent, durable non-absorptive material as recommended  
3 for the compatibility with sealant by the sealant Manufacturer; which will control the joint depth for  
4 sealant placement, break bond of sealant at bottom of joint, form optimum shape of sealant bead  
5 on back side, and provide a highly compressible backer to minimize the possibility of sealant  
6 extrusion when the joint is compressed. Backer rod shall be at least larger than the width of the  
7 joint. Refer to manufacturer recommendations for backer rod size. Coordinate with Architect.  
8

9 **2.3 TYPICAL PERFORMANCE CHARACTERISTICS**

- A. T-S-00227E and 19-GP-24 test method:
- |                                |   |
|--------------------------------|---|
| Adhesion-In-Peel               | Mortar 6.3 kg (14 lbs)<br>Anodized aluminum 8.2 kg (18 lbs)<br>Granite 7.3 kg (16 lbs)<br>Minimum requirement 2.26 kg (5 lbs) |
| Durability (Bond and Cohesion) | Passed (on mortar, granite and anodized aluminum at ± 25% movement)   |
| Sagging                        | None up to 50°C (122°F)   |
| Hardness                       | 25 (Shore A) after 7 days at 24°C (75°F), plus 21 days at 70°C (158°F)  |
| Percent Solids                 | 96% after 7 days at 24°C (75°F), plus 21 days at 70°C (158°F)   |
| Pot Life                       | Up to 7 hours at 24°C (75°F)  |
| Tack-Free Time                 | Less than 72 hours at 24°C (75°F)   |
| Low Temperature Flexibility    | -54°C (-65°F)   |
| Staining                       | None  |
- B. Other Test Methods:
- |                                     |   |
|-------------------------------------|---|
| Hardness                            | Average 35 (Shore A) after 5 years  |
| ASTM D2240                          |   |
| Extension and Compression and Cycle | 1/2" X 1/2" (12 mm X 12 mm) at 24°C (75°F) will withstand 100 cycles of 40% extension and 25% compression |
| TRC-ST/450                          |   |
| Ultra-Violet Resistance             | No adverse effects after 5 weeks' exposure to 14-25 E-Viton of UV energy at 70°C (158°F)                  |
| TRC-ST/448                          |   |
| Accelerated Aging                   | No adhesive or cohesive failure, nor significant changes at 8,000 hours                                   |
| ASTM E42, Method E                  |   |

10  
11 **PART 3 - EXECUTION**

12  
13 **3.1 EXAMINATION**

- 14 A. The Contractor shall have the sole responsibility for the accuracy of all measurements and for the  
15 estimate of material quantities required and necessary to satisfy the requirements of these  
16 Specifications.  
17

18 **3.2 SEQUENCING/SCHEDULING**

- 19 A. Remove only as much sealant work as can be restored to a weathertight condition each day and  
20 before showers commence.  
21 B. All sealant work shall be completed each day on the section being worked on.  
22 C. The Contractor shall not proceed with the sealant work until all unsatisfactory conditions  
23 detrimental to the proper and timely completion of the sealant work have been corrected.  
24

25 **3.3 SUBSTRATE PREPARATION**

- 26 A. Remove all debris from working surfaces. Remove all loose materials.  
27 B. Thoroughly clean all surface areas involved to remove dirt, oils, grease, heavy laitance, for release  
28 agent, curing compound, and other contaminants, which would interfere with the application and  
29 performance of the sealant, in accordance with the Manufacturer's recommendations.  
30 C. Remove all foreign projections in the joint by grinding or other suitable methods.  
31 D. Prime all surfaces requiring adhesion of sealant.

- 1 E. Install the sealant material under conditions where rain is not anticipated within eight hours of  
2 application and substrate surface temperatures are above 40°F and below 110°F.  
3

4 **3.4 SEALANT APPLICATION – SINGLE STAGE**

- 5 A. All material shall be applied in strict accordance with the Manufacturer's recommendations.  
6 B. All surfaces to receive the sealant system shall be air-dried a minimum of 24 hours immediately  
7 prior to performing Work.  
8 C. Where Manufacturer's specifications are more stringent or require more material than specified  
9 herein, follow the Manufacturer's specifications.  
10 D. Primer  
11 1. Apply the concrete primer at the rate of 225 square feet per gallon. Evenly apply two  
12 consecutive coats to the joint interface to produce a continuous film.  
13 2. Allow the primer to dry for 45 minutes or until tack-free.  
14 3. Do not apply more primer than can be coated over within 8 hours.  
15 4. Do not apply primer to adjacent surfaces not scheduled for sealant to prevent staining.  
16 E. Joint Backing  
17 1. Joint backing shall be used to control the depth of joint to the recommended dimension.  
18 2. Select a size, to allow for 25% minimum compression of the backing when inserted into  
19 the joint.  
20 3. Where depth of joint will not permit use of joint backing, a bond-breaker tape must be  
21 installed to prevent three-sided adhesion.  
22 F. Sealant  
23 1. Mix according to Manufacturer's detailed instructions.  
24 2. Minimum mixing time: 6 minutes.  
25 3. Apply with conventional sealant equipment, filling joint completely.  
26 G. Tooling  
27 1. Immediately after application, tooling shall be employed to insure firm, full contact with the  
28 inner faces of the joint.  
29 2. Dry tooling is preferred. Tooling agents can be used.  
30 H. Cleaning  
31 1. Remove immediately all excess sealant adjacent to the joint with "Xylol" or "Toluol" as  
32 work progresses.  
33 2. Avoid staining of adjacent areas.  
34 3. At the conclusion of the sealant Work, remove all tools, scaffolding, equipment,  
35 construction materials and construction debris from the site.  
36

37 **3.5 SEALANT APPLICATION – TWO STAGE**

- 38 A. All material shall be applied in strict accordance with the Manufacturer's recommendations.  
39 B. All surfaces to receive the sealant system shall be air-dried a minimum of 24 hours immediately  
40 prior to performing Work.  
41 C. Where Manufacturer's specifications are more stringent or require more material than specified  
42 herein, follow the Manufacturer's specifications.  
43 D. Primer  
44 1. Apply the concrete primer at the rate of 225 square feet per gallon. Evenly apply two  
45 consecutive coats to the joint interface to produce a continuous film.  
46 2. Allow the primer to dry for 45 minutes or until tack-free.  
47 3. Do not apply more primer than can be coated over within 8 hours.  
48 4. Do not apply primer to adjacent surfaces not scheduled for sealant to prevent staining.  
49 E. Joint Backing Stage I  
50 1. Joint backing shall be used to control the depth of joint to the recommended dimension.  
51 2. Select a size, to allow for 25% minimum compression of the backing when inserted into  
52 the joint.  
53 3. Where depth of joint will not permit use of joint backing, a bond-breaker tape must be  
54 installed to prevent three-sided adhesion.  
55 F. Installation of Expandable Acrylic Foam Sealant  
56 1. Preparation of the Work Area  
57 a. The contractor shall provide a properly formed and prepared building joint  
58 openings constructed to the exact dimensions and elevations shown on shown  
59 on the contract drawings. Deviations from these dimensions will not be allowed  
60 without the written consent of the engineer of record.





SECTION 07 13 50

HISTORIC SELF-ADHERING SHEET WATERPROOFING

- 1  
2  
3  
4 PART 1 – GENERAL  
5 1.1 RELATED DOCUMENTS  
6 1.2 SUMMARY  
7 1.3 REFERENCE STANDARDS  
8 1.4 SUBMITTALS  
9 1.5 QUALITY ASSURANCE  
10 1.6 DELIVERY, STORAGE AND HANDLING  
11 1.7 PROJECT CONDITIONS  
12 1.8 WARRANTY  
13 PART 2 – PRODUCTS  
14 2.1 MATERIALS  
15 PART 3 – EXECUTION  
16 3.1 EXAMINATION  
17 3.2 PREPARATION OF SUBSTRATES  
18 3.3 INSTALLATION  
19 3.4 CLEANING AND PROTECTION  
20

21 **PART 1 - GENERAL**

22  
23 **1.1 RELATED DOCUMENTS**

- 24 A. All of the Contract Documents, including General and Supplementary Conditions and Division 1  
25 General Requirements, apply to the work of this section.  
26

27 **1.2 SUMMARY**

- 28 A. The work of this section includes, but is not limited to, the following:  
29 1. Self-adhering rubberized asphalt sheet membrane waterproofing  
30 2. Prefabricated drainage composite  
31 3. Protection board  
32 B. Related Sections: Other specification sections which directly relate to the work of this section  
33 include, but are not limited to, the following:  
34 1. Section 07 01 90.71 – Historic Sealant Rehabilitation  
35 2. Section 07 62 50 – Historic Sheet Metal Flashing and Trim  
36

37 **1.3 REFERENCE STANDARDS**

- 38 A. The following standards and publications are applicable to the extent referenced in the text.  
39 B. American Society for Testing and Materials (ASTM)  
40 C 836 Standard Specification for High Solids, Cold Liquid-Applied Elastomeric  
41 Waterproofing Membrane for Use with Separate Wearing Course  
42 D 412 Standard Test Methods for Rubber Properties in Tension  
43 D 570 Standard Test Method for Water Absorption of Plastics  
44 D 882 Standard Test Methods for Tensile Properties of Thin Plastic Sheeting  
45 D 903 Standard Test Method for Peel or Stripping Strength of Adhesive Bonds  
46 D 1876 Standard Test Method for Peel Release of Adhesives (T-Peel)  
47 D 1970 Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet  
48 Materials Used as Steep Roofing Underlayment for Ice Dam Protection  
49 D 3767 Standard Practice for Rubber - Measurements of Dimensions  
50 D 5385 Standard Test Method for Hydrostatic Pressure Resistance of Waterproofing  
51 Membranes  
52 E 96 Standard Test Methods for Water Vapor Transmission of Materials  
53 E 154 Standard Test Methods for Water Vapor Retarders Used in Contact with Earth  
54 Under Concrete Slabs, on Walls, or as Ground Cover  
55

56 **1.4 SUBMITTALS**

- 57 A. Product Data: Submit manufacturer's product data, installation instructions, use limitations and  
58 recommendations. Include certification of data indicating VOC (Volatile Organic Compound)  
59 content of all components of waterproofing system.

- 1 B. Samples: Submit representative samples of the following for approval:  
2 1. Sheet membrane  
3 2. Protection board  
4 3. Prefabricated drainage composite  
5

6 **1.5 QUALITY ASSURANCE**

- 7 A. Manufacturer: Sheet membrane waterproofing shall be manufactured and marketed by a firm with  
8 a minimum of 20 years' experience in the production and sales of self-adhesive sheet membrane  
9 waterproofing. Manufacturers proposed for use but not named in these specifications shall submit  
10 evidence of ability to meet all requirements specified, and include a list of projects of similar design  
11 and complexity completed within the past 5 years.  
12 B. Installer: A firm which has at least 5 years' documented experience in work of the type required by  
13 this section.  
14 C. Materials: For each type of material required for the work of this section, provide primary materials  
15 which are the products of one manufacturer.  
16 D. Pre-Installation Conference: A pre-installation conference shall be held prior to commencement of  
17 field operations to establish procedures to maintain optimum working conditions and to coordinate  
18 this work with related and adjacent work. Agenda for meeting shall include review of special details  
19 and flashing.  
20

21 **1.6 DELIVERY, STORAGE AND HANDLING**

- 22 A. Deliver materials and products in labeled packages. Store and handle in strict compliance with  
23 manufacturer's instructions, recommendations and material safety data sheets. Protect from  
24 damage from sunlight, weather, excessive temperatures and construction operations. Remove  
25 damaged material from the site and dispose of in accordance with applicable regulations.  
26 1. Do not double-stack pallets of membrane on the job site. Provide cover on top and all  
27 sides, allowing for adequate ventilation.  
28 2. Protect mastic and adhesive from moisture and potential sources of ignition.  
29 3. Store drainage composite or protection board flat and off the ground. Provide cover on  
30 top and all sides.  
31 B. Sequence deliveries to avoid delays, but minimize on-site storage.  
32

33 **1.7 PROJECT CONDITIONS**

- 34 A. Perform work only when existing and forecasted weather conditions are within the limits  
35 established by the manufacturer of the materials and products used.  
36 B. Proceed with installation only when substrate construction and preparation work is complete and in  
37 condition to receive sheet membrane waterproofing.  
38

39 **1.8 WARRANTY**

- 40 A. Provide a written 2-year contractor's workmanship warranty.  
41 B. Sheet Membrane Waterproofing: Provide written 5-year material warranty issued by the membrane  
42 manufacturer upon completion of the work.  
43

44 **PART 2 - PRODUCTS**

45  
46 **2.1 MATERIALS**

- 47 A. Self-adhering Sheet Membrane Waterproofing: self-adhesive, cold-applied composite sheet  
48 consisting of a thickness of 1.4 mm (0.056 in.) of rubberized asphalt and 0.1 mm (0.004 in.) of  
49 cross-laminated, high density polyethylene film. Provide rubberized asphalt membrane covered  
50 with a release sheet, which is removed during installation. No special adhesive or heat shall be  
51 required to form laps. Such as: Bituthene 3000/Low Temperature Membrane by Grace  
52 Construction Products.  
53 B. Sheet Membrane Waterproofing

1 PHYSICAL PROPERTIES FOR SHEET MEMBRANE WATERPROOFING:

Property	Test Method	Typical Value
Color		Dark gray-black
Thickness	ASTM D 3767 Method A	1.5 mm (0.060 in.) nominal
Flexibility, 180° bend over 25 mm (1 in.) mandrel at -43°C (-45°F)	ASTM D 1970	Unaffected
Tensile Strength, Membrane Die C	ASTM D 412 Modified <sup>1</sup>	2240 kPa (325 lbs/in. <sup>2</sup> ) minimum
Tensile Strength, Film	ASTM D 882 Modified <sup>1</sup>	34.5 MPa (5,000 lbs/in. <sup>2</sup> ) minimum
Elongation, Ultimate Failure of Rubberized Asphalt	ASTM D 412 Modified <sup>1</sup>	300% minimum
Crack Cycling at -32°C (-25°F), 100 Cycles	ASTM C 836	Unaffected
Lap Adhesion at Minimum Application Temperature	ASTM D 1876 Modified <sup>2</sup>	700 N/m (4 lbs/in.) – Bituthene 3000 880 N/m (5 lbs/in.) – Low Temp
Peel Strength	ASTM D 903 Modified <sup>3</sup>	1576 N/m (9 lbs/in.)
Puncture Resistance, Membrane	ASTM E 154	222 N (50 lbs) minimum
Resistance to Hydrostatic Head	ASTM D 5385	60 m (200 ft) of water
Permeance	ASTM E 96, Section 12 – Water Method	2.9 ng/m <sup>2</sup> sPa (0.05 perms) maximum
Water Absorption	ASTM D 570	0.1% maximum

2  
3 Footnotes:

- 4 1. The test is run at a rate of 50 mm (2 in.) per minute.
- 5 2. The test is conducted 15 minutes after the lap is formed and run at a rate of 50 mm (2 in.) per minute at -4°C
- 6 (25°F).
- 7
- 8 a. Prefabricated Drainage Composite: (Hydroduct® 220) (Hydroduct® 660) Drainage Composite by
- 9 Grace Construction Products. Drainage Composite shall be designed to promote positive drainage
- 10 while serving as a protection course.
- 11 b. Protection Board
- 12 i. Expanded Polystyrene Protection Board: 25 mm (1 in.) thick for vertical applications with
- 13 the following characteristics. Adhere to waterproofing membrane with Bituthene
- 14 Protection Board Adhesive.
- 15 Normal Density: 16 kg/m<sup>3</sup> (1.0 lb/ft<sup>3</sup>)
- 16 Thermal Conductivity, K factor: 0.24 at 5°C (40°F), 0.26 at 24°C (75°F)
- 17 Thermal Resistance, R-Value: 4 per 25 mm (1 in.) of thickness
- 18 c. Liquid Membrane (for cants, terminations and penetrations): Bituthene Liquid Membrane, by Grace
- 19 Construction Products
- 20 d. Waterstop: Adcor™ ES hydrophilic non-bentonite waterstop by Grace Construction Products for
- 21 non-moving concrete construction joints.
- 22 e. Waterproofing Primer: Such as Permabarrier WB Primer, by Grace Construction Products.
- 23 f. Miscellaneous Materials: Surface conditioner, mastic, liquid membrane, tape and accessories
- 24 specified or acceptable to manufacturer of the sheet membrane waterproofing.
- 25

26 **PART 3 - EXECUTION**

27

28 **3.1 EXAMINATION**

- 29 A. The installer shall examine conditions of substrates and other conditions under which this work is to
- 30 be performed and notify the contractor, in writing, of circumstances detrimental to the proper
- 31 completion of the work. Do not proceed with work until unsatisfactory conditions are corrected.
- 32

33 **3.2 PREPARATION OF SUBSTRATES**

- 34 A. Refer to manufacturer's literature for requirements for preparation of substrates. Surfaces shall be
- 35 structurally sound and free of voids, spalled areas, loose aggregate and sharp protrusions.

- 1 B. Remove contaminants such as grease, oil and wax from exposed surfaces. Remove dust, dirt,  
2 loose stone and debris. Use repair materials and methods which are acceptable to manufacturer of  
3 sheet membrane waterproofing.  
4 C. Cast-In-Place Concrete Substrates:  
5 1. Fill form tie rod holes with concrete and finish flush with surrounding surface.  
6 2. Repair bugholes over 13 mm (0.5 in.) in length and 6 mm (0.25 in.) deep and finish flush  
7 with surrounding surface.  
8 3. Remove scaling to sound, unaffected concrete and repair exposed are  
9 4. Grind irregular construction joints to suitable flush surface.  
10 D. Related Materials: Treat joints and install flashing as recommended by waterproofing manufacturer.  
11

12 **3.3 INSTALLATION**

- 13 A. Refer to manufacturer's literature for installation requirements, including but not limited to, the  
14 following:  
15 1. Apply primer at rate recommended by manufacturer. Recoat areas not waterproofed if  
16 contaminated by dust. Mask and protect adjoining exposed finish surfaces to protect  
17 those surfaces from excessive application of primer.  
18 2. Delay application of membrane until primer is completely dry. Dry time will vary with  
19 weather conditions.  
20 3. Seal daily terminations with troweled bead of liquid membrane.  
21 4. Apply protection board and related materials in accordance with manufacturer's  
22 recommendations.  
23

24 **3.4 CLEANING AND PROTECTION**

- 25 A. Remove any masking materials after installation. Clean any stains on materials which would be  
26 exposed in the completed work.  
27 B. Protect completed membrane waterproofing from subsequent construction activities as  
28 recommended by manufacturer.  
29

30 **END OF SECTION**

SECTION 07 14 16  
COLD FLUID-APPLIED WATERPROOFING

- 1  
2  
3 PART 1 – GENERAL  
4 1.1 [RELATED DOCUMENTS](#)  
5 1.2 [SUMMARY](#)  
6 1.3 [QUALITY ASSURANCE](#)  
7 1.4 [FIELD CONDITIONS](#)  
8 PART 2 – PRODUCTS  
9 2.1 [MATERIALS, GENERAL](#)  
10 2.2 [LATEX-RUBBER WATERPROOFING \(WP-2\)](#)  
11 2.3 [AUXILIARY MATERIALS](#)  
12 2.4 [MOLDED-SHEET DRAINAGE PANELS](#)  
13 PART 3 – EXECUTION  
14 3.1 [EXAMINATION](#)  
15 3.2 [PREPARATION](#)  
16 3.3 [PREPARATION AT TERMINATIONS, PENETRATIONS, AND CORNERS](#)  
17 3.4 [JOINT AND CRACK TREATMENT](#)  
18 3.5 [WATERPROOFING APPLICATION](#)  
19 3.6 [MOLDED-SHEET DRAINAGE PANEL INSTALLATION](#)  
20 3.7 [PROTECTION](#)

21 **PART 1 - GENERAL**

22 **1.1 RELATED DOCUMENTS**

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

25 **1.2 SUMMARY**

- 26 A. Section Includes:  
27 1. Latex-rubber waterproofing.  
28 2. Foundation thermal/protection insulation.  
29 B. Related Requirements:  
30 1. Section 07 21 00 "Thermal Insulation" for below grade perimeter insulation.  
31 2. Section 09 30 13 "Ceramic Tiling" for fluid-applied waterproof membranes beneath ceramic tiles.

32 **1.3 PREINSTALLATION MEETINGS**

- 33 A. Preinstallation Conference: Conduct conference at Project site.  
34 1. Review waterproofing requirements including, but not limited to, the following:  
35 a. Surface preparation specified in other Sections.  
36 b. Minimum curing period.  
37 c. Forecasted weather conditions.  
38 d. Special details and sheet flashings.  
39 e. Repairs.

40 **1.4 ACTION SUBMITTALS**

- 41 A. Product Data: For each type of product.  
42 1. Include construction details, material descriptions, and tested physical and performance properties  
43 of waterproofing.  
44 2. Include manufacturer's written instructions for evaluating, preparing, and treating substrate.  
45 B. Shop Drawings:  
46 1. Show locations and extent of waterproofing.  
47 2. Include details for substrate joints and cracks, sheet flashings, penetrations, inside and outside  
48 corners, tie-ins with adjoining waterproofing, and other termination conditions.  
49 3. Include setting drawings showing layout, sizes, sections, profiles, and joint details of pedestal-  
50 supported concrete pavers.  
51

- 1 C. Samples: For each exposed product and for each color and texture specified, including the following  
2 products:  
3 1. Flashing sheet, 8 by 8 inches.  
4 2. Membrane-reinforcing fabric, 8 by 8 inches.  
5 3. Insulation, 8 by 8 inches.  
6 4. Drainage panel, 4 by 4 inches.
- 7 **1.5 INFORMATIONAL SUBMITTALS**  
8 A. Qualification Data: For Installer.  
9 B. Field quality-control reports.  
10 C. Sample Warranties: For special warranties.
- 11 **1.6 QUALITY ASSURANCE**  
12 A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by  
13 waterproofing manufacturer.
- 14 **1.7 FIELD CONDITIONS**  
15 A. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures  
16 recommended in writing by waterproofing manufacturer.  
17 1. Do not apply waterproofing to a damp or wet substrate, when relative humidity exceeds 85 percent,  
18 or when temperatures are less than 5 deg F above dew point.  
19 2. Do not apply waterproofing in snow, rain, fog or mist, or when such weather conditions are  
20 imminent during application and curing period.  
21 B. Maintain adequate ventilation during application and curing of waterproofing materials.
- 22 **1.8 WARRANTY**  
23 A. Manufacturer's Special Warranty: Manufacturer agrees to repair or replace waterproofing that fails in  
24 materials or workmanship within specified warranty period.  
25 1. Warranty Period: Five years from date of Substantial Completion.

26 **PART 2 - PRODUCTS**

- 27 **2.1 MATERIALS, GENERAL**  
28 A. Source Limitations for Waterproofing System: Obtain waterproofing materials from single source from  
29 single manufacturer.
- 30 **2.2 LATEX-RUBBER WATERPROOFING (WP-1)**  
31 A. Two-Component, Unreinforced, Latex-Rubber Waterproofing: ASTM C 836/C 836M; coal-tar free.  
32 1. Products: Subject to compliance with requirements, provide one of the following:  
33 a. Grace Construction Products; W.R. Grace & Co. -- Conn; Procor.  
34 b. Carlisle Coatings and Waterproofing; CCW-703.  
35 c. Comparable product by Polyguard Inc.  
36 2. Hydrostatic-Head Resistance: 65 feet minimum; ASTM D 5385.
- 37 **2.3 AUXILIARY MATERIALS**  
38 A. General: Provide auxiliary materials recommended in writing by waterproofing manufacturer for intended  
39 use and compatible with one another and with waterproofing.  
40 1. Furnish liquid-type auxiliary materials that comply with VOC limits of authorities having jurisdiction.  
41 B. Primer: Manufacturer's standard primer, sealer, or surface conditioner; factory-formulated acrylic latex,  
42 polyurethane, or epoxy.  
43 C. Sheet Flashing: 50-mil-minimum, nonstaining, uncured sheet neoprene.  
44 1. Adhesive: Manufacturer's recommended contact adhesive.  
45 D. Joint Reinforcing Strip: Manufacturer's recommended fiberglass mesh or polyester fabric.  
46 E. Joint Sealant: Multicomponent polyurethane sealant, compatible with waterproofing; ASTM C 920,  
47 Type M, Class 25 or greater; Grade NS for sloping and vertical applications and Grade P for deck  
48 applications; Use NT exposure; and as recommended by manufacturer for substrate and joint conditions.  
49 1. Backer Rod: Closed-cell polyethylene foam.  
50

1 **2.4 MOLDED-SHEET DRAINAGE PANELS**

- 2 A. Nonwoven-Geotextile-Faced, Molded-Sheet Drainage Panel: Composite subsurface drainage panel  
3 consisting of a studded, nonbiodegradable, molded-plastic-sheet drainage core; with a nonwoven, needle-  
4 punched geotextile facing with an apparent opening size not exceeding No. 70 sieve laminated to one side  
5 of the core and a polymeric film bonded to the other side; and with a vertical flow rate of 9 to 18 gpm per  
6 ft..

7 **2.5 INSULATION**

- 8 A. Board Insulation: Extruded-polystyrene board insulation according to ASTM C 578, square or shiplap  
9 edged.  
10 1. Manufacturers: Subject to compliance with requirements, provide products by the following:  
11 a. DiversiFoam Products.  
12 b. Dow Chemical Company (The).  
13 2. Type IV, minimum compressive strength.

14 **PART 3 - EXECUTION**

15 **3.1 EXAMINATION**

- 16 A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and  
17 other conditions affecting performance of the Work.  
18 1. Verify that concrete has cured and aged for minimum time period recommended in writing by  
19 waterproofing manufacturer.  
20 2. Verify that substrate is visibly dry and within the moisture limits recommended in writing by  
21 manufacturer. Test for capillary moisture by plastic sheet method according to ASTM D 4263.  
22 B. Proceed with installation only after unsatisfactory conditions have been corrected.

23 **3.2 PREPARATION**

- 24 A. Clean, prepare, and treat substrates according to manufacturer's written instructions. Provide clean, dust-  
25 free, and dry substrates for waterproofing application.  
26 B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other  
27 construction.  
28 C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, acid residues, and other  
29 penetrating contaminants or film-forming coatings from concrete.  
30 D. Remove fins, ridges, and other projections, and fill honeycomb, aggregate pockets, holes, and other voids.

31 **3.3 PREPARATION AT TERMINATIONS, PENETRATIONS, AND CORNERS**

- 32 A. Prepare surfaces at terminations and penetrations through waterproofing and at expansion joints, drains,  
33 sleeves, and corners according to waterproofing manufacturer's written instructions and to  
34 recommendations in ASTM C 1471.  
35 B. Apply waterproofing in two separate applications, and embed a joint reinforcing strip in the first preparation  
36 coat when recommended by waterproofing manufacturer.

37 **3.4 JOINT AND CRACK TREATMENT**

- 38 A. Prepare, treat, rout, and fill joints and cracks in substrate according to waterproofing manufacturer's written  
39 instructions and to recommendations in ASTM C 898/C 898M and ASTM C 1471. Before coating  
40 surfaces, remove dust and dirt from joints and cracks according to ASTM D 4258.  
41 1. Comply with ASTM C 1193 for joint-sealant installation.  
42 2. Apply bond breaker on sealant surface, beneath preparation strip.  
43 3. Prime substrate along each side of joint and apply a single thickness of preparation strip at least 6  
44 inches wide along each side of joint. Apply waterproofing in two separate applications and embed  
45 a joint reinforcing strip in the first preparation coat.  
46 B. Install sheet flashing and bond to deck and wall substrates where required according to waterproofing  
47 manufacturer's written instructions.  
48 1. Extend sheet flashings for 4 inches onto perpendicular surfaces and items penetrating substrate.  
49

1 **3.5 WATERPROOFING APPLICATION**

- 2 A. Apply waterproofing according to manufacturer's written instructions and to recommendations in  
3 ASTM C 1471.
- 4 B. Apply primer over prepared substrate unless otherwise instructed in writing by waterproofing manufacturer.
- 5 C. Unreinforced Waterproofing Applications: Mix materials and apply waterproofing by spray, roller, notched  
6 squeegee, trowel, or other application method suitable to slope of substrate.
- 7 1. Apply one or more coats of waterproofing to obtain a seamless membrane free of entrapped gases  
8 and pinholes, with a dry film thickness of 90 mils.
- 9 2. Apply waterproofing to prepared wall terminations and vertical surfaces.
- 10 3. Verify manufacturer's recommended wet film thickness of waterproofing every 100 sq. ft..
- 11 D. Cure waterproofing, taking care to prevent contamination and damage during application and curing.
- 12 E. Install protection course with butted joints over waterproofing before starting subsequent construction  
13 operations.
- 14 1. For vertical applications, set protection course in nominally cured membrane, which will act as an  
15 adhesive. If membrane cures before application of protection course, use adhesive.

16 **3.6 MOLDED-SHEET DRAINAGE PANEL INSTALLATION**

- 17 A. Place and secure molded-sheet drainage panels, with geotextile facing away from wall or deck substrate,  
18 according to manufacturer's written instructions. Use adhesive or another method that does not penetrate  
19 waterproofing. Lap edges and ends of geotextile to maintain continuity. Protect installed molded-sheet  
20 drainage panels during subsequent construction.

21 **3.7 PROTECTION**

- 22 A. Protect waterproofing from damage and wear during remainder of construction period.
- 23 B. Correct deficiencies in or remove waterproofing that does not comply with requirements; repair substrates,  
24 reapply waterproofing, and repair sheet flashings.
- 25 C. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended  
26 in writing by manufacturer of affected construction.

27 **END OF SECTION**



SECTION 07 16 13

POLYMER MODIFIED CEMENT WATERPROOFING

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12 2.1 [PREPACKAGED, POLYMER-MODIFIED CEMENT WATERPROOFING \(WP-2\)](#)  
13 2.2 [ACCESSORY MATERIALS](#)  
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15 PART 3 – EXECUTION  
16 3.1 [EXAMINATION](#)  
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19 **PART 1 - GENERAL**

20 **1.1 RELATED DOCUMENTS**

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

23 **1.2 SUMMARY**

- 24 A. Section includes polymer-modified cement waterproofing.  
25 B. Related Requirements:  
26 1. Section 03 30 00 "Cast-in-Place Concrete" for the finishing of concrete walls and slabs to receive  
27 waterproofing.

28 **1.3 PREINSTALLATION MEETINGS**

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

30 **1.4 ACTION SUBMITTALS**

- 31 A. Product Data: For each type of product.  
32 1. Include construction details, material descriptions, and installation instructions.  
33 B. LEED Submittals:  
34 1. Product Data for Credit IEQ 4.2: For waterproofing for negative-side application, documentation  
35 including printed statement of VOC content.  
36 C. Samples for Verification: For each type of waterproofing indicated, in manufacturer's standard sizes.

37 **1.5 INFORMATIONAL SUBMITTALS**

- 38 A. Product Certificates: For each type of waterproofing, patching, and plugging material.  
39 B. Product Test Reports: For each product formulation, for tests performed by manufacturer and witnessed  
40 by a qualified testing agency.

41 **1.6 QUALITY ASSURANCE**

- 42 A. Applicator Qualifications: A firm experienced in applying polymer-modified cement waterproofing similar in  
43 material, design, and extent to that indicated for this Project, whose work has resulted in applications with  
44 a record of successful in-service performance.  
45

- 1 **1.7 FIELD CONDITIONS**  
2 A. Weather Limitations: Proceed with application only when existing and forecasted weather conditions  
3 permit polymer-modified cement waterproofing to be performed according to manufacturer's written  
4 instructions.  
5 B. Proceed with waterproofing work only after pipe sleeves, vents, curbs, inserts, drains, and other  
6 projections through the substrate to be waterproofed have been completed. Proceed only after substrate  
7 defects, including honeycombs, voids, and cracks, have been repaired to provide a sound substrate free of  
8 forming materials, including reveal inserts.  
9 C. Ambient Conditions: Proceed with waterproofing work only if temperature is maintained at 40 deg For  
10 above during work and cure period, and space is well ventilated and kept free of water.

11 **PART 2 - PRODUCTS**

- 12 **2.1 PREPACKAGED, POLYMER-MODIFIED CEMENT WATERPROOFING (WP-2)**  
13 A. Negative-Side, Polymer-Modified Cement Waterproofing: Manufacturer's proprietary blend of dry  
14 cementitious and other ingredients for mixing with polymer admixture to produce a waterproof coating that  
15 is suitable for vertical and horizontal applications below or above grade, is breathable, resists negative-  
16 side hydrostatic pressure, and has properties complying with or exceeding the criteria specified below.  
17 1. Water Permeability: Maximum zero for water at 30 feet when tested according to COE CRD-C 48.  
18 2. Compressive Strength: Minimum 4000 psi at 28 days when tested according to ASTM C 109/C  
19 109M.  
20 3. Flexural Strength: Minimum 710 psi at 28 days when tested according to ASTM C 348.  
21 4. Bond Strength: Minimum 220 psi at 14 days when tested according to ASTM C 321.  
22 5. Color: White.  
23 6. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction, but not  
24 exceed 250 g/L.

- 25 **2.2 ACCESSORY MATERIALS**  
26 A. Patching Compound: Factory-premixed cementitious repair mortar, crack filler, or sealant recommended  
27 by waterproofing manufacturer for filling and patching tie holes, honeycombs, reveals, and other  
28 imperfections and compatible with substrate and other materials indicated.  
29 B. Plugging Compound: Factory-premixed cementitious compound with hydrophobic properties and  
30 recommended by waterproofing manufacturer; resistant to water and moisture but vapor permeable for all  
31 standard applications (vertical, overhead, and horizontal surfaces not exposed to vehicular traffic); and  
32 compatible with substrate and other materials indicated.  
33 C. Portland Cement: ASTM C 150/C 150M, Type I.  
34 D. Slurry-Coat Sand: ASTM C 144.  
35 E. Trowel-Coat Sand: ASTM C 33/C 33M, fine aggregate.  
36 F. Water: Potable.

- 37 **2.3 MIXES**  
38 A. Prepackaged, Polymer-Modified Cement Waterproofing: Add prepackaged dry ingredients to mixing liquid  
39 according to manufacturer's written instructions. Mix together with mechanical mixer or by hand to required  
40 consistency.  
41

1 **PART 3 - EXECUTION**

2 **3.1 EXAMINATION**

- 3 A. Examine substrates, areas, and conditions, with Applicator present, for suitable conditions where  
4 waterproofing is to be applied.  
5 B. Proceed with application only after unsatisfactory conditions have been corrected.  
6 C. Notify Architect in writing of active leaks or defects that would affect system performance.

7 **3.2 PREPARATION**

- 8 A. Comply with manufacturer's written instructions.  
9 B. Protect other work from damage caused by cleaning, preparation, and application of waterproofing.  
10 Provide temporary enclosure to ensure adequate ambient temperatures and ventilation conditions for  
11 application.  
12 C. Do not allow waterproofing, patching, and plugging materials to enter reveals or annular spaces intended  
13 for resilient sealants or gaskets, such as joint spaces between pipes and pipe sleeves.  
14 D. Stop active water leaks with plugging compound.  
15 E. Repair damaged or unsatisfactory substrate with patching compound.  
16 1. At holes and cracks 1/16 inch wide or larger in substrate, remove loosened chips and cut reveal  
17 with sides perpendicular to surface, not tapered, and minimum 1 inch deep. Fill reveal with patching  
18 compound flush with surface.  
19 F. Surface Preparation: Remove efflorescence, chalk, dust, dirt, mortar spatter, grease, oils, paint, curing  
20 compounds, and form-release agents to ensure that waterproofing bonds to surfaces.  
21 1. Clean concrete surfaces according to ASTM D 4258.  
22 a. Smooth-Formed and Trowel-Finished Concrete: Prepare by mechanical abrading or  
23 abrasive-blast cleaning according to ASTM D 4259.  
24 2. Concrete Joints: Clean reveals.

25 **3.3 APPLICATION**

- 26 A. General: Comply with waterproofing manufacturer's written instructions for application and curing.  
27 1. Saturate surface with water and maintain damp condition until applying waterproofing. Remove  
28 standing water.  
29 2. Number of Coats: Two.  
30 a. Coating Thickness: Maximum application thickness of 47 mils per coat for total thickness as  
31 required for specified water permeability.  
32 b. Apply first coat as a slurry with brush or roller, and apply subsequent coats with brush,  
33 roller, spray, or trowel.  
34 c. Vigorously work first coat onto the substrate, forcing the material into surface voids. Apply  
35 each subsequent coat into full contact with previous coat.  
36 d. Allow manufacturer's recommended time between coats. Dampen surface between coats.  
37 B. Final Coat Finish: Smooth troweled.  
38 C. Curing: Cure waterproofing for not less than five days immediately after application and prior to being  
39 placed in service.

40 **END OF SECTION**

**SECTION 07 18 00**  
**TRAFFIC COATINGS**

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- 14 2.1 [MATERIALS, GENERAL](#)
- 15 2.2 [TRAFFIC COATING \(PTC-1\)](#)
- 16 2.3 [TRAFFIC COATINGS FOR PEDESTRIAN TRAFFIC](#)
- 17 2.4 [ACCESSORY MATERIALS](#)
- 18 PART 3 – EXECUTION
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- 22 3.4 [PEDESTRIAN TRAFFIC-COATING APPLICATION](#)
- 23 3.5 [CLEANING AND PROTECTING](#)

24 **PART 1 - GENERAL**

25 **1.1 RELATED DOCUMENTS**

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

28 **1.2 SUMMARY**

- 29 A. Section includes traffic coatings for the following applications:
- 30 1. Equipment-room floor.
- 31 B. Related Requirements:
- 32 1. Section 09 67 23 "Resinous Flooring" for fluid-applied, decorative resinous flooring that does not  
33 serve as a waterproofing membrane with integral wearing surface.

34 **1.3 PREINSTALLATION MEETINGS**

- 35 A. Preinstallation Conference: Conduct conference at Project site.
- 36 1. Review requirements for traffic coating products and installation, including surface preparation,  
37 substrate conditions, project and manufacturer's details, installation procedures, mockups, testing  
38 and inspection requirements, protection and repairs, and coordination and sequencing of traffic  
39 coating work with work of other Sections.

40 **1.4 ACTION SUBMITTALS**

- 41 A. Product Data: For each type of product, including installation instructions.
- 42 B. Shop Drawings: Show locations for traffic coating system components. Show details for each type of  
43 substrate, movement joints, corners, and edge conditions, including penetrations, transitions, and  
44 terminations.
- 45 C. LEED Submittals:
- 46 1. Product Data for Credit IEQ 4.2: For interior field-applied traffic coatings, documentation including  
47 printed statement of VOC content.
- 48

1 **1.5 INFORMATIONAL SUBMITTALS**

- 2 A. Qualification Data: For Installer.  
3 B. Product Test Reports: Test data for traffic coating products and traffic coating system, by qualified testing  
4 agency, indicating proposed traffic coating meets performance requirements.  
5 C. Warranty: Sample of unexecuted manufacturer and installer special warranties.  
6 D. Field quality control reports.  
7 E. Product Certificates: For each type of traffic coating.  
8 F. Sample Warranty: For special warranty.

9 **1.6 QUALITY ASSURANCE**

- 10 A. Installer Qualifications: A manufacturer-approved firm with minimum five years' experience in installation of  
11 specified products in successful use on similar projects, employing workers trained by manufacturer,  
12 including a full-time on-site supervisor with a minimum of three years' experience installing similar work.  
13 B. Product Certifications:  
14 1. VOC emissions per 40 CFR 59, Subpart D - National Volatile Organic Compound Emission  
15 Standards for Architectural Coatings.

16 **1.7 DELIVERY, STORAGE AND HANDLING**

- 17 A. Accept materials on site in manufacturer's unopened original packaging.  
18 B. Store products in weather protected environment, clear of ground and moisture, within temperature ranges  
19 recommended by traffic coating manufacturer.  
20 C. Construction Waste: Store and dispose of packaging materials and construction waste in accordance with  
21 requirements of Division 01 Section "Construction Waste Management"

22 **1.8 ENVIRONMENTAL REQUIREMENTS**

- 23 A. Environmental Limitations: Apply traffic coating within the range of ambient and substrate temperatures  
24 recommended by traffic coating manufacturer.  
25 1. Protect substrates from environmental conditions that affect coating performance.  
26 2. Do not apply traffic coating to a damp or wet substrate or during snow, rain, fog, or mist or when dew  
27 is present.  
28 B. Do not install traffic coating until items that penetrate membrane have been installed.

29 **1.9 WARRANTY**

- 30 A. Manufacturer's Warranty: Manufacturer agrees to repair or replace traffic coating that fails in materials or  
31 workmanship within specified warranty period.  
32 1. Failures include, but are not limited to, the following:  
33 a. Adhesive or cohesive failures.  
34 b. Abrasion or tearing failures.  
35 c. Surface crazing or spalling.  
36 d. Intrusion of water, oils, gasoline, grease, salt, deicer chemicals, or acids into deck substrate.  
37 2. Warranty Period: Five years from date of Substantial Completion.

38 **PART 2 - PRODUCTS**

39 **2.1 MATERIALS, GENERAL**

- 40 A. Material Compatibility: Provide primers; base-, intermediate-, and topcoat; and accessory materials that are  
41 compatible with one another and with substrate under conditions of service and application, as demonstrated  
42 by manufacturer based on testing and field experience.  
43 B. Source Limitations:  
44 1. Obtain traffic coatings from single source from single manufacturer.  
45 2. Obtain primary traffic-coating materials, including primers, from traffic-coating manufacturer. Obtain  
46 accessory materials including aggregates, sheet flashings, joint sealants, and substrate repair  
47 materials of types and from sources recommended in writing by primary material manufacturer.  
48

- 1 **2.2 TRAFFIC COATING (PTC-1)**  
2 A. Traffic Coating: Manufacturer's standard, traffic-bearing, seamless, high-solids-content, cold liquid-applied,  
3 elastomeric, waterproofing membrane system with integral wearing surface for equipment-room floor;  
4 according to ASTM C 957.
- 5 1. Manufacturers: Subject to compliance with requirements, provide products by the following:  
6 a. Tremco Incorporated.
- 7 **2.3 TRAFFIC COATINGS FOR PEDESTRIAN TRAFFIC**  
8 A. Traffic Coatings: Manufacturer's low-odor, low-VOC, interior and exterior exposure, pedestrian traffic-  
9 bearing, seamless, high-solids-content, cold liquid-applied, elastomeric, waterproofing membrane system  
10 meeting ASTM C 957, and SWRI validated.  
11 1. Basis of Design Products: Tremco Incorporated, Sealant/Waterproofing Division; Vulkem  
12 Mechanical Room Coating System 350/950/951NF.  
13 B. Primer: Liquid primer recommended for substrate and conditions by traffic-coating manufacturer.  
14 C. Base Coat: Aromatic Polyurethane.  
15 D. Topcoat Aggregate: Manufacturer's standard aggregate for each use indicated of particle sizes, shape, and  
16 minimum hardness recommended in writing by traffic-coating manufacturer.  
17 1. Color: As selected by Architect from manufacturer's full range
- 18 **2.4 ACCESSORY MATERIALS**  
19 A. General: Accessory materials as described in manufacturer's written installation instructions, recommended  
20 to produce complete traffic coating system meeting performance requirements, and compatible with traffic  
21 coating material and adjacent materials..  
22 B. Single-Component, Non-Sagging Polyurethane Joint Sealant: ASTM C 920, Type NS, Class 50.  
23 1. Basis of Design Product: Tremco Inc., Dymonic 100.

24 **PART 3 - EXECUTION**

- 25 **3.1 EXAMINATION**  
26 A. Surface Condition: Before applying traffic coating materials, examine substrate and conditions to ensure  
27 substrates are fully cured and free from high spots, depressions, loose and foreign particles and other  
28 deterrents to adhesion, and conditions comply with manufacturer's written recommendations.  
29 1. Verify concrete surfaces are visibly dry, have cured for time period recommended by traffic coating  
30 manufacturer, and are free from release agents, curing agents, laitance, and other contaminates.  
31 2. Test surfaces following cleaning and abrasion specified below.  
32 a. Test for capillary moisture by method recommended in writing by traffic-coating manufacturer.  
33 b. Test for traffic coating adhesion per manufacturer's recommended method.  
34 c. Notify Architect in writing of unsatisfactory conditions.  
35 B. Proceed with installation once unsatisfactory conditions have been corrected.
- 36 **3.2 PREPARATION**  
37 A. Surface Preparation: Clean, prepare, and treat substrates in accordance with ASTM C 1127 and traffic  
38 coating manufacturer's written instructions.  
39 1. Remove contaminants, curing compounds, and film-forming coatings from substrates.  
40 2. Remove projections and excess materials and fill voids with manufacturer's recommended substrate  
41 patching material.  
42 3. Prepare surfaces to a uniform profile in accordance with ASTM D 4259 and meeting ICRI Surface  
43 Profile CSP 2 - 4. Do not acid etch.  
44 4. Clean prepared surfaces in accordance with ASTM D 4258.  
45 B. Protect adjacent finished surfaces by masking. Mask termination point on vertical surfaces. Protect weep  
46 holes and drains.  
47

- 1 **3.3 TERMINATIONS AND PENETRATIONS**
- 2 A. Detail Preparation: Prepare vertical and horizontal surfaces at horizontal to vertical transitions, terminations,
- 3 joints, and penetrations through traffic coatings in accordance with ASTM C 1127 and manufacturer's written
- 4 instructions, using accessory materials specified.
- 5 1. At terminations of traffic coating exposed to traffic, rout 1/4 by 1/4 inch keyway in concrete.
- 6 2. Prepare non-moving shrinkage cracks, large cracks, construction joints, expansion joints, projections
- 7 and protrusions, penetrations, drains, and changes in plane in accordance with manufacturer's
- 8 written instructions and details.
- 9 3. Prepare joints and cracks in substrate in accordance with ASTM C 1127 and ASTM D 4258 and
- 10 manufacturer's written instructions.
- 11 B. Joint Sealant Installation: Comply with ASTM C 1193 and manufacturer's written instructions. Allow joint
- 12 sealants to cure adequately before coating with traffic coating.
- 13 1. Provide joint sealant cants with backer rods at penetrations and at horizontal-to-vertical intersections.
- 14 Tool sealant material to form 45 degree angle transition.
- 15 2. Rout and fill cracks with joint sealant and tool flush with surface.
- 16 3. Feather edges of joint sealant applications.
- 17 4. Allow joint sealant to cure. Apply detail coat of base coat over unfilled and filled cracks and joints,
- 18 and feather terminating edges.
- 19 5. Fill expansion joints with backer rod and joint sealant. Do not apply traffic coating over expansion
- 20 joints.
- 21 **3.4 PEDESTRIAN TRAFFIC-COATING APPLICATION**
- 22 A. Primer: Prime metal surfaces, porous surfaces (when required), and preceding coats left uncoated for more
- 23 than 24 hours or that have lost surface tack, with manufacturer's recommended primer. Allow to cure before
- 24 proceeding.
- 25 B. Apply traffic coating according to ASTM C 1127 and manufacturer's written instructions. Use roller-applied
- 26 or self-leveling formulations as recommended by manufacturer for project conditions.
- 27 1. Verify that wet film thickness of each coat complies with requirements every 100 sq. ft.
- 28 C. Apply number of coats of specified compositions for pedestrian traffic coating at locations indicated on
- 29 Drawings.
- 30 1. Base Coat: Single application of not less than 40 mil.
- 31 2. Top Coat: Single application at not less than 15 mil.
- 32 3. Aggregate: Uniformly broadcast aggregate on coats specified to receive aggregate. Embed
- 33 aggregate according to manufacturer's written instructions.
- 34 D. Apply traffic coatings to prepared wall terminations and vertical surfaces to height indicated; omit aggregate
- 35 on vertical surfaces.
- 36 E. Cure traffic coatings. Prevent contamination and damage during application and curing stages.
- 37 **3.5 CLEANING AND PROTECTING**
- 38 A. Clean spills, stains, and overspray resulting application utilizing cleaning agents recommended by
- 39 manufacturers of affected construction. Remove masking materials.
- 40 B. Protect traffic coating from damage from subsequent work.
- 41

**END OF SECTION**

SECTION 07 21 00  
THERMAL INSULATION

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- 12 2.3 [MINERAL-WOOL BLANKETS \[INSUL-3\]](#)
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23 **PART 1 - GENERAL**

24 **1.1 RELATED DOCUMENTS**

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

27 **1.2 SUMMARY**

- 28 A. Section Includes:
  - 29 1. Extruded polystyrene foam-plastic board.
  - 30 2. Polyisocyanurate foam-plastic board.
  - 31 3. Mineral-wool blanket.
  - 32 4. Mineral-wool board.

33 **1.3 ACTION SUBMITTALS**

- 34 A. Product Data: For each type of product.
- 35 B. Sustainable Design Submittals:
  - 36 1. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and
  - 37 cost.
  - 38 2. Product Data: For adhesives, indicating VOC content.
  - 39 3. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting
  - 40 materials.

41 **1.4 INFORMATIONAL SUBMITTALS**

- 42 A. Product test reports.
- 43 B. Research reports.
- 44



- 1 **1.5 DELIVERY, STORAGE, AND HANDLING**  
2 A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other  
3 sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling,  
4 storing, and protecting during installation.  
5 B. Protect foam-plastic board insulation as follows:  
6 1. Do not expose to sunlight except to necessary extent for period of installation and concealment.  
7 2. Protect against ignition at all times. Do not deliver foam-plastic board materials to Project site until  
8 just before installation time.  
9 3. Quickly complete installation and concealment of foam-plastic board insulation in each area of  
10 construction.

11 **PART 2 - PRODUCTS**

- 12 **2.1 EXTRUDED POLYSTYRENE FOAM-PLASTIC BOARD (INSUL-1)**  
13 A. Extruded polystyrene boards also called "XPS boards."  
14 B. Extruded Polystyrene Board, Type VII (INSUL-1): ASTM C 578, Type VII, 60-psi minimum compressive  
15 strength; maximum flame-spread and smoke-developed indexes of 25 and 450, respectively, per  
16 ASTM E 84.  
17 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products  
18 that may be incorporated into the Work include, but are not limited to, the following:  
19 2. Basis-of-Design Product: Subject to compliance with requirements, provide comparable product by  
20 one of the following:  
21 a. DiversiFoam Products.  
22 b. Dow Chemical Company (The).  
23 c. Owens Corning.

- 24 **2.2 POLYISOCYANURATE FOAM-PLASTIC BOARD (INSUL-2)**  
25 A. Polyisocyanurate Board, Foil Faced (INSUL-2): ASTM C 1289, foil faced, Type I, Class 1 or 2.  
26 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products  
27 that may be incorporated into the Work include, but are not limited to, the following:  
28 2. Basis-of-Design Product: Subject to compliance with requirements, provide comparable product by  
29 one of the following:  
30 a. Atlas Roofing Corporation.  
31 b. Dow Chemical Company (The).  
32 c. Hunter Panels.  
33 d. Johns Manville.  
34 e. Rmax, Inc.  
35 3. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.

- 36 **2.3 MINERAL-WOOL BLANKETS (INSUL-3)**  
37 A. Recycled Content: Postconsumer recycled content plus one-half of Pre-consumer recycled content not less  
38 than 35 percent. Pre consumer = 70%. Post-consumer = 0%.  
39 B. Mineral-Wool Blanket, Unfaced (INSUL-3): ASTM C 665, Type I (blankets without membrane facing);  
40 consisting of fibers; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively,  
41 per ASTM E 84; passing ASTM E 136 for combustion characteristics.  
42 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products  
43 that may be incorporated into the Work include, but are not limited to, the following:  
44 2. Basis-of-Design Product: Subject to compliance with requirements, provide comparable product by  
45 one of the following:  
46 a. Industrial Insulation Group, LLC (IIG-LLC).  
47 b. Roxul Inc.  
48 c. Thermafiber Inc.; an Owens Corning company.  
49

- 1    **2.4    MINERAL-WOOL BOARD (INSUL-4)**  
2    A.    Recycled Content: Postconsumer recycled content plus one-half of Pre-consumer recycled content not less  
3    than 35 percent. Pre consumer = 70%. Post-consumer = 0%.  
4    B.    Mineral-Wool Board, Types IA and IB (**INSUL-4**): ASTM C 612, Types IA and IB; unfaced, with maximum  
5    flame-spread and smoke-developed indexes of 15 and zero, respectively, per ASTM E 84; passing  
6    ASTM E 136 for combustion characteristics. Nominal density of 4 lb/cu. ft..  
7    1.    Manufacturers: Subject to compliance with requirements, available manufacturers offering products  
8    that may be incorporated into the Work include, but are not limited to the following:  
9    a.    Industrial Insulation Group, LLC (IIG-LLC).  
10   b.    Roxul Inc.  
11   c.    Thermafiber, Inc.; an Owens Corning company.
- 12   **2.5    ACCESSORIES**  
13   A.    Insulation for Miscellaneous Voids (**INSUL-5**):  
14   1.    Glass-Fiber Insulation: ASTM C 764, Type II, loose fill; with maximum flame-spread and smoke-  
15   developed indexes of 5, per ASTM E 84.  
16   2.    Spray Polyurethane Foam Insulation: ASTM C 1029, Type II, closed cell, with maximum flame-  
17   spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.  
18   B.    Insulation Anchors, Spindles, and Standoffs: As recommended by manufacturer.  
19   C.    Adhesive for Bonding Insulation (**TAPE-1**): Product compatible with insulation and air and water barrier  
20   materials, and with demonstrated capability to bond insulation securely to substrates without damaging  
21   insulation and substrates.
- 22   1.    Adhesives shall have a VOC content of 70 g/L or less.

23   **PART 3 - EXECUTION**

- 24   **3.1    PREPARATION**  
25   A.    Clean substrates of substances that are harmful to insulation, including removing projections capable of  
26   puncturing insulation or vapor retarders, or that interfere with insulation attachment.
- 27   **3.2    INSTALLATION, GENERAL**  
28   A.    Comply with insulation manufacturer's written instructions applicable to products and applications.  
29   B.    Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or  
30   snow at any time.  
31   C.    Extend insulation to envelop entire area to be insulated. Fit tightly around obstructions and fill voids with  
32   insulation. Remove projections that interfere with placement.  
33   D.    Provide sizes to fit applications and selected from manufacturer's standard thicknesses, widths, and lengths.  
34   Apply single layer of insulation units unless multiple layers are otherwise shown or required to make up total  
35   thickness or to achieve R-value.
- 36   **3.3    INSTALLATION OF SLAB INSULATION**  
37   A.    On vertical slab edge and foundation surfaces, set insulation units using manufacturer's recommended  
38   adhesive according to manufacturer's written instructions.  
39   1.    If not otherwise indicated, extend insulation a minimum of 24 inches below exterior grade line.  
40   B.    On horizontal surfaces, loosely lay insulation units according to manufacturer's written instructions. Stagger  
41   end joints and tightly abut insulation units.  
42   1.    If not otherwise indicated, extend insulation a minimum of 24 inches in from exterior walls.
- 43   **3.4    INSTALLATION OF FOUNDATION WALL INSULATION**  
44   A.    Butt panels together for tight fit.  
45   B.    Anchor Installation: Install board insulation on concrete substrates by adhesively attached, spindle-type  
46   insulation anchors.  
47   C.    Adhesive Installation: Install with adhesive or press into tacky waterproofing or dampproofing according to  
48   manufacturer's written instructions.
- 49   **3.5    INSTALLATION OF CAVITY-WALL INSULATION**  
50   A.    Foam-Plastic Board Insulation: Install pads of adhesive spaced approximately 24 inches o.c. both ways on  
51   inside face and as recommended by manufacturer. Fit courses of insulation between wall ties and other  
52   obstructions, with edges butted tightly in both directions. Press units firmly against inside substrates.



SECTION 07 21 29

SPRAYED CELLULOSE ACOUSTICAL INSULATION

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- 6 1.3 [ACTION SUBMITTALS](#)
- 7 1.4 [INFORMATIONAL SUBMITTALS](#)
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- 10 PART 2 – PRODUCTS
- 11 2.1 [SPRAY-ON SYSTEM](#)
- 12 2.2 [MISCELLANEOUS MATERIALS](#)
- 13 PART 3 – EXECUTION
- 14 3.1 [EXAMINATION](#)
- 15 3.2 [PREPARATION](#)
- 16 3.3 [INSTALLATION](#)
- 17 3.4 [PROTECTION](#)

18 **PART 1 - GENERAL**

19 **1.1 RELATED DOCUMENTS**

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

22 **1.2 SUMMARY**

- 23 A. Section Includes:
- 24 1. Sprayed cellulose acoustical insulation (indicated as SAI-1 on the Drawings).
- 25 B. Related Requirements:
- 26 1. Section 07 21 00 "Thermal Insulation" for foam-plastic board insulation.

27 **1.3 ACTION SUBMITTALS**

- 28 A. Product Data: For each type of product.
- 29 B. Manufacturer's Written Certification:
- 30 1. Product contains no asbestos, fiberglass or other man-made mineral fibers.
- 31 2. Recycled Content: Minimum fiber recycled content shall no less than 75%.
- 32 3. Materials shall not contain any added Urea-Formaldehyde Resins.

33 **1.4 INFORMATIONAL SUBMITTALS**

- 34 A. Qualification Data: For Installer.
- 35 B. Product Test Reports: For each product, for tests performed by a qualified testing agency.

36 **1.5 QUALITY ASSURANCE**

- 37 A. Manufacturer shall have a current Underwriters Laboratories (UL) Code Evaluation Report.
- 38 B. Manufacturer shall be in compliance with the 2009 and 2012 International Building Code.
- 39 C. Manufacturer shall subscribe to independent laboratory follow-up inspection services of Underwriters
- 40 Laboratories and Factory Mutual. Each bag shall be labeled accordingly.
- 41 D. Applicator: Licensed by manufacturer.

42 **1.6 DELIVERY, STORAGE AND HANDLING**

- 43 A. Deliver in original, unopened containers bearing name of manufacturer, product identification and
- 44 reference to U.L. testing.
- 45 B. Store materials dry, off ground, and under cover.
- 46 C. Protect liquid adhesive from freezing.
- 47 D. Water to be potable.

1 **PART 2 - PRODUCTS**

2 **2.1 SPRAY-ON SYSTEM**

- 3 A. Performance:
- 4 1. Bond strength shall be greater than 100 psf per ASTM E 736.
  - 5 2. Product shall be Class 1 Class A per ASTM E 84/ UL 723.
  - 6 3. Non-corrosive per ASTM C 739.
  - 7 4. Bond Deflection per ASTM E 759: 6" Deflection in 10' Span – No Spalling or Delamination.
  - 8 5. R-Value shall be 3.75 per inch per ASTM C518.
  - 9 6. Comply with IBC 803.3/2009 IBC 803.10 stability requirements for interior finishes.
  - 10 7. Meet ASTM C 1149.
- 11 B. Basis-of-Design Product: Subject to compliance with requirements, provide International Cellulose Corporation - K-13 Spray-On-Systems or comparable product by one of the following:
- 12 1. Applegate Insulation.
- 13 C. Material:
- 14 1. Color shall be from Manufacturer's standard color chart.
  - 15 2. Comply with local Building Code requirements.
  - 16 3. Material shall have been tested in accordance with ASTM E 1042. Testing laboratory shall be
  - 17 NVLAP accredited.
  - 18

19 **2.2 MISCELLANEOUS MATERIALS**

- 20 A. Primer: Material recommended by insulation manufacturer where required for adhesion of insulation to
- 21 substrates.

22 **PART 3 - EXECUTION**

23 **3.1 EXAMINATION**

- 24 A. Examine surfaces and report unsatisfactory conditions in writing. Do not proceed until unsatisfactory
- 25 conditions are corrected.
- 26 B. Verify surfaces to receive spray insulation to determine if priming/sealing is required to insure bonding
- 27 and/or to prevent discoloration caused by migratory stains.

28 **3.2 PREPARATION**

- 29 A. Clips, hangers, supports, sleeves and other attachments to spray bases are to be placed by other trades
- 30 prior to the application of sprayed insulation.
- 31 B. Ducts, piping, conduit or other suspended equipment shall not be positioned until after the application of
- 32 sprayed insulation.
- 33 C. Provide masking, drop cloths or other satisfactory coverings for materials/surfaces that are not to receive
- 34 insulation to protect from over-spray.
- 35 D. Coordinate installation of the sprayed cellulose fiber with work of other trades.
- 36 E. Prime surfaces as required by manufacturer's instructions or as determined by examination.

37 **3.3 INSTALLATION**

- 38 A. Install spray applied insulation to achieve an average NRC as indicated on the Material Tag Index.
- 39 B. Cure insulation with continuous natural or mechanical ventilation.
- 40 C. Remove and dispose of over-spray.

41 **3.4 PROTECTION**

- 42 A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other
- 43 causes.

44 **END OF SECTION**

SECTION 07 27 15.13

NON BITUMINOUS SELF-ADHERING SHEET AIR BARRIERS

- 1
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- 14 PART 2 – PRODUCTS
- 15 2.1 [MATERIALS](#)
- 16 2.2 [PERFORMANCE REQUIREMENTS](#)
- 17 2.3 [NONBITUMINOUS SHEET AIR BARRIER \(AB-2\)](#)
- 18 2.4 [ACCESSORY MATERIALS](#)
- 19 PART 3 – EXECUTION
- 20 3.1 [EXAMINATION](#)
- 21 3.2 [SURFACE PREPARATION](#)
- 22 3.3 [INSTALLATION](#)
- 23 3.4 [CLEANING AND PROTECTION](#)

24 **PART 1 - GENERAL**

25 **1.1 RELATED DOCUMENTS**

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

28 **1.2 SUMMARY**

- 29 A. Section Includes:
  - 30 1. Self-adhering, vapor-permeable, nonbituminous sheet air barriers.
- 31 B. Related Requirements:
  - 32 1. Section 06 16 00 "Sheathing" for wall sheathings and wall sheathing joint-and-penetration treatments.
  - 33 2. Section 07 42 13.13 "Formed Metal Wall Panels" for the weather barrier envelope system.

34 **1.3 DEFINITIONS**

- 35 A. Air-Barrier Material: A primary element that provides a continuous barrier to the movement of air.
- 36 B. Air-Barrier Accessory: A transitional component of the air barrier that provides continuity.
- 37 C. Air-Barrier Assembly: The collection of air-barrier materials and accessories applied to an opaque wall,
- 38 including joints and junctions to abutting construction, to control air movement through the wall.

39 **1.4 PREINSTALLATION MEETINGS**

- 40 A. Preinstallation Conference: Conduct conference at Project site.
  - 41 1. Review air-barrier requirements and installation, special details, mockups, air-leakage and bond
  - 42 testing, air-barrier protection, and work scheduling that covers air barriers.

43 **1.5 ACTION SUBMITTALS**

- 44 A. Product Data: For each type of product.
  - 45 1. Include manufacturer's written instructions for evaluating, preparing, and treating each substrate;
  - 46 technical data; and tested physical and performance properties of products.
- 47 B. Shop Drawings: For air-barrier assemblies.
  - 48 1. Show locations and extent of air-barrier materials, accessories, and assemblies specific to Project
  - 49 conditions.
  - 50 2. Include details for substrate joints and cracks, counterflashing strips, penetrations, inside and outside
  - 51 corners, terminations, and tie-ins with adjoining construction.
  - 52 3. Include details of interfaces with other materials that form part of air barrier.

- 1 C. Sustainable Design Submittals:
- 2 1. Product Certificates: For regional materials, indicating location of material manufacturer and point of  
3 extraction, harvest, or recovery for each raw material. Include distance to Project and cost for each  
4 regional material.
- 5 **1.6 INFORMATIONAL SUBMITTALS**
- 6 A. Qualification Data: For Installer.
- 7 B. Product Certificates: From air-barrier manufacturer, certifying compatibility of air barriers and accessory  
8 materials with Project materials that connect to or that come in contact with air barrier.
- 9 C. Product Test Reports: For each air-barrier assembly, for tests performed by a qualified testing agency.
- 10 1. Submit documentation from an approved independent testing laboratory certifying compliance with a)  
11 the air leakage rates of the air barrier membrane assembly, including primary membrane, primer and  
12 sealants have been tested to meet ASTM E2357, b) ICC-AC 38, c) Peel adhesion to unprimed  
13 plywood and cyclic and elongation per ICC-AC 48, d) Class A flame spread index and smoke  
14 development per ASTM E-84.
- 15 2. Submit documentation from an approved independent testing laboratory certifying the air leakage and  
16 vapor permeance rates of the air barrier membrane, including primary membrane and transition  
17 sheets, exceed the requirements of the Massachusetts Energy Code and in accordance with ASTM  
18 E2178.
- 19 a. Test report submittals shall include test results of sustained wind loads and gust load air  
20 leakage results.
- 21 D. Field quality-control reports.
- 22 **1.7 QUALITY ASSURANCE**
- 23 A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by  
24 manufacturer.
- 25 **1.8 DELIVERY, STORAGE, AND HANDLING**
- 26 A. Remove and replace liquid materials that cannot be applied within their stated shelf life.
- 27 B. Protect stored materials from direct sunlight.
- 28 **1.9 FIELD CONDITIONS**
- 29 A. Environmental Limitations: Apply air barrier within the range of ambient and substrate temperatures  
30 recommended in writing by air-barrier manufacturer.
- 31 1. Protect substrates from environmental conditions that affect air-barrier performance.
- 32 2. Do not apply air barrier to a damp or wet substrate or during snow, rain, fog, or mist.
- 33 **1.10 WARRANTY**
- 34 A. Provide manufacturer's published 12-year material warranty for air barrier membrane materials, sealant and  
35 flashing membrane.

36 **PART 2 - PRODUCTS**

37 **2.1 MATERIALS**

- 38 A. Source Limitations: Obtain primary air-barrier materials and air-barrier accessories from single source from  
39 single manufacturer.

40 **2.2 PERFORMANCE REQUIREMENTS**

- 41 A. Air-Barrier Performance: Air-barrier assembly and seals with adjacent construction shall be capable of  
42 performing as a continuous air barrier and as a liquid-water drainage plane flashed to discharge to the  
43 exterior incidental condensation or water penetration. Air-barrier assemblies shall be capable of  
44 accommodating substrate movement and of sealing substrate expansion and control joints, construction  
45 material changes, penetrations, and transitions at perimeter conditions without deterioration and air leakage  
46 exceeding specified limits.  
47

- 1 **2.3 NONBITUMINOUS SHEET AIR BARRIER (AB-2)**  
2 A. Basis-of-Design Product: Subject to compliance with requirements, provide BlueskinVP 160 manufactured  
3 by Henry. or comparable product by one of the following:  
4 1. Tremco, Inc., ExoAir 111.  
5 2. Carlisle Coatings & Waterproofing Inc.  
6 3. Cosella-Dörken Products, Inc.  
7 4. GCP Applied Technologies Inc. (formerly Grace Construction Products).  
8 5. VaproShield LLC.  
9 B. Nominal 23-mil- (0.58 mm-) thick, self-adhering sheet consisting of a breathable carrier film or fabric and an  
10 adhesive with release liner on adhesive side and formulated for application with primer that complies with  
11 VOC limits  
12 C. Physical and Performance Properties:  
13 1. Air leakage: <0.004 CFM/ft<sup>2</sup> @ 1.57 lbs/ft<sup>2</sup> when tested in accordance with ASTM E2178,  
14 2. Water Vapor Permeance: 29 perms to ASTM E96, Method B,  
15 3. Tested to ASTM E2357 for Air Leakage of Air Barrier Assemblies,  
16 4. Resistance to Water Penetration: Pass ICC-ES AC 38  
17 5. Water Penetration Resistance around Nails: Pass when tested to AAMA 711-05 & ASTM D 1970  
18 modified,  
19 6. Surface Burning Characteristics: Class A, when tested in accordance with ASTM E84: Flame Spread  
20 Rating of 0 and Smoke Development Classification of 105,  
21 7. Basis Weight: Minimum 160 gm/m<sup>2</sup>, when tested in accordance with TAPPI Test Method T-410,  
22 8. Tensile Strength: 40 lbF MD and 29 lbF CD per ASTM D828,  
23 9. Average Dry Breaking Force: 127 lbF MD, and 91 lbF CD per ASTM D 5034,  
24 10. Cyclic and Elongation: Pass at 100 cycles, -29 degrees C (-20 degrees F) per ICC-ES AC 48

25 **2.4 ACCESSORY MATERIALS**

- 26 A. Requirement: Provide primers, transition strips, termination strips, joint sealants, counterflashing strips,  
27 flashing sheets and metal termination bars, termination mastic, substrate patching materials, adhesives,  
28 tapes, foam sealants, lap sealants, and other accessory materials that are recommended in writing by air-  
29 barrier manufacturer to produce a complete air-barrier assembly and that are compatible with primary air-  
30 barrier material and adjacent construction to which they may seal.  
31 B. Self-adhering membrane for window sill pan flashings shall be Blueskin® SA, LT, or HT manufactured by  
32 Henry; an SBS modified bitumen, self-adhering sheet membrane which is integrally laminated to a blue  
33 polyethylene film. Membrane shall have the following physical properties:  
34 C. Self-adhering membrane for all window jams, headers, door openings, inside and outside corners, and  
35 other transitions shall be pre-cut BlueskinVP™ 160 manufactured by Henry; a self-adhering sheet air barrier  
36 membrane with an engineered film specifically designed to be water resistant and vapor permeable.  
37 Membrane shall have the following physical properties:  
38 D. Low VOC adhesive primer for primary self-adhering water resistive air barrier membrane, self-adhering  
39 transition membrane and SBS modified bitumen membranes at all temperatures shall be Blueskin® LVC  
40 Adhesive as supplied by Henry; a low V.O.C. quick setting rubber based adhesive. Adhesive Primer shall  
41 have the following physical properties:  
42 E. Termination Sealant shall be HE925 BES Sealant manufactured by Henry; a moisture cure, medium  
43 modulus polymer modified sealing compound having the following physical properties:  
44 1. Compatible with sheet air barrier, roofing and waterproofing membranes and substrate,  
45 2. Seals construction joints up to 1 inch wide,

46 **PART 3 - EXECUTION**

47 **3.1 EXAMINATION**

- 48 A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and  
49 other conditions affecting performance of the Work.  
50 1. Verify that substrates are sound and free of oil, grease, dirt, excess mortar, or other contaminants.  
51 2. Verify that substrates have cured and aged for minimum time recommended in writing by air-barrier  
52 manufacturer.  
53 3. Verify that substrates are visibly dry and free of moisture.  
54 B. Proceed with installation only after unsatisfactory conditions have been corrected.



- 1 **3.2 SURFACE PREPARATION**  
2 A. Clean, prepare, treat, fill, and seal substrate and joints and cracks in substrate according to manufacturer's  
3 written instructions and details. Provide clean, dust-free, and dry substrate for air-barrier application.  
4 B. Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other  
5 construction.  
6 C. At changes in substrate plane, apply sealant or termination mastic beads at sharp corners and edges to  
7 form a smooth transition from one plane to another.  
8 D. Cover gaps in substrate plane and form a smooth transition from one substrate plane to another with  
9 stainless-steel sheet mechanically fastened to structural framing to provide continuous support for air barrier.

- 10 **3.3 INSTALLATION**  
11 A. Install materials according to air-barrier manufacturer's written instructions and details to form a seal with  
12 adjacent construction and ensure continuity of air and water barrier.  
13 B. Prepare, treat, and seal inside and outside corners and vertical and horizontal surfaces at terminations and  
14 penetrations with termination mastic.  
15 C. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by  
16 air-barrier sheet on same day. Reprime areas exposed for more than 24 hours.  
17 D. Apply and firmly adhere air-barrier sheets over area to receive air barrier. Accurately align sheets and  
18 maintain uniform minimum lap widths and end laps. Overlap and seal seams, and stagger end laps to ensure  
19 airtight installation.  
20 1. Apply sheets in a shingled manner to shed water.  
21 2. Roll sheets firmly to enhance adhesion to substrate.  
22 E. Apply continuous air-barrier sheets over accessory strips bridging substrate cracks, construction, and  
23 contraction joints.  
24 F. Seal top of through-wall flashings to air-barrier sheet with an additional 6-inch-wide, transition strip.  
25 G. Seal exposed edges of sheet at seams, cuts, penetrations, and terminations not concealed by metal  
26 counterflashings or ending in reglets with termination mastic.  
27 H. Install air-barrier sheet and accessory materials to form a seal with adjacent construction and to maintain a  
28 continuous air barrier.  
29 I. At end of each working day, seal top edge of air-barrier material to substrate with termination mastic.  
30 J. Apply joint sealants forming part of air-barrier assembly within manufacturer's recommended application  
31 temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.  
32 K. Wall Openings: Prime concealed, perimeter frame surfaces of windows, curtain walls, storefronts, and doors.  
33 Apply transition strip so that a minimum of 3 inches of coverage is achieved over each substrate. Maintain  
34 3 inches of contact over firm bearing to perimeter frames, with not less than 1 inch of full contact.  
35 1. Transition Strip: Roll firmly to enhance adhesion.  
36 2. Preformed Silicone Extrusion: Set in full bed of silicone sealant applied to walls, frame, and air-barrier  
37 material.  
38 L. Fill gaps in perimeter frame surfaces of windows, curtain walls, storefronts, doors, and miscellaneous  
39 penetrations of air-barrier material with foam sealant.  
40 M. Repair punctures, voids, and deficient lapped seams in air barrier. Slit and flatten fishmouths and blisters.  
41 Patch with air-barrier sheet extending 6 inches beyond repaired areas in all directions.

- 42 **3.4 CLEANING AND PROTECTION**  
43 A. Protect air-barrier system from damage during application and remainder of construction period, according  
44 to manufacturer's written instructions.  
45 1. Protect air barrier from exposure to UV light and harmful weather exposure as recommended in writing  
46 by manufacturer. If exposed to these conditions for longer than recommended, remove and replace  
47 air barrier or install additional, full-thickness, air-barrier application after repairing and preparing the  
48 overexposed materials according to air-barrier manufacturer's written instructions.  
49 2. Protect air barrier from contact with incompatible materials and sealants not approved by air-barrier  
50 manufacturer.  
51 B. Clean spills, stains, and soiling from construction that would be exposed in the completed Work, using  
52 cleaning agents and procedures recommended in writing by manufacturer of affected construction.

53 **END OF SECTION**

SECTION 07 42 13.13  
FORMED METAL WALL PANELS

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3 PART 1 – GENERAL  
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14 1.11 WARRANTY  
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27 **PART 1 - GENERAL**

28 **1.1 RELATED DOCUMENTS**

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

31 **1.2 SUMMARY**

- 32 A. Section Includes:  
33 1. Zinc alloy metal plate wall panels in an open joint rain screen assembly.  
34 B. Related Sections:  
35 1. Section 05 40 00 – Cold-Formed Metal Framing: Wall panel substrates support framing.  
36 2. Section 06 16 00 – Sheathing: Plywood substrate wall sheathing  
37 3. Section 07 27 15 – Non-bituminous Self-adhering Sheet Air Barriers: Air and moisture barrier  
38 required as part of metal wall panel assembly.  
39 4. Section 07 62 00 – Sheet Metal Flashing and Trim: Field formed flashings and other sheet metal  
40 work.

41 **1.3 PREINSTALLATION MEETINGS**

- 42 A. Coordination: Coordinate panel assemblies with rain drainage, flashing, trim, stud back-up, soffits, and other  
43 adjoining work.  
44 B. Preinstallation Conference: Conduct conference at Project site.  
45 1. Meet with Owner, Architect, Owner's insurer if applicable, metal panel Installer, metal panel  
46 manufacturer's representative, structural-support Installer, and installers whose work interfaces with  
47 or affects metal panels, including installers of doors, windows, and louvers.  
48 2. Review and finalize construction schedule and verify availability of materials, Installer's personnel,  
49 equipment, and facilities needed to make progress and avoid delays.  
50 3. Review methods and procedures related to metal panel installation, including manufacturer's written  
51 instructions.  
52 4. Examine support conditions for compliance with requirements, including alignment between and  
53 attachment to structural members.  
54 5. Review flashings, special siding details, wall penetrations, openings, and condition of other  
55 construction that affect metal panels.

- 1 6. Review governing regulations and requirements for insurance, certificates, and tests and inspections
- 2 if applicable.
- 3 7. Review temporary protection requirements for metal panel assembly during and after installation.
- 4 8. Review of procedures for repair of metal panels damaged after installation.
- 5 9. Document proceedings, including corrective measures and actions required, and furnish copy of
- 6 record to each participant.

7 **1.4 ACTION SUBMITTALS**

- 8 A. Product Data: Submit for each type of product indicated, include construction details, material descriptions,
- 9 dimensions of individual components and profiles, and finishes for each type of metal plate wall panel and
- 10 accessory.
- 11 B. Sustainable Design Submittals LEED Reports:
- 12 1. Submit documentation from manufacturer for amounts of pre-consumer and post-consumer recycled
- 13 content for products specified, and include statement indicating costs for materials having recycled
- 14 content.
- 15 2. Submit documentation showing manufacturing location, and location of harvested raw materials.
- 16 3. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and
- 17 cost.
- 18 C. Shop Drawings: Submit fabrication and installation layouts of metal plate wall panels; including details of
- 19 edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures,
- 20 and accessories; and special details.
- 21 1. Provide distinction between factory-assembled, shop-assembled, and field-assembled work.
- 22 2. Provide details of following items at full scale.
- 23 a. Manufacturer's standard sheet metal trims.
- 24 b. Components of wall panel construction, anchorage methods, and hardware.
- 25 D. Coordination Drawings: Submit exterior elevations, drawn to scale, that have the following items shown and
- 26 coordinated with each other, using input from installers of these items as follows:
- 27 1. Metal plate wall panels and attachments.
- 28 2. Girts.
- 29 3. Wall-mounted items including doors, windows, louvers, and lighting fixtures.
- 30 4. Penetrations of wall by pipes and utilities.
- 31 E. Samples: Submit for each type of exposed finish required, and prepared on samples of size indicated below:
- 32 1. Zinc Alloy Metal Plate Wall Panels: At least 6 inch by 6 inch.
- 33 F. Test and Inspection Reports: Submit test and inspection reports on each type of wall panel system provided
- 34 for project based on evaluation of comprehensive tests performed by qualified testing agency.
- 35 G. Maintenance Data: Submit maintenance data for metal plate wall panels

36 **1.5 INFORMATIONAL SUBMITTALS**

- 37 A. Qualification Data: For Installer.
- 38 B. Product Test Reports: For each product, for tests performed by a qualified testing agency.
- 39 C. Field quality-control reports.
- 40 D. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and
- 41 registered with manufacturer.

42 **1.6 CLOSEOUT SUBMITTALS**

- 43 A. Maintenance Data: For metal panels to include in maintenance manuals.

44 **1.7 QUALITY ASSURANCE**

- 45 A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with
- 46 at least five years of documented experience.
- 47 B. Installer: Company specializing in performing work of this section and approved by manufacturer.
- 48 1. Install system in strict compliance with manufacturer's installation instructions.
- 49 C. Source Limitations: Obtain each type of metal plate wall panel from single source and from single
- 50 manufacturer.
- 51 D. Mockup: Refer to Section 01 43 39 – Mockups for description of construction required to complete a
- 52 mockup submittal for review.
- 53 1. Corner of metal panel cladding system MTLP-1 at external corner, and at curtain wall jamb. Base
- 54 size on at least three typical panel heights per the enlarged elevations and one panel width per
- 55 manufacturer's typical panel sizes for the design intent.

- 1 **1.8 DELIVERY, STORAGE, AND HANDLING**
- 2 A. Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly
- 3 identifying product name and manufacturer.
- 4 B. Storage and Handling: Store materials in clean, dry, interior area in accordance with manufacturer's
- 5 instructions.
- 6 C. Deliver panels, components, and other manufactured items without damage or deformation.
- 7 D. Protect panels during transportation, handling, and installation from weather, excessive temperatures and
- 8 construction operations.
- 9 E. Handle panels in strict compliance with manufacturer's instructions and recommendations, and in a manner
- 10 to prevent bending, warping, twisting, and surface damage.
- 11 1. Store panels vertically with top of panel down, storage of panels horizontally is not permitted.
- 12 Store panels covered with suitable weather tight and ventilated covering.
- 13 G. Provide storage of panels to ensure dryness, with positive slope for drainage of moisture.
- 14 H. Do not store panels in contact with other materials that might cause staining, denting, or other surface
- 15 damage.
- 16 I. Remove strippable protective covering from zinc alloy panel only after installation.
- 17 **1.9 FIELD CONDITIONS**
- 18 A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit
- 19 assembly of metal panels to be performed according to manufacturers' written instructions and warranty
- 20 requirements.
- 21 **1.10 COORDINATION**
- 22 A. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of soffits, and other
- 23 adjoining work to provide a leakproof, secure, and noncorrosive installation.
- 24 **1.11 WARRANTY**
- 25 A. Wall System Warranty: Provide wall panel manufacturer warranty, agreeing to correct defects in
- 26 manufacturing of materials within one year period after Date of Substantial Completion.
- 27 1. Failures include, but are not limited to, the following:
- 28 a. Structural failures, including rupturing, cracking, or puncturing.
- 29 b. Deterioration: Beyond normal weathering of wall system metals and other materials.
- 30 B. Panel Material Warranty: Provide panel material manufacturer warranty, agreeing to repair finish of metal
- 31 plate wall panels that show evidence of corrosive deterioration within specified warranty period.
- 32 1. Finish Warranty Period: 20 years from Date of Substantial Completion.

33 **PART 2 - PRODUCTS**

- 34 **2.1 MANUFACTURER**
- 35 A. Dri-Design – Zinc Alloy Wall Panel System (MTLP-1).
- 36 B. Zinc Alloy Plate Material Supplier:
- 37 1. Unicore Building Products; Product Architectural Zinc, VMZINC®
- 38 **2.2 PERFORMANCE REQUIREMENTS**
- 39 A. Metal Plate Wall Panel Assembly: Metal plate wall panels, attachment system components, miscellaneous
- 40 metal framing, and accessories necessary for a complete weather tight wall system based on AAMA CW-
- 41 RS-1
- 42 B. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content:
- 43 1. Post-consumer content: 17%.
- 44 2. Pre-consumer (Post-industrial) content: 35%.
- 45 C. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following
- 46 loads, based on testing according to ASTM E 1592:
- 47 1. Wind Loads: As indicated on Drawings.
- 48 2. Deflection Limits: For wind loads, no greater than 1/180 of the span.
- 49 3. Provide systems tested in accordance with ASTM E330/E330M and certified to be without permanent
- 50 deformation or failure of structural members.
- 51 D. Metal Plate Wall Panel Assemblies: Comply with performance requirements without failure due to defective
- 52 manufacturing, fabrication, installation, or other construction defects.
- 53

- 1 E. Design, fabricate, and erect a dry joint, pressure equalized rainscreen zinc alloy wall panel system without  
2 use of sealants, gaskets, or butyl tape, tested as installed in compliance with AAMA 508, and as follows:  
3 1. Cyclic Static Air Pressure Differential: Pass cycled pressure loading at 25 psf in 100 three-second  
4 cycles in accordance with ASTM E1233/E1233M.  
5 2. Air Infiltration: Pass when tested at 1.57 psf (25 mph) in accordance with ASTM E283.  
6 3. Water Penetration:  
7 a. Static: Pass water penetration test under 25.0 psf positive static air pressure difference for at  
8 least 15 minutes with 5 gallons per sf per hour of water applied in accordance with ASTM  
9 E331.  
10 b. Dynamic: Pass water penetration test under 15.0 psf dynamic pressure difference for at least  
11 15 minutes with 5 gallons per sf per hour of water applied in accordance with AAMA 501.1.  
12 4. Structural: Provide systems tested in accordance with ASTM E330/E330M and certified to be without  
13 permanent deformation or failure of structural members.  
14 5. System Thermal Design: Installed insulation and CFS clip system, sub-framing, clips and cladding  
15 attachment shall not have thermal bridging of fasteners or framing that creates a continuous metal  
16 path from exterior surface of insulation to interior face of insulation.

17 **2.3 MATERIALS**

- 18 A. Zinc Alloy Plate: Alloy and temper as recommended by manufacturer for application, Architectural Rolled  
19 Zinc, Type 1-Cut from Strip, in accordance with ASTM B69 and manufacturers performance requirements.  
20 1. Thickness: [1.0 mm (0.039 inch)] or [1.5 mm (0.059 inch)].  
21 2. Tensile Strength: Range of 14 to 38 ksi; ASTM B69.  
22 3. Hardness: Range of 54 to 74; in accordance with Rockwell tester for 15T scale; ASTM E18.  
23 B. Panel Depth: As indicated on Drawings.  
24 C. Panel Size: As indicated on Drawings.  
25 D. Panel Joints: As indicated on Drawings.  
26 E. Color:  
27 1. Preweathered Zinc:  
28 a. Quartz Zinc; zinc finish with dark grey aspect.

29 **2.4 FABRICATION**

- 30 A. Fabricate and finish wall panels within manufacturer's facilities and fulfill indicated performance requirements  
31 demonstrated by laboratory testing.  
32 1. Comply with indicated profiles and with dimensional and structural requirements.

33 **2.5 ACCESSORIES**

- 34 A. Metal Plate Wall Panel Accessories: Provide components required for a complete metal plate wall panel  
35 assembly including trim, copings, fascia, mullions, sills, corner units, flashings, and similar items. Match  
36 material and finish of panels unless otherwise indicated.  
37 B. Provide integral drainage system and manufactures standard extrusions at termination of dissimilar  
38 materials.  
39 C. Flashing and Trim: Match material, finish, and color of adjacent wall panels.  
40 1. Thickness: At least 0.040 inch.  
41 2. Refer to Section 07 62 00.  
42 D. Panel Fasteners: Designed to withstand design loads, with at least 7/16 inch diameter head and neoprene  
43 washer.  
44 1. Material: Provide stainless steel fasteners.  
45 E. Sub-Girts: Galvanized, provide size and gage in accordance with project requirements.  
46 1. Furring Channel: Provide Hat, C, U or Z type as recommended by manufacturer.  
47 2. Flat Strap: At least 14 gage, 0.0747 inch (1.90 mm) thick.  
48 3. Refer to Section 05 40 00.  
49 F. CFS Clip (**CLIP-1**): Provide CFS GreenGirt Clip consisting of polyester and vinyl ester bioresin matrix (FRP)  
50 with recycled materials, fire retardant additives and integral continuous metal inserts the length of clip profile.  
51 Reinforce CFS clip with glass strand rovings used internally for longitudinal (lengthwise) strength and  
52 continuous strand glass mats or stitched reinforcements used internally for transverse (crosswise) strength.  
53 1. Length of Clip: 6 inch long.  
54 2. Depth of Clip; Refer to Drawings or as required.  
55 3. Grid Spacing of CFS Clips; Horizontally & Vertically: Refer to Drawings or as required.  
56 G. Substrate Wall Sheathing: Plywood, PS 1, Grade C-D, Exposure I, at least 5/8 inch thick.  
57 1. Refer to Drawings and Section 06 16 00 for requirements.  
58

- 1 H. Air/Weather Barriers: Provide climate specific weather barrier with performance characteristics for air  
2 penetration, water vapor transmission, and water penetration resistance.  
3 1. Refer to Section 07 27 15 for requirements.

4 **PART 3 - EXECUTION**

5 **3.1 EXAMINATION**

- 6 A. Examine substrates, and Work areas and conditions with Installer present for compliance with requirements  
7 for installation tolerances, wall panel supports, and other conditions affecting performance of this Work.  
8 B. Examine wall framing to verify that girts, angles, channels, studs, and other structural wall panel support  
9 members and anchorage have been installed within alignment tolerances required by wall panel  
10 manufacturer.  
11 C. Verify that weather barrier has been installed over sheathing or substrate to prevent air infiltration or water  
12 penetration.  
13 D. Examine rough-in for components and systems penetrating wall panels to coordinate actual penetration  
14 locations relative to wall panel joint locations prior to installation.  
15 E. Proceed with installation only after unsatisfactory conditions have been corrected.

16 **3.2 PREPARATION**

- 17 A. Miscellaneous Framing: Install sub-girt, base angles, sills, furring, and other wall panel support members  
18 and provide anchorage in accordance with ASTM C754 for gypsum panel type substrates and panel  
19 manufacturer's installation instructions.

20 **3.3 INSTALLATION**

- 21 A. Assemble CFS clip system using manufacturer's standard procedures and processes identical to tested  
22 units and as necessary to comply with performance requirements indicated.  
23 1. Install CFS clip system in accordance with manufacturer's installation instructions.  
24 2. Comply with CFS clip system and dimensional and structural requirements as indicated on drawings.  
25 3. Erect CFS clip system in established sequence in accordance with manufacturer's standard  
26 installation procedures.  
27 4. Provide spray foam sealant on backside of cantilevered fasteners that completely puncture insulation  
28 layer.  
29 B. Install wall panels in accordance with manufacturer's installation instructions, including pressure equalized  
30 rainscreen installation method and installation guidelines.  
31 1. Wall panels consist of single sheets of metal formed with interlocking gutter and drainage system  
32 integral to the panel with single horizontal attachment for dry-joint rainscreen assembly.  
33 2. Use of secondary drainage channels, brackets, support pins, joint sealants or gaskets to manage the  
34 drainage of wall panel system is not permitted.  
35 3. Attach wall panels using progressive interlocking method, engaging bottom of panel in top of previous  
36 panel working bottom up, and left to right.  
37 4. Install wall panels with single top attachment in pre-punched holes to allow individual panels to move  
38 due to thermal expansion.  
39 5. Do not compromise internal gutter.  
40 C. Installers shall wear gloves and long sleeve shirts to prevent oils on fingers and skin from leaving marks on  
41 zinc alloy surfaces.  
42 1. Use mineral oil approved by zinc alloy supplier to remove finger prints.  
43 D. To limit damage due to galvanic action on metal panels from water flowing over surfaces, install metals in  
44 the following order from top to bottom; aluminum, zinc, galvalume, lead, and copper.  
45 E. Install wall panels for orientation, sizes, and locations as indicated on Drawings.  
46 F. Install wall panels with proper anchorage and other components for this Work securely in place.  
47 G. Install wall panels with provisions for thermal and structural movement.  
48 H. Install shims to plumb substrates as necessary for installation of wall panels.  
49 I. Install weather tight seals at perimeter of wall panel openings.  
50 1. Test for proper adhesion on small unexposed area of solid surfacing prior to use.  
51 2. Refer to Section 07 92 00.  
52 J. Flashing and Trim: Comply with performance requirements, manufacturer's installation guidelines, and  
53 SMACNA - Architectural Sheet Metal Manual.  
54 1. Provide concealed fasteners where possible, and set units true to line and level as indicated.  
55 2. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.  
56 3. Install flashing and trim as wall panel Work proceeds.

- 1 K. Install weather tight escutcheons for pipe and conduit penetrating exterior walls.  
2 L. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against  
3 galvanic action as recommended by wall panel manufacturer.  
4 M. Install attachment system to support wall panels and with provisions to provide a complete weather tight wall  
5 system, including sub girts, extrusions, flashings and trim.  
6 1. Include attachment to supports and trims at locations using dissimilar materials.  
7 2. Do not apply sealants to joints, unless noted otherwise on Drawings or Shop Drawings.  
8 3. Install starter extrusion at base course and at cut panel locations.  
9 N. Install accessories with positive anchorage to building and weather tight mounting and provisions for thermal  
10 expansion, and coordinate installation with flashings and other components.  
11 1. Install components required for a complete wall panel assembly including trim, copings, flashings  
12 and other accessory items.  
13 O. Weather Barrier: Install weather barrier behind wall panels and over substrate in accordance with  
14 requirements of Section 07 27 15.

15 **3.4 TOLERANCES**

- 16 A. Shim and align wall panel units with installed tolerances of 1/4 inch in 20 feet, non-cumulative, on level,  
17 plumb, and location lines as indicated.

18 **3.5 PROTECTION**

- 19 A. Protect installed products from damage during subsequent construction.  
20 B. Provide protection of wall panels as necessary due to cleaning of adjacent materials with chemicals that  
21 may harm wall panel finish.  
22 C. Replace wall panels damaged or deteriorated beyond successful repair by finish touchup or similar minor  
23 repair procedures.

24 **3.6 CLEANING**

- 25 A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless  
26 otherwise indicated in manufacturer's written installation instructions. On completion of metal panel  
27 installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean  
28 condition during construction.  
29 B. After metal panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.  
30 C. Upon completion of wall panel installation, clean finished surfaces as recommended by panel manufacturer  
31 and panel material supplier.  
32 D. Clean zinc surfaces of fingerprints immediately with wall panel manufacturer approved mineral oil.  
33 E. Upon completion of wall panel installation, clear weep holes and drainage channels of obstructions and dirt.

34 **END OF SECTION**

SECTION 07 52 13

APP MODIFIED ASPHALT BITUMINOUS ROOFING (OPTION A)

PART 1 – GENERAL

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    - 3.21 ACCEPTANCE

**PART 1 - GENERAL**

**1.1 CONDITIONS OF THE CONTRACT**

- A. The conditions of the Contract (General, Supplementary and Other Conditions) and the requirements of Division 1 are hereby made a part of this Section. Applicable provisions of Division 1 shall govern Work under this Section.



1.2 WORK INCLUDED

- A. This Section includes all labor, material, equipment and related services necessary to perform the following Work:
1. Furnish and install new insulated two (2) ply 30-year NDL APP modified bitumen roof membrane system.
  2. Furnish and install new APP modified bitumen roof flashings.
  3. Furnish and install new lead flashings at all drains and vent details.
  4. Coordinate the installation of new metal work incidental to the roofing Work.
  5. Furnish and install new surfacing.
  6. Embed new surface granules into fluid applied and heat applied membrane areas at base flashings only.
  7. Repair or replace adjacent roof areas that are damaged by the roofing Contractor.
  8. Tray-type Vegetated Roof Assemblies.
  9. Vegetated Roof Assembly Accessories.
  10. Provide an all-inclusive warranty as specified herein for the following systems:
    - a. Single Source Warranty for Vegetated Roof Assembly
    - b. Membrane Manufacturer's No Dollar Limit Warranty
    - c. Extended Overburden Warranty for Vegetated Roof Assembly

1.3 RELATED SECTIONS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Section 02 41 50 – Historic Selective Demolition/Deconstruction
- C. Section 07 01 90.71 – Historic Sealant Rehabilitation
- D. Section 07 62 52 – Historic Sheet Metal Flashing and Trim

1.4 QUALITY ASSURANCE

- A. The membrane Manufacturer shall have a minimum ten (10) years experience specializing in modified asphalt roof membranes.
- B. The applicator shall have a minimum five (5) years documented experience specializing in modified asphalt roof membranes.
- C. The roof insulation and membrane system must be applied by a roofing Contractor authorized by the roof system Manufacturer.
- D. The insulation system shall be manufactured by the roof membrane system manufacturer or specifically approved for use in the specified roof membrane system in order to meet all stated warranty requirements.
- E. The applicator shall be licensed by the roof membrane manufacturer to install all roof membrane insulation and vegetated roof assemblies.
- F. The membrane Manufacturer shall approve all components used in the roof system.
- G. At start of new membrane installation, Manufacturer's Representative shall visit the job site to ensure that the installation begins correctly with all installation procedures and guidelines being followed and notify the Architect of his findings. Failure to notify constitutes acceptance of the Work of his licensed applicator (the Contractor) by the Manufacturer.
- H. Upon 50 percent completion of the project, the roof membrane Manufacturer's Representative shall inspect the installation for adherence to installation procedures and guidelines. The installation shall be inspected more frequently if deemed necessary by the Manufacturer, Architect, Owner or Contractor.
- I. Upon completion of the installation, an inspection shall be made by the roof membrane Manufacturer's Representative to ascertain that the roof system has been installed according to the applicable roof membrane Manufacturer's specifications.
- J. All the above indicated job visits shall be documented in writing by the roof membrane Manufacturer's Representative indicating all problems, concerns, recommendations and directives given to the roofing Contractor regarding roof system installation. Copies shall be provided to the Architect within ten (10) days of the inspection date.
- K. It is the roofing Contractor's responsibility to arrange the Manufacturer's Representative's inspections.
- L. There shall be no deviation made from this Specification or the approved shop drawing without prior written approval by the Manufacturer and Architect.

- 1 M. Shop drawings of proposed alternate details shall be submitted to the Architect for approval prior to  
2 the start of construction.
- 3 N. Proposed alternate details and application procedures shall comply with the Specifications,  
4 Drawings and Manufacturer's recommendations.
- 5 O. The Contractor shall keep a copy of the membrane Manufacturer's installation instructions and  
6 these Specifications on site at all times.
- 7 P. **Vegetated Roof Assemblies Installer Qualifications:** A qualified vegetated roof assembly  
8 Installer, approved, authorized or licensed by vegetated roofing system provider, whose work has  
9 resulted in successful establishment of vegetated roofs from pre-vegetated trays.
- 10 1. Field Supervision: Require Installer to maintain an experienced full-time supervisor on  
11 Project site when vegetated roof assembly work is in progress.
- 12 Q. Single Source Responsibility: Vegetated green roof components shall be from a single source.  
13 Installer may request inspection or oversight during installation from the Green Roof Provider.
- 14 R. There shall be no deviation from this Specification or the Drawings. Installer assumes liability for  
15 any deviations from Specifications and/or Drawings.
- 16 S. Installer Qualifications: Installer shall be qualified to install the vegetative green roof system. If  
17 Installer does not meet the minimum requirements, Green Roof Provider technical representative  
18 shall be present for at least 1 work day to verify training and module handling.
- 19 T. Roofing Inspection: By Owner or designated Waterproofing Provider to verify that the waterproofing  
20 surface is approved for installation of the vegetated green roof system.
- 21 1. At a minimum, a slip sheet or protection layer (6 ounce non-woven geotextile or  
22 equivalent) may be required to protect the work surface and waterproofing warranty. Verify  
23 and document the need for a slip sheet or protection layer.
- 24 2. Verify existing roof loads and roof load limitations prior to hoisting green roof materials.
- 25 U. Once the green roof installation is complete, an inspection shall be conducted by a technical  
26 representative of the Green Roof Installer and/or the Green Roof Provider to verify that the green  
27 roof system was installed properly.

#### 28 29 **1.5 REGULATORY REQUIREMENTS**

- 30 A. Materials and construction shall meet the following:
- 31 1. Underwriters Laboratories, Inc. (UL): Class A Fire Hazard Classification.
- 32 2. Factory Mutual Engineering Corporation (FM): Windstorm Resistance Classification, FM  
33 Data Sheets 1-28 (September, 1991 Revision) and 1-49 (Class I-90 Construction); Fire  
34 Classification, Class 1 (FM Approval Standards).
- 35 3. International Conference of Building Officials (ICBO)
- 36 4. Uniform Building Code (UBC).
- 37 5. Regional, State and Local Building Codes and/or Ordinances.

#### 38 39 **1.6 REFERENCES**

- 40 A. References shall refer to the most recent standard.
- 41 1. American Society for Testing and Materials (ASTM).
- 42 2. Federal Specifications (FS).
- 43 3. Factory Mutual System (FM).

#### 44 45 **1.7 DEFINITIONS**

- 46 A. Contract Documents: All specifications and Drawings that collectively describe the requirements for  
47 construction of the Project.
- 48 B. Vegetated Green Roof: An area of landscaped planting constructed over a waterproofed substrate  
49 and separated from the natural ground by a structure.
- 50 C. Vegetated Green Roof System: The complete system of materials and components which are  
51 installed above the waterproofing and result in a vegetated green roof surface.
- 52 D. Extensive Green Roof: These extensive green roof systems are constructed in shallow soil depths  
53 nominal 4-inches with hearty, drought-tolerant plants such as sedums, herbs and groundcovers. In  
54 northern climates, extensive green roofs typically do not require permanent irrigation systems.  
55 However, irrigation may be needed in semi-arid and arid climates. Extensive green roof systems  
56 are low-maintenance and typically require occasional weeding or plant maintenance on an annual  
57 basis.

- 1 E. Growing Medium or Substrate: An engineered, blended mixture composed of composted organic  
2 matter and lightweight, coarse and porous aggregate. The substrate is blended to be lightweight  
3 and conducive to vigorous plant growth.
- 4 F. Filter Fabric: Woven geotextile that is placed within the module (optional) prior to filling media to  
5 reduce likelihood of fines being released via the drainage holes.
- 6 G. Sedum Tile or Mat: An integrated layer of sedum which covers the entire surface of growing media  
7 in the green roof modules. The sedum may be grown in the modules from plugs or cuttings, or  
8 alternatively pre-grown in a production field and harvested into tiles or mat and then rooted in the  
9 modules.
- 10 H. Green Roof System Installer (or 'Installer'): Company retained to install the green roof system as  
11 per this specification.
- 12 I. Waterproofing Provider: Company that provides and/or certifies all materials required for installation  
13 of the building/roof waterproofing, furnishes and verifies installation and water tightness and  
14 confirms acceptability prior to installation of the Green Roof System.
- 15 J. Captured Water: Water that is retained in the drainage layer of a vegetated roof assembly after new  
16 water additions have ceased and that cannot escape the roof except through evaporation or plant  
17 transpiration.
- 18 K. Finish Elevation: Elevation of finished growing-media surface of planting area.
- 19 L. Planting Area: Areas to be planted.
- 20 M. Plant; Plants; Plant Material: Vegetation in general, including trees, shrubs, vines, ground covers,  
21 ornamental grasses, bulbs, corms, tubers, or herbaceous vegetation.
- 22 N. Growing Medium: Manufactured, lightweight soil mixture that promotes good growing conditions for  
23 specific varieties of plants.
- 24 O. FLL Greenroof Guidelines: German Guidelines for Planning, Execution, and Upkeep of Green Roof  
25 Sites, Current Release. Worldwide acknowledged state-of-the-art technology as scientific  
26 foundation for successful and thriving green roofs.
- 27 P. FM Approval: Class Number 4477, Approval Standard for Vegetated Roof System.

#### 28 29 **1.8 SPECIAL ROOFING CONTRACTOR REQUIREMENTS**

- 30 A. The Contractor shall provide a Project Foreman with a minimum of five (5) years documented  
31 experience in the supervision of roof system and vegetated roof assembly installation and shall be  
32 knowledgeable in the type of roof system specified herein.
- 33 B. The Contractor shall not change Foreman or crew without prior approval of the Architect.
- 34 C. The Contractor's Foreman shall be present on the job site during the majority of work hours and  
35 shall be accessible at all times to ensure good Project coordination and communication.
- 36 D. During the workday should the weather conditions appear to be changing adversely, the Foreman  
37 shall take preventative measures to allow the roof to be closed to a watertight condition to avoid  
38 exposure of buildings, equipment and materials.
- 39 E. All Work that requires saw cutting, vacuuming and other similar functions that create substantial  
40 noise and/or vibration shall be coordinated well in advance of the Work with the Owner and the  
41 Architect.
- 42 F. Prior to the start of any roof project, and daily after the start, the Contractor shall review the type of  
43 space below the roof being worked on to ensure that all special requirements because of  
44 occupancy are complied with prior to start of the Work.
- 45 G. Take all necessary precautions to protect the Owner's property as well as adjacent property,  
46 including trees, shrubs, buildings, sanitary and storm sewers, water piping, gas piping, electric  
47 conduit or cable, etc. from any and all damage which may result due to work on this Project.
- 48 H. Repair any Work, damaged by failure to provide proper and adequate protection, to its original  
49 state to the satisfaction of the Owner or remove and replace with new Work at the Contractor's  
50 expense.

#### 51 52 **1.9 PREINSTALLATION CONFERENCE**

- 53 A. Pre-installation Conference: Conduct conference at the Madison Municipal Building; 210 Martin  
54 Luther King Jr Blvd., Madison, WI 53703
  - 55 1. Attendance: Contractor, Installer, Owner Architect, Architect's Roof Consultant, Architect's  
56 Landscape Architect, vegetated roofing system and membrane roofing system  
57 manufacturer representatives, roofing installer, and those requested to attend.
  - 58 2. Meeting Date: Minimum 2 weeks prior to beginning work of this Section, and to prior work  
59 of related Sections affecting work of this Section.

- 1                   3.     Agenda:  
2                   a.     Discuss flood testing and other special considerations for this project.  
3                   b.     Discuss expectations for slip sheets, protection course and vegetated roof  
4                   assemblies including, but not limited to: pre-vegetated trays, edging for trays,  
5                   stand-alone edging, stone mulch, and pavers on tabs.  
6                   c.     Discuss post-installation care including establishment period and maintenance  
7                   regimen.  
8

9     **1.10     SUBMITTALS - ROOFING**

- 10           A.     Submit shop drawings as required. Drawings shall show roof edge condition details, roof  
11           penetration flashing details, standard roof section and all other details required for proper roof  
12           system installation that are not shown in or that differ from the Specifications and Drawings.  
13           B.     Submit a list of materials for use in the Work.  
14           C.     Submit product data for membrane and flashing with temperature range for application of  
15           membrane.  
16           D.     Submit current membrane Manufacturer's installation instructions.  
17           E.     A total of three (3) copies of each submittal are required.  
18           F.     Submit copies of proposed manufacturer's guaranty.  
19           G.     Submit written proof of contractor's approval by specified system manufacturer.  
20

21     **1.11     SUBMITTALS - VEGETATED ROOF ASSEMBLIES**

- 22           A.     Product Data: For each vegetated roof assembly.  
23           1.     Include construction details, material descriptions, dimensions of individual components and  
24           profiles, and finishes.  
25           2.     Include material descriptions for each growing medium.  
26           3.     Include material descriptions for each plant type and characteristics.  
27           B.     Sustainable Design Submittals:  
28           1.     Product Data: For recycled content, indicating postconsumer and pre-consumer recycled  
29           content and manufacturing locations for each system.  
30           2.     Product Data: For tray system product ingredients, disclose product ingredients, source,  
31           manufacturing locations, and recycling options content conforming to LEED requirements.  
32           3.     Product Data: Include FM Approval Class Number 4477 certificate for tray system.  
33           C.     Shop Drawings: For each vegetated roof assembly.  
34           1.     Include plans, sections, and edger locations.  
35           2.     Indicate dimensions, weights, and loads.  
36           3.     Detail field assembly of components, depth of growing media, metal edger connections  
37           (including corner pieces), and attachments to other work.  
38           4.     Note any deviations from the drawings or specs and any limitations of the proposed  
39           vegetated roof assembly components or overall system.  
40

41     **1.12     INFORMATIONAL SUBMITTALS**

- 42           A.     Qualification Data: For Installer.  
43           1.     Written submittal by manufacturer indicating that installer is certified as qualified to perform  
44           the work of this section.  
45           B.     Product Certificates: For each type of manufactured product.  
46           1.     Manufacturer's technical data sheets for standard products.  
47           2.     Analysis of other materials by a recognized laboratory, according to methods established by  
48           the Association of Official Analytical Chemists, where applicable.  
49           3.     Product Test Reports: For complete analysis of each growing medium, for tests performed  
50           by manufacturer and witnessed by a qualified testing agency or by a qualified testing  
51           agency. Confirm that growing medium meets FFL Green Roof Guidelines.  
52           4.     Field quality-control reports.  
53           5.     Sample Warranty: For special warranties.  
54

55     **1.13     PRODUCT DELIVERY, STORAGE AND HANDLING**

- 56           A.     Deliver all materials in Manufacturer's original, unopened containers with Manufacturer's labels  
57           intact and legible.

- 1 B. Store rolls of roofing membrane, cans and drums of cement, primers and coatings on end. Do not  
2 use rolls of roofing membrane that have been flattened out of round and/or been used for  
3 weighting.
- 4 C. Materials shall be stored so as to protect them completely from damage by the elements and  
5 temperatures. Storage of materials on ground and/or rooftop shall be protected with waterproof  
6 canvas covering and stored on raised platforms. The use of pallets or similar type equipment will  
7 be acceptable.
- 8 1. Waterproof canvas covering shall be applied in a watertight manner and securely tied at  
9 the end of each workday or work period.
- 10 2. Use of Manufacturer's product protection wrapping is not acceptable for worksite type  
11 protection. Wrapping shall be side-punctured or end-punctured or slashed before  
12 covering with canvas.
- 13 3. No tears in the waterproof canvas covering will be allowed.
- 14 D. Material storage in warehouse, storage trailer, or tent is recommended.
- 15 E. Keep lids tightly sealed on all emulsions, solvent-based adhesives and cements to keep volatiles  
16 from escaping.
- 17 F. Handling Materials
- 18 1. Do not store or transport roofing materials on the roof in a manner that may exceed the  
19 live load capacity of the deck system or the structure. The Architect during routine  
20 observations may make recommendations as to loading.
- 21 2. Do not transport roofing materials over or store materials on a finished section, without  
22 prior approval of the Architect.
- 23 3. The Contractor's Foremen shall have a hand held thermometer on the roof to check  
24 application temperature.
- 25 G. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight,  
26 certified analysis, name and address of manufacturer, and indication of conformance with state and  
27 Federal laws if applicable. Store away from sources of ignition and extremely high temperatures.  
28 Avoid exposure to heat, sparks, and open flames.
- 29 H. Bulk Materials:
- 30 1. Do not dump or store bulk materials on or near structures, utilities, walkways and  
31 pavements, or existing roof areas or plants.
- 32 2. Provide erosion-control measures to prevent erosion or displacement of bulk materials,  
33 discharge of debris-bearing water runoff, and airborne dust reaching adjacent properties,  
34 water conveyance systems, or walkways.
- 35 3. Store growing medium in a dry area, free of contaminants which may adversely affect the  
36 engineered blend, including weed seeds.
- 37 4. Accompany each delivery of bulk materials with product certificates.
- 38 I. Plant Materials:
- 39 1. Maintain health of plants as recommended by nursery guidelines prior to installation.  
40 Store vegetated planters and materials over plywood panels or protective sheeting on the  
41 roof.
- 42 2. Pre-vegetated trays may be stored in a cool location, below 75 degrees for a maximum  
43 of 24 hours. Do not leave pre-vegetated trays in hot storage areas or sitting in full sun  
44 locations on the project site or on the roof.
- 45 3. Provide water source for irrigating plants per manufacturer's recommendations.
- 46 J. Handle and store materials, and place equipment in a manner to avoid overloading roof structure or  
47 damaging roofing membrane.

48  
49 **1.14 ENVIRONMENTAL REQUIREMENTS**

- 50 A. Do not apply roof membrane or base flashings during inclement weather or when air temperature is  
51 below (or is expected to be below) 40°F (5°C).
- 52 B. Do not start tear off of existing materials when inclement weather is expected.
- 53 C. Vegetated Roofing Assemblies Weather Limitations: Proceed with installation only when existing  
54 and forecasted weather conditions permit installation to be performed when optimum results may  
55 be obtained. Install plant materials when temperatures are between 40 deg F (5 deg C) and 95 deg  
56 F (35 deg C), except as otherwise instructed by manufacturer. Do not install if extended freezing  
57 temperatures are expected or if ambient soil temperature is expected to remain below 50 deg F (10  
58 deg C). Apply products during favorable weather conditions according to manufacturer's written  
59 instructions and warranty requirements.

- 1 D. Protect the roof deck and waterproofing membranes using appropriate materials such as plywood  
2 sheeting. Avoid using sharp tools and keep the roof surfaces clean and free of soil, grit, or debris.  
3

4 **1.15 VEGETATED ROOF PERFORMANCE REQUIREMENTS**

- 5 A. Vegetated roof covering system shall:  
6 1. Support sedums and other vegetated groundcovers.  
7 2. Provide efficient drainage of moisture that is in excess of that required for the vigorous  
8 growth of the installed vegetation.  
9 3. Protect roof waterproofing materials from damage caused by exposure to ultraviolet  
10 radiation, physical abuse, and rapid temperature fluctuations.  
11 4. Retain moisture in accordance with ASTM E2398.  
12

13 **1.16 GUARANTEES, WARRANTIES, CERTIFICATES**

- 14 A. Furnish two copies of the following to the Architect:  
15 1. Contractor's Warranty: The Contractor shall warrant, in writing, that the roof system shall  
16 remain leak free for a period of two (2) years following completion and that the roof system  
17 has been installed according to material Manufacturer's current specification. The  
18 warranty shall cover labor and materials. The MRCA printed guarantee shall be used as a  
19 standard. Roofing Contractor shall verify that the Extended Overburden Warranty for  
20 Vegetated Roof Assembly (see below) is covered by either the Roofing Contractor or Roof  
21 Membrane System Manufacturer.  
22 2. Single Source Warranty for Vegetated Roof Assembly: Provide materials and labor  
23 warranty for both full roof assembly and vegetated roof system (including pre-vegetated  
24 tray systems, metal tray edging, stand-alone metal edging, stone mulch, pavers on tabs,  
25 and other individual components and assemblies that make up the Vegetated Roof  
26 Assembly) for length of roofing membrane warranty along with removal of overburden.  
27 a. Contractor and manufacturer should review this with Architect to confirm that the  
28 system will meet all requirements of all intended warranties.  
29 3. Membrane Manufacturer's No Dollar Limit Warranty: The roof system Manufacturer shall  
30 furnish a Cost of Repair/Replacement Manufacturer's Materials Roofing Guarantee. The  
31 guarantee shall include the costs of repairs or replacement of the membrane and flashing,  
32 and insulation systems damaged as a result of the membrane failure and necessary to  
33 stop leaks which occur during a period of THIRTY (30) years from the date of completion,  
34 as a result of workmanship or deterioration of the membrane system or base flashing.  
35 The guarantee shall cover both labor and materials.  
36 4. Extended Overburden Warranty for Vegetated Roof Assembly: Manufacturer will provide  
37 removal and replacement of vegetated roof assembly.  
38 a. Warranty Period: Twenty years  
39 5. Membrane Manufacturer's Owner Service Manual: Provide for the Owner an  
40 informational manual to include the Manufacturer's approved emergency repair  
41 procedures and materials, maintenance procedures and customer service information.  
42

43 **1.17 CLOSEOUT SUBMITTALS**

- 44 A. Maintenance Data: For vegetated roof assembly and plants, including a recommended  
45 maintenance plan with procedures for inspection and care during a calendar year. Submit before  
46 start of required warranty and maintenance periods.  
47 B. Continuing Maintenance Proposal: From vegetated roof assembly Installer to Owner, in the form of  
48 a standard two-year maintenance agreement, starting on date initial maintenance service is  
49 concluded. State services, obligations, conditions, and terms for agreement period and for future  
50 renewal options.  
51

52 **PART 2 - PRODUCTS**

53  
54 **2.1 ACCEPTABLE MANUFACTURERS**

- 55 A. There will be no substitute roof membrane manufacturers considered for this membrane option  
56 B. Roof Membrane, Insulation and Vegetated Roofing Manufacturer for this system option (Option A)  
57 shall be Derbigum Roof Systems, Inc.  
58 C. Obtain vegetated roof assembly components, growing medium, plants, and accessories from single  
59 source from single manufacturer.

- 1 D. Provide products by Manufacturers specified herein which meet the approval of the specified
- 2 manufacturer. No non-approved materials will be used by the Contractor.
- 3 E. **No material specified or approved shall contain asbestos.**
- 4 F. All materials shall be new unless noted otherwise.

## 5 6 2.2 MATERIALS

### 7 Roof Insulation Membrane System:

#### 8 A. Insulation – thickness as shown on the Drawings

##### 9 1. Flat Stock:

10 a. Polyisocyanurate: ASTM C 1289 Type II and compressive strength of 25 pounds  
11 per square inch nominal, dimensional stability of 2% maximum linear change (@  
12 158°F and 97% relative humidity for 7 days) and a curing time of 24 hours plus  
13 an additional 24 hours per inch of thickness at a minimum of 60°F before  
14 Manufacturer shipment. Rigid board insulation with fiberglass facers such as  
15 Derbiboard by Derbigum or manufacturer approved equal. No substitutions will  
16 be allowed that would void the intended warranty. Fiberglass facers are required.  
17 4' X 4' maximum board size for adhered application, 4' x 8' maximum board size  
18 for mechanically attached application.

19 b. Cover Board: Gypsum Roof Board meeting ASTM C473; 1/2" nominal thickness  
20 such as "DensDeck Prime" by G-P Gypsum Corporation or approved equal.

##### 21 2. Tapered:

22 a. Saddles and Crickets: Tapered ASTM C 1289. (except as noted on the  
23 Drawings, provide taper as required to achieve a minimum net slope of 1/4" per  
24 foot slope) tapered polyisocyanurate system with fiberglass facers, such as  
25 "Derbiboard Tapered" by Derbigum or approved equal. All boards shall be  
26 factory primed.

27 b. Tapered Polyisocyanurate Edge Strip: Tapered ASTM C 1289. tapered  
28 polyisocyanurate system with fiberglass facers, such as "Gemini Series Tapered  
29 Edge Strip" by Atlas Roofing Corporation or approved equal.

30 c. Pre-manufactured tapered sump: tapered ASTM 1289, such as "Panel Q Hinged  
31 Target Sump" by Hunter Panels or manufacturer approved equal.

32 B. Asphalt: Hot asphalt may be used on this Project as an insulation adhesive only.

33 C. Adhesive: Polyurethane spray adhesive such as "Insta-Stik" by the DOW Chemical Corporation  
34 ([www.dow.com](http://www.dow.com)), two-component, low-rise, expanding, polyurethane adhesive such as "OlyBond  
35 Classic" by OMG Roofing Products ([www.olyfast.com](http://www.olyfast.com)) or approved equal or roofing asphalt may be  
36 used to adhere insulation coverboard and saddles and crickets.

37 D. Base Sheet (only as required): ASTM D4601 Type II Oxidized asphalt coated fiberglass matt base  
38 sheet such as PRS Glass Base by Derbigum.

#### 39 E. Fasteners:

40 1. Insulation to metal deck: Fasteners shall be self-drilling, self-tapping, organic  
41 fluoropolymer coated screws (minimum 30 Kesternich Cycles) with a minimum 0.222"  
42 shank diameter with G-90 galvanized metal plate devices, minimum 2-7/8" hexagonal,  
43 such as those manufactured by Olympic Manufacturing Group ([www.olyfast.com](http://www.olyfast.com)), ITW  
44 Buildex ([www.itwbuildex.com](http://www.itwbuildex.com)), or DekFast ([www.sfsintecusa.com](http://www.sfsintecusa.com)), length as required.  
45 Fasteners shall be FM approved for the specific use. In areas of metal deck with conduit  
46 nested within the flutes of the deck, as identified by the Contractor prior to insulation  
47 installation, "Lexsuco Clips" by GAF Materials Corporation ([www.gaf.com](http://www.gaf.com)) shall be used.  
48 Fasteners shall be installed according to the Roof Insulation Installation Section of this  
49 Specification.

50 2. Insulation to wood deck: Fasteners shall be self-drilling, self-tapping, organic  
51 fluoropolymer coated screws (minimum 30 Kesternich Cycles) with a minimum 0.222"  
52 shank diameter with G-90 galvanized metal plate devices, minimum 2-7/8" hexagonal,  
53 such as those manufactured by Olympic Manufacturing Group ([www.olyfast.com](http://www.olyfast.com)), ITW  
54 Buildex ([www.itwbuildex.com](http://www.itwbuildex.com)), or DekFast ([www.sfsintecusa.com](http://www.sfsintecusa.com)), length as required.  
55 Fasteners shall be FM approved for the specific use.

56 3. Wood to wood: Fasteners (nails or lag screws) shall be galvanized and long enough to  
57 penetrate into substrate 1-1/4". Withdrawal resistance shall be 100 pounds per nail  
58 minimum.

4. Wood to masonry/concrete: Fasteners shall be 1/2" minimum diameter metal expansion stud anchors in pre-drilled holes such as "Kwik Bolt 3 Stud Expansion Anchor" by Hilti, Inc. ([www.hilti.co](http://www.hilti.co)) or approved equal.
  5. Wood to metal deck: Fasteners shall be self-drilling, self-tapping, organic fluoropolymer coated screws (minimum 30 Kesternich Cycles) with a minimum 0.201" shank diameter such as "Type 14-10 Heavy Duty All Purpose Screw" by Olympic Manufacturing Group ([www.olyfast.com](http://www.olyfast.com)) or approved equal (fasteners shall be long enough to penetrate metal minimum 3/4").
  6. Concrete Anchor – General: Other fasteners not specifically described shall be as selected by the Contractor subject to approval by the Architect. All fasteners shall meet the requirements set forth herein.
- F. Fiber Cant: Nominal 4 X 4 perlite or 4 X 4 split lumber #2 grade or better, or as indicated on the Drawings.
- G. Insulated Tapered Edge Strips (as required): ASTM C 728 Type 1. Tapered perlite rigid board insulation as shown on the Drawings such as "Tapered Fesco Board" by Johns Manville, or approved equal.
- H. Asphalt Primer: Refer to roof membrane specification section(s) herein for Asphalt Primer.
- I. Other Materials: All other materials not specifically described but required for a complete and proper installation of the Work in this Section, shall be as selected by the Contractor subject to approval by the Architect.

Roof Membrane System:

Bidder's Note: Torch applied membrane system Derbicolor XPS-T6-FR (slate) may be used in any combination acceptable to the manufacturer to achieve the specified warranty at the best possible price.

- A. Base Membrane (this installation will require one (1) base membrane ply – refer to drawings): APP modified asphalt base sheet meeting ASTM D6509 such as "Derbigum GP" by Derbigum Roof Systems, Inc.
- B. Surface Membrane: UL Class A, fire resistance rated, heat welded APP modified asphalt membrane such as "Derbicolor XPS-FR" by Derbigum Roof Systems, Inc. with slate granules.
- C. Base Flashing Stripping Ply: APP modified asphalt base sheet meeting ASTM D6509 such as "Derbigum GP" by Derbigum Roof Systems, Inc.
- D. Base Flashing Surface Ply: Torch applied, UL Class A, fire resistance rated APP modified asphalt membrane such as "Derbicolor XPS-FR" by Derbigum Roof Systems, Inc.
- E. Base Sheet over Lightweight Insulating Concrete: ASTM D4897 (fiberglass), Type II venting base sheet such as "PRS Vented Base Sheet" by Derbigum Roof Systems, Inc.
- F. Fluid Applied Flashing Membrane: "Derbigum Liquid," is a two-component with catalyst, high performance seamless and self-terminating cold fluid applied reinforced unsaturated polyester membrane system, as manufactured by Derbigum Roof Systems, Inc., color shall be white.
- G. Lead Flashing: FS QQ-L11-201, Grade B, 4 lb./sq. ft. lead at drain and plumbing vent details; 30" X 30" required minimum dimension for drains and 12" required minimum roof flange dimension for plumbing vents.
- H. Termination Bar: Stainless steel, 1" high by 0.075" thick, with pre-drilled holes at 8" on-center as manufactured by Advanced Building Products, Inc., Springvale, ME, or approved equal.
- I. Field Membrane Cold Adhesive Mastic: Asbestos-FREE grade, "Permastic" by Derbigum Roof Systems, Inc.
- J. Flashing Membrane Cold Adhesive Mastic: Asbestos-FREE grade, "Perflash" by Derbigum Roof Systems, Inc.
- K. Fasteners (Miscellaneous):
  1. Fasteners such as nails, screws and bolts, etc. shall be compatible with roof membrane and flashing system. They shall be of type and size as shown on the Drawings, recommended by the roof membrane Manufacturer or specified herein.
  2. Screws used to secure metal to blocking shall be No. 8 minimum, galvanized penetrating wood blocking a minimum 1-1/2" and shall have watertight neoprene washers under head. The installed withdrawal resistance shall be a minimum of 150 pounds per screw.
  3. Nails used to secure wood such as fascias, cant strips, blocking and nailers to other wood members shall be galvanized and long enough to penetrate 1-1/4". Two rows are required, staggered when feasible. Spacing in any one row shall not exceed 24". Spacing shall not exceed 12", 8" each way from outside corners. Withdrawal resistance shall be 100 pounds per nail minimum. (Lag screws of equivalent strength may be used if desired.)



- 1 4. Fasteners used to secure lumber to masonry or concrete shall be 1/2" minimum diameter
- 2 metal expansion stud anchors in pre-drilled holes such as "Kwik-Bolt II Stud Expansion
- 3 Anchor" by Hilti, Inc. or approved equal. Space fasteners at 24" o.c. (maximum).
- 4 5. Fasteners used to secure lumber to metal deck shall be self-drilling, self-tapping, organic
- 5 fluoropolymer coated screws (minimum 30 Kesternich Cycles) with a minimum 0.201"
- 6 shank diameter such as "Type 14-10 Heavy Duty All Purpose Screw" by Olympic
- 7 Manufacturing or approved equal (2-1/4" length required for 2x nailer or blocking). Space
- 8 fasteners at 12" o.c. (maximum). **AND/OR** nut, bolt and washer assemblies, 1/2"
- 9 minimum diameter, spaced 4' o.c. and have galvanized metal or stainless steel
- 10 consistency. Stagger if lumber is 6" or wider. At outside corners fasteners shall be
- 11 spaced 2' o.c., 8' each way from the corner. Minimum withdrawal resistance shall be 800
- 12 pounds per fastener.
- 13 6. Fasteners used to secure metal to metal shall be hardened, self-tapping, sheet metal
- 14 gimlet point type, with hex/washer head and be of compatible material.
- 15 7. Other fasteners not specifically described shall be as selected by the Contractor subject to
- 16 approval by the Architect. All fasteners shall meet the requirements set forth in FM Data
- 17 Sheets 1-28 and 1-49 as appropriate.
- 18 L. Asphalt Primer: ASTM D41 asphaltic based primer such as PRS Asphalt Roof Primer by Derbigum
- 19 Roof Systems, Inc.
- 20 M. Cant: DERBICANT, new 1 1/4" x 1 1/4" x 2 or 2 1/4" x 2 1/4" x 3 1/4" regular bitumen cant strip.
- 21 N. Roof Drain Assemblies: Obtain replacement clamps, rings, and strainers. All strainers shall be
- 22 cast iron.
- 23 O. Lumber, Nailers and Blocking: #2 grade wood (lumber) or better with salt preservative pressure
- 24 treatment (0.40 pcf minimum retention).
- 25 P. Plywood: (Thickness as shown on the Drawings) APA exterior rated 4-ply CDX with salt
- 26 preservative pressure treatment (0.40 pcf minimum retention).
- 27 Q. Polyvinyl Chloride (PVC) Piping: Conforming to requirements for Schedule 40, DWV pattern,
- 28 ASTM Specification D1785 and D2665.
- 29 R. Cap Flashing/Membrane Flashing: Ethylene propylene diene monomer (EPDM), 0.45 inches thick
- 30 in compliance with RMA IPR-1 and UL Class A fire rating such as "Carlisle SynTec Systems" by
- 31 Carlisle Corp. or approved equal.
- 32 S. Other Materials: All other materials not specifically described but required for a complete and
- 33 proper installation of the work in this Section, shall be as selected by the Contractor subject to
- 34 approval by the Architect.

35 Vegetated Roof System

- 36 A. Tray-Type Vegetated Roof Assembly: Modular assembly consisting of manufacturer's standard
- 37 trays for field assembly adjacent to and interlocking with each other over roofing system.
- 38 1. Basis-of-Design Product: Provide Derbigreen/Columbia Green Technologies Pre-Grown
- 39 Tray, no substitutions.
- 40 2. Tray Depth, Nominal: 4-5/8 inches (117.5 mm).
- 41 3. Tray Size: 24 by 24 inches (610 by 610 mm).
- 42 4. Tray Material: Injection molded, 100 mil polypropylene, 88 percent post-consumer
- 43 recycled content.
- 44 5. Tray Design: Trays must be fully interlocking and overlap adjacent trays by a minimum of
- 45 1/4 inch (6.5 mm). Tray bottom to have ridges and trough design to maximize air flow and
- 46 retain stormwater.
- 47 6. Connection Holes and Fasteners:
- 48 a. Four 3/8 inch (9.5 mm) holes, aligned and centered in each vertical side panel.
- 49 b. Plastic Tray Pin: Provided by manufacturer.
- 50 c. Hook and Plastic Tray Pin: For integrated drip irrigation. Provided by
- 51 manufacturer.
- 52 7. Growing Medium Depth: Manufacturer's standard media depth for pre-grown trays.
- 53 8. Assembly Weight: Manufacturer's given weight, fully saturated, is 30-32 lbs/sf. Assembly
- 54 shall not ever exceed 40 lbs/sq. ft., including growing media and plants and saturated with
- 55 captured water, but not including weight of roofing system.
- 56 9. Recycled Content: Trays shall have post-consumer recycled content of not less than 88
- 57 percent.

- 1 B. Growing Medium: Vegetated roof assembly manufacturer's lightweight, manufactured soil mixture  
2 designed for Extensive Green Roof areas indicated in the drawings.  
3 1. Basis of Design Product: Columbia Green Technologies; Extensive Growing Medium.  
4 2. General Condition at Time of Planting: Free of aggregates 1/2 inch (13 mm) or larger in  
5 any dimension; free of roots, plants, clods, pockets of sand, paint, building debris, oils,  
6 solvents, roofing materials, and other extraneous materials harmful to plant growth; free of  
7 weeds, disease-causing plant pathogens, and other undesirable organisms.  
8 3. Maximum Media Density: ASTM E 2399, 80 lb/cu. ft. (1280 kg/cu. m) for growing-medium  
9 mixture.  
10 4. Maximum Media Water Retention: ASTM E 2399, 35 to 65 percent by volume for growing-  
11 medium mixture at maximum media density per FLL Green Roof Guidelines.
- 12 C. Plants  
13 1. Pre-grown Tray: Species provided by manufacturer, grown in tray to project specifications  
14 with minimum 90 percent plant coverage. Match hardiness zone.  
15 2. Sourced or approved by Columbia Green Technologies for warranty to apply.  
16 3. Conform to Project landscape design requirements, recommendations of local  
17 horticulturalists, and requirements of authorities having jurisdiction, including Fire Marshal,  
18 for specific recommendations and regulations.
- 19 D. Access Boxes: Vegetated roof assembly manufacturer's aluminum drain boxes with removable,  
20 rigid covers for accessing drains, valves, and switches beneath the finish elevation of growing  
21 medium; secure each cover with four noncorrosive screws.  
22 1. Size: 12 inches (305 mm) square by depth of vegetated roof assembly at each location.
- 23 E. Soil Retainer: Vegetated roof assembly manufacturer's extruded-aluminum edging.  
24 1. Basis-of-Design Product: Columbia Green Technologies; Standard Tray Edger.  
25 2. Tray Edger: 5.5 inch (140 mm) height 18 gauge aluminum with prefabricated tray pin  
26 receiving slot for tray attachment.  
27 a. Color: Mill finish.  
28 b. Corners: Provide manufacturer's Prefabricated Standard Tray Edger Inside  
29 Corner and Prefabricated Outside Corner at 90 degree corners. Match color to  
30 tray edger.  
31 3. Method of Attachment, Tray System: Tray edger is held in place by the weight of the  
32 system. Use manufacturer's standard removable pin fastener to attach edger to sides of  
33 tray.  
34

### **PART 3 - EXECUTION**

#### **ROOFING**

##### **3.1 DEFINITIONS**

- 40 A. The term "phased construction" or "phased application" shall mean the roof system construction or  
41 application process in which all parts of cross-section of a roof system (including vapor retarder),  
42 roof insulation, roof membrane and surfacing are not completed for a particular roof area during  
43 one day or work period.  
44

##### **3.2 EXAMINATION**

- 46 A. The Contractor shall have the sole responsibility for the accuracy of all measurements and for the  
47 estimate of material quantities required and necessary to satisfy the requirements of these  
48 Specifications.  
49

##### **3.3 SUBSTRATE PREPARATION**

- 51 A. Remove the existing construction to the extent shown on the drawings.  
52 B. Do not cut the existing structural components.  
53 C. Clean and dry substrate.  
54 D. Deck Repairs: If deck repairs are required, the Contractor shall contact the Architect immediately.  
55 (All required deck repairs shall be as directed by the Architect and shall be by Change Order.)  
56

##### **3.4 OTHER REPAIRS AND CONSTRUCTION**

- 57 A. Replace all deteriorated construction not originally scheduled for replacement. Repairs shall be by  
58 Change Order and as directed by the Architect.  
59

3.5 ROOF MEMBRANE WORKMANSHIP

- A. All roofing work shall be accomplished with a Foreman fully trained and knowledgeable in the application procedures of the specified roof membrane. The Foreman shall oversee the work of all working personnel who are thoroughly skilled in the application of specified materials. All workmanship to be of the very best quality and shall be done in such a manner as to fulfill the intent of the Drawings and Specifications.
- B. Bidder's Note: Propane torch work will not be allowed at the surface membrane laps. Contractors shall utilize hot air welding robots or other equipment approved by the Architect. Bleed-out will be monitored closely.
- C. Any propane torch work shall be pre-approved by the Architect and completed in accordance with NRCA/MRCA CERTA program requirements. All propane equipment shall be handled by CERTA-certified operators only.
- D. Weather Condition Limitations: Proceed with roofing work only when existing and forecasted weather conditions will permit Work to be performed in accordance with the requirements of this Specification.
- E. After starting the Work, the Contractor shall be responsible for complete moisture integrity of the roofing and flashing membrane and for providing a properly applied roof. Therefore, the Contractor shall:
1. Establish and follow application procedures to insure that adequate quantities of materials are used.
  2. Maintain competent Foreman continuously supervising the Work with authority to discard unsuitable materials and remove unsatisfactory workmen from the Project.
  3. Observe all fire precautions involving the storage and handling of roofing materials. Provide adequate quantity of fire extinguishers at the worksite, especially at any open flames.
  4. Comply with current roofing safety standards at all times.
  5. Supervise installation of and be responsible for seeing that roof mechanical and electrical equipment, roof drains, etc. are properly set without damage to the roof. Make roof and flashing repairs as necessary and advise the Architect in writing of all potential leaks as may be caused by other trades not under the Contractor's control.
  6. Under no conditions shall any roofing materials be applied before sunrise, or at anytime when there are indications of moisture present (rain, mist, dew, frost, and snow).
  7. Install only as much roofing material as can be completed and covered in accordance with the requirements of this Specification in any one day or work period.
  8. Apply roofing membrane as directed by the Manufacturer and in strict accordance with this Project Manual.
  9. Avoid walking on membrane while being laid, roofing mechanic shall set and kick the roll of roofing membrane from the insulation or deck side, not from the side previously covered with roofing membrane.
  10. Insure that all wheeled equipment on the roof be equipped with pneumatic tires.
  11. Permit no traffic over, nor stack roofing equipment or materials on completed new roofing surfaces without adequate protection with 1/2" plywood.
  12. Insure that all fishmouths are cut (do not attempt to walk down) and objects causing separation are removed. Patch the areas if the cut is made after the bitumen has set.
  13. Install flashings at openings, projections and walls adjoining new roofing every day or work period. If circumstances do not allow this, these areas shall be made watertight at the end of each day or work period.
  14. At the end of each day's Work, install temporary water cut-offs at all points where the roof membrane does not abut a wall, wood edge member or expansion joint. Water Cut-Off: At end of day's work, or when precipitation is imminent, construct a water cut-off at all open edges. Cut-offs can be built using plastic cement and roofing felts, constructed to withstand protracted periods of service. Cut-offs must be completely removed prior to the resumption of roofing. The water cut-off shall be removed completely before continuing the roof installation. If breaks occur in the water cut-offs or any other part of the roof membrane and water damages the roof insulation, all damaged roof insulation, vapor retarder and roof membrane over the damaged insulation shall be removed and replaced with new materials.
  15. When using hot air welding equipment, follow all specified procedures outlined by the roof membrane Manufacturer.

- 1                   16.     Comply with other workmanship requirements as outlined in other Sections of this  
2                   Specification.  
3

4 **3.6     PHASED CONSTRUCTION CRITERIA**

- 5     A.     Phased construction of the roof membrane, outside the normal recommendations of the membrane  
6           manufacturer will not be permitted.  
7

8 **3.7     ROOF INSULATION INSTALLATION**

- 9     A.     Insulation Attachment, All Deck Types:  
10           1.     Mechanically attached - Mechanically fasten base sheet or insulation, as noted on the  
11                   Drawings, in a Factory Mutual 1-90 pattern. Verify fastening pattern with Architect.  
12           2.     Loose-laid - Install insulation without attachment.  
13           3.     Foam Adhesive Adhered – Adhere insulation as noted on Drawings in full applications of  
14                   adhesive.  
15     B.     Install all base layers of insulation as indicated on the drawings.  
16     C.     The two opposite sides of any base layer insulation board shall be directly supported to provide the  
17           maximum bearing width (minimum 1.5"). Board edges shall be trimmed as required.  
18     D.     Install insulation coverboard atop base layer as indicated on the Drawings (adhered with hot  
19           asphalt or low rise foam adhesive).  
20     E.     Install tapered insulation for saddles and crickets as indicated on the Drawings (adhered with hot  
21           asphalt or low rise foam adhesive).  
22     F.     Install cover board insulation as indicated on the drawings atop preceding layers of insulation,  
23           including saddles and crickets. Cut or score insulation boards to conform to angles of new  
24           substrate (adhered with hot asphalt or low rise foam adhesive).  
25     G.     Limit gaps to 1/8" maximum between boards. Stagger all board joints within the field of the roof.  
26           Offset the end and side joints a minimum of 6" from the joints of the preceding layer.  
27     H.     Cover all installed insulation with roofing membrane by the end of each day.  
28

29 **3.8     ROOF MEMBRANE APPLICATION**

- 30     A.     Prior to roof membrane application, coordinate all HVAC work with the Owner's HVAC  
31           representative. Proper coordination of this work will be the responsibility of the Contractor.  
32     B.     Execute Work such that the membrane can be sealed on a down slope surface at the end of each  
33           day.  
34     C.     Atop insulation install all modified asphalt membrane materials in strict accordance with the  
35           membrane manufacturer's requirements.  
36     D.     Install longitudinal runs of roof membrane at right angles to the main slope direction (at roof slopes  
37           not exceeding 1/2" per foot) of the field of the roof (or continuous with the roof section's long  
38           dimension). Begin membrane installation at the low point of the roof. Shingle membranes such  
39           that water does not run against seams and laps.  
40     E.     All membrane materials shall be laid free from wrinkles, buckles and voids and shall be turned up  
41           and adhered or heat welded to cant strips and trimmed at vertical walls.  
42     F.     Membrane construction shall not be phased. "Phasing" shall be defined by the manufacturer.  
43     G.     At end of day's work, or when precipitation is imminent, construct a water cut-off at all open edges.  
44           Cut-offs can be built using plastic cement and roofing felts, constructed to withstand protracted  
45           periods of service. Cut-offs must be completely removed prior to the resumption of roofing.  
46     H.     At the end of every day, install "three-course" flashing system consisting of alternating layers of  
47           reinforcement material and mastic to all wall terminations.  
48

49 **3.9     BASE FLASHING INSTALLATION**

- 50     A.     Install new wood blocking and metal where required and as specified in other Sections of this  
51           Specification.  
52     B.     All rooftop equipment (including plumbing vents, base flashings, exhaust fans, skylights, vents,  
53           etc.) shall be raised by the roofing Contractor with specified and/or approved material to provide a  
54           minimum of 8" between the surface membrane and the top of the base flashing.  
55     C.     Install the base flashing according to the Drawings and roof membrane Manufacturer's  
56           requirements.  
57     D.     Nail at 8" o.c. top edge and vertical laps of the base flashing to the substrate.  
58     E.     Install "three-course" flashing system consisting of alternating layers of reinforcement material and  
59           mastic to the tops of all exposed base flashings.

- 1 F. Extend plumbing vents as necessary to assure a minimum of 8" of flashing height as measured  
2 from the surface membrane to the top of the vent stack. Furnish and install PVC piping with EPDM  
3 couplers as required.
- 4 G. Install lead flashing at plumbing vents. Lead shall be installed in mastic over base sheet  
5 underlayment and flashed with base sheet underlayment material (as shown on the Drawings) prior  
6 to membrane installation. Prime lead prior to installation.
- 7 H. Install lead flashing at all drain locations. Lead shall be installed in mastic over base sheet  
8 underlayment and flashed with base sheet underlayment material (as shown on the Drawings) prior  
9 to membrane installation. Prime lead prior to installation.
- 10 I. Prime all sheet metal that is to be stripped into the roof membrane. Allow primer to dry before  
11 stripping in.
- 12 J. Comply with applicable recommendations of Factory Mutual Prevention Data 1-49.
- 13 K. All flashings on the section being rehabilitated shall be completed or made watertight by the end of  
14 the working day.

### 3.10 MISCELLANEOUS DETAILS

- 16 A. Roof Drains
- 17 1. Disassemble and remove domes and clamping collars scheduled to remain. Clean and  
18 examine sumps and leader components as directed. Replace all missing or broken  
19 components. Install new drain and bolts.
- 20 2. Install and seal roof membrane and flashings at drains according to the Drawings.
- 21 3. All roof drain systems shall be installed to allow positive water flow into the roof drain from  
22 the roof surface.
- 23 4. Replace strainers in drains at the end of each working day.

### VEGETATED ROOF ASSEMBLIES

#### 3.11 EXAMINATION

- 28 A. Examine each area to receive vegetated roof assembly for compliance with requirements for  
29 installation tolerances and other conditions affecting performance.
- 30 1. **Verify that** roof insulation over roofing membrane is in place, secure, and flush along all  
31 seams.
- 32 2. Verify that perimeter and other flashings are in place and secure along entire lengths  
33 where they will be covered by vegetated roof assembly.
- 34 3. Verify protection course over membrane roofing is in place and conforming to roofing  
35 manufacturer instructions, as inspected and accepted by roofing manufacturer's technical  
36 representative.
- 37 B. Inspect growing medium.
- 38 1. Verify that no foreign or deleterious material or liquid, such as paint, paint washout,  
39 concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel,  
40 paint thinner, turpentine, tar, roofing compound, or acid has been deposited in growing  
41 medium within a planting area.
- 42 2. If growing medium is contaminated by foreign or deleterious material or liquid, remove  
43 growing medium and contamination and replace with new growing medium.

#### 3.12 INSTALLATION, GENERAL

- 46 A. Protection Course: Cover roofing system with protection board if required by roofing manufacturer  
47 with butted and fully taped joints before roofing system is subject to vegetated roof assembly  
48 installation work.
- 49 B. Sweep with broom and then use air compressor to blow remaining dust and debris from substrate.
- 50 C. Install vegetated roof assembly according to manufacturer's written instructions.
- 51 D. Prepare Surface:
- 52 1. All surfaces to be smooth, free of debris, soil, and grit prior to placing modules. All  
53 surfaces shall be maintained clean and free of debris, soil, and grit during installation.  
54 Never walk upon such materials as they may damage waterproofing membrane. If  
55 required, clean the surface as recommended by Waterproofing Provider.
- 56 E. Protect Roof Surface and Structures:
- 57 1. Traffic over the working area shall be restricted and controlled to qualified personnel only.  
58 Provide safety signage, barriers and safety equipment, as appropriate.
- 59

- 1 2. Protect heavily traveled areas or use protected layers during mobilization of materials and  
2 equipment to the work area, as recommend by the Waterproofing Provider.  
3 3. Prevent materials from entering and clogging roof drains and conductors and from spilling  
4 or migrating onto surfaces of other construction.  
5 F. Inspect the Work Area:  
6 1. Perform a pre-installation inspection of the work areas  
7 2. Install slop sheet or protection later above the roof membrane waterproofing in  
8 accordance with manufacturer's guidance. The roof surface shall be smooth, free of  
9 debris and grit before installing a slop sheet or protective layer.  
10 3. Perform module installation only after appropriate roof waterproofing system has been  
11 installed, tested for leaks, and certified to be ready for installation of green roof system.  
12 Verify that roof assembly is watertight and free draining.

13 **3.13 TRAY PLACEMENT**

- 14 A. Install trays according to manufacturer's written instructions and details.  
15 B. Place trays directly over protection cover provided under roofing work of this Section.  
16 C. Position bottom troughs of trays perpendicular to direction of roof slope, except minor crickets.  
17 D. Orient and overlap interlocking sides to hold trays in place.

18  
19 **3.14 TRAY EDGER INSTALLATION**

- 20 A. Install edger according to manufacturer's written instructions and details.  
21 B. Install tray edger at vegetated roof perimeter to conceal tray sides.  
22 C. Place short end of edging under tray so that it is held in place by weight of tray. Ensure inverted  
23 "U" section at top of edger conceals tray edge.  
24 D. Abut lengths of edging neatly. Allow 1/4 inch (6 mm) gap maximum between edging sections.  
25 Adjust and trim edging to align sections and achieve a tight fit.  
26 E. Corners: Utilize manufacturer's prefabricated corners.  
27 F. Access Boxes: Install access box at each drain, valve, and switch. Install top of boxes 0.5 - 1  
28 inches above the finish elevation of growing medium where applicable.  
29

30 **3.15 PLANTING**

- 31 A. Thoroughly water plant material immediately after planting, at the end of each work day, and after  
32 the entire installation of plant material is completed.  
33 B. Inspect planting work at the end of each day and after entire installation is complete. Immediately  
34 repair any areas that show signs of subsidence, un-evenness, or extreme plant stress with new  
35 materials conforming to this Section.  
36

37 **3.16 FIELD QUALITY CONTROL**

- 38 A. Testing Agency: Owner will engage a qualified testing agency to perform tests.  
39 B. Perform the following tests:  
40 1. Flood Testing: Flood test each deck area for leaks, according to procedures in  
41 ASTM D 5957, after completing and protecting roofing membrane but before placing  
42 overlaying construction. Install temporary containment assemblies, plug or dam drains,  
43 and flood with potable water.  
44 a. Flood to an average depth of 2-1/2 inches (64 mm), with a minimum depth of 1  
45 inch (25 mm) and a maximum depth of 4 inches (100 mm). Maintain 2 inches (50  
46 mm) of clearance from top of sheet flashings.  
47 b. Flood each area for **72** hours.  
48 C. Correct deficiencies in work that do not comply with requirements.  
49 D. Prepare test and inspection reports.  
50

51 **3.17 ADJUSTING**

- 52 A. Make adjustments and alignments of trays and metal edger as necessary to give a uniform and  
53 finished appearance.  
54 B. Replace plant material that appears to be stressed or damaged.  
55  
56  
57

1 **3.18 CLEANING**

- 2 A. During planting and maintenance, keep adjacent areas and construction clean and maintain work  
3 area in an orderly condition.  
4

5 **3.19 PROTECTION**

- 6 A. Protect vegetated roof assemblies from damage, including growing-medium contamination, due to  
7 operations of other contractors and trades. Repair or replace damaged vegetated roof assemblies.  
8

9 **3.20 MAINTENANCE SERVICE**

- 10 A. Maintenance Service: Provide maintenance by skilled employees of vegetated roof assembly  
11 Installer approved by roofing-membrane manufacturer. Begin maintenance immediately after plants  
12 are installed and continue until plantings are acceptably healthy and well established but for not  
13 less than the specified maintenance period.

- 14 1. Assembly and Plant Maintenance: During maintenance period, maintain plantings by  
15 cultivating, watering, hand-weeding, fertilizing (if necessary), adjusting and repairing, and  
16 performing other operations as required to establish healthy, viable plantings.  
17 a. Replace growing medium that becomes displaced or eroded because of settling  
18 or other processes.  
19 b. Apply treatments as required to keep plant materials, planted areas, and growing  
20 medium free of pests and pathogens or disease. Use integrated pest  
21 management practices whenever possible to minimize the use of pesticides and  
22 reduce hazards. Treatments include physical controls such as hosing off foliage,  
23 mechanical controls such as traps, and biological control agents.  
24 c. Use only products and methods acceptable to roofing-membrane manufacturer.  
25 d. Following maintenance period, instruct Owner and furnish written maintenance  
26 instructions as necessary for planting materials to develop and maintain healthy  
27 root structure.

- 28 2. Maintenance Period: 24 months from date of Planting Completion.

- 29 B. Record all green roof maintenance events. Include name of person, date and activity.

- 30 1. If growing media test, record lab, test and results.  
31 2. If fertilizer, record type and amount applied per 1000 sf.  
32 3. Record time needed for bi-weekly weed walk and drain inspection.

- 33 C. Foot Traffic: Limit foot traffic to a random path a couple times per week by one person. Avoid  
34 walking in a single path, standing in one place, or trampling plants. If parapet or adjoining wall  
35 must be serviced, plants may be covered with plywood or foam sheeting for up to 4 hours  
36 intermittently, provided foliage is not wet or frozen and conditions are not too hot or sunny.

- 37 D. Spring Maintenance (March to June):

- 38 1. Soil Testing and Fertilization. Approximately 2-3 weeks before spring "growth flush",  
39 administer an annual soil test for PH and fertility levels. Growth flush varies by region,  
40 consult biweekly maintenance protocol email for specific recommended testing date in  
41 project's region.  
42 2. Maintain pH in the range of 6.5 to 8.0. In the event that pH falls below 6.0, consult the testing  
43 lab for appropriate recommendations to increase alkalinity. If the soil is above 8.0, it can be  
44 made more acidic with elemental Sulphur or an application of acidifying fertilizer.  
45 3. Maintain fertility in the normal range using a typical field soil fertility test as provided by A&L  
46 labs or equivalent testing lab. Evaluate the various nutrient levels such as Nitrogen (N or  
47 NO3N), Potassium (K), Phosphorus (P). If the soil contains a low (L) amount of these  
48 nutrients, conduct a single application of controlled release fertilizer, such as Nutricote® or  
49 Osmocote®, at the lab recommended rate. Ensure that fertilizer contains NO Herbicides or  
50 Pesticides. Follow the fertilizer labeled directions for application rate and use a rotary  
51 spreader to ensure even fertilizer application. Runoff potential does exist and should be  
52 evaluated by the applicator in accord with the site specifics; the greater the runoff sensitivity,  
53 the lower the application rate. All applications of fertilizer are the sole responsibility of the  
54 applicator.  
55 4. Coordinate with irrigation contractor to ensure that irrigation system is brought back on-line  
56 at the appropriate time to avoid freezing but to provide adequate water to plants starting in  
57 the spring.  
58 5. Conduct Monthly Inspections:

- 1 a. Weed Walk: Pull and dispose of all weeds before they flower and set seed.  
2 NEVER allow any woody plant to establish in a green roof system, unless they  
3 have been specified in intensive green roof areas as part of this project.
- 4 b. Displaced Soil: Nesting birds may displace soil. Replace lost soil using only  
5 manufacturer's specific, tested, approved engineered green roof growing media  
6 based on the intensive or extensive area in which the displacement occurs.
- 7 c. Drainage Inspection: Inspect roof drains for any debris, pebbles or leaves and  
8 remove to ensure proper drainage.
- 9 d. Debris Removal: Remove any debris blown onto the roof immediately to ensure  
10 no damage to plants.
- 11 e. Pest Control: Monitor pest presence, as most pest problems are the result of an  
12 imbalance in the relationship of pest organism and its natural biological controls  
13 and these problems may self-correct. If pest problems are persistent, use  
14 organic and natural biological control agents to restore balance. Pesticide use is  
15 discouraged and should always be considered secondary to cultural and  
16 biological control measures, as pesticides can contaminate runoff water and  
17 cause environmental damage. Pesticides shall only be applied by qualified and  
18 licensed applicators, and only as required. All applications of pesticides are the  
19 sole responsibility of the applicator.
- 20 f. Examine paver and stone mulch areas. Correct any areas that have settled,  
21 where stone mulch has been displaced, where pavers have separated away from  
22 one another, and/or correct any other unsatisfactory conditions related to the  
23 pavers, stone mulch, and edging for the duration of the maintenance period.
- 24 E. Summer Maintenance (June to September):  
25 1. Conduct Monthly Inspections as outlined above for Spring Maintenance.
- 26 F. Fall Maintenance (October to November):  
27 1. Conduct Monthly Inspections as outlined above for Sprint Maintenance.  
28 2. **Do Not Fertilize** during the fall. It may stimulate tender growth and compromise the cold  
29 hardiness of the plant materials.  
30 3. **Do Not Water Period:** For northern temperate zones, do not water within 4 weeks of the  
31 expected average frost date. Normally, there is plenty of moisture this time of year, and  
32 adding additional water may compromise the durability of the plants to endure winter's cold.  
33 For this reason, watering during the winter is also not recommended.
- 34 G. Winter Maintenance:  
35 1. Avoid walking on frozen plants and roof surfaces as they are slippery and dangerous.  
36 2. If clear pathways are needed, avoid using salt and other deicing chemicals, which may kill  
37 plants and damage pavers. Instead, use sand or cat litter as anti-slip agents. Consider use  
38 of heat strips with pavers, provided they can be applied without damage to the roofing  
39 membrane.  
40 3. Avoid piling the snow in a single place. Disperse snow evenly over the green roof plantings  
41 as excess snow piling can potentially damage plants by insulating the plants and keeping  
42 them warm and wet, thereby triggering fungal diseases.
- 43 H. Watering:  
44 1. Water only during establishment period outlined in LEED SSc6.1.

45  
46 **3.21 ACCEPTANCE**

- 47 A. Conduct post installation inspection to determine acceptance of vegetated green roof assemblies.  
48 Inspection to be made by Construction Manager or by Owner's Representative upon Vegetative  
49 Roof Assembly Contractor's request; five working days' notice required.
- 50 B. Installer is responsible to complete requirements to obtain confirmation of warranty from the green  
51 roof systems manufacturer(s).
- 52 C. Installer is responsible to ensure proper maintenance until work has been accepted by  
53 representative of Owner or Construction Manager.
- 54 D. Upon acceptance, and at the end of the maintenance and warranty period, Owner assumes  
55 responsibility for maintenance unless otherwise specified.  
56  
57

**END OF SECTION**



SECTION 07 52 16

SBS MODIFIED ASPHALT BITUMINOUS ROOFING (OPTION B)

PART 1 – GENERAL

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    - 3.21 ACCEPTANCE

**PART 1 - GENERAL**

**1.1 CONDITIONS OF THE CONTRACT**

- A. The conditions of the Contract (General, Supplementary and Other Conditions) and the requirements of Division 1 are hereby made a part of this Section. Applicable provisions of Division 1 shall govern Work under this Section.

**1.2 WORK INCLUDED**

- A. This Section includes all labor, material, equipment and related services necessary to perform the following Work:

- 1 1. Furnish and install new three (3) ply 30-year NDL SBS modified bitumen roof membrane
- 2 system.
- 3 2. Furnish and install new SBS modified bitumen roof flashings.
- 4 3. Furnish and install new lead flashings at all drains and vent details.
- 5 4. Coordinate the installation of new metal work incidental to the roofing Work.
- 6 5. Furnish and install new surfacing.
- 7 6. Embed new surface granules into all "bleed-out" areas.
- 8 7. Repair or replace adjacent roof areas that are damaged by the roofing Contractor.
- 9 8. Tray-type Vegetated Roof Assemblies
- 10 9. Vegetated Roof Assembly Accessories
- 11 10. Provide an all-inclusive warranty as specified herein for the following systems:
- 12 a. Single Source Warranty for Vegetated Roof Assembly
- 13 b. Membrane Manufacturer's No Dollar Limit Warranty
- 14 c. Extended Overburden Warranty for Vegetated Roof Assembly

### 1.3 RELATED SECTIONS

- 17 A. Drawings and general provisions of the Contract, including General and Supplementary Conditions
- 18 and Division 01 Specification Sections, apply to this Section.
- 19 B. Section 02 41 00 – Historic Selective Demolition/Deconstruction
- 20 C. Section 07 01 90.71 – Historic Sealant Rehabilitation
- 21 D. Section 07 62 52 – Historic Sheet Metal Flashing and Trim

### 1.4 QUALITY ASSURANCE

- 24 A. The membrane Manufacturer shall have a minimum ten (10) years experience specializing in
- 25 modified asphalt roof membranes.
- 26 B. The applicator shall have a minimum five (5) years documented experience specializing in modified
- 27 asphalt roof membranes and shall be licensed by the roof membrane manufacturer to install all roof
- 28 membrane insulation and vegetated roof assemblies.
- 29 C. The roof insulation and membrane system must be applied by a roofing Contractor authorized by
- 30 the roof system Manufacturer.
- 31 D. The insulation system shall be manufactured by the roof membrane system manufacturer or
- 32 specifically approved for use in the specified roof membrane system in order to meet all stated
- 33 warranty requirements.
- 34 E. The membrane Manufacturer shall approve all components used in the roof system.
- 35 F. At start of new membrane installation, Manufacturer's Representative shall visit the job site to
- 36 ensure that the installation begins correctly with all installation procedures and guidelines being
- 37 followed and notify the Architect of his findings. Failure to notify constitutes acceptance of the
- 38 Work of his licensed applicator by the Manufacturer.
- 39 G. Upon 50 percent completion of the project, the roof membrane Manufacturer's Representative shall
- 40 inspect the installation for adherence to installation procedures and guidelines. The installation
- 41 shall be inspected more frequently if deemed necessary by the Manufacturer, Architect, Owner or
- 42 Contractor.
- 43 H. Upon completion of the installation, an inspection shall be made by the roof membrane
- 44 Manufacturer's Representative to ascertain that the roof system has been installed according to the
- 45 applicable roof membrane Manufacturer's specifications.
- 46 I. All the above indicated job visits shall be documented in writing by the roof membrane
- 47 Manufacturer's Representative indicating all problems, concerns, recommendations and directives
- 48 given to the roofing Contractor regarding roof system installation. Copies shall be provided to the
- 49 Architect within ten (10) days of the inspection date.
- 50 J. It is the roofing Contractor's responsibility to arrange the Manufacturer's Representative's
- 51 inspections.
- 52 K. All components used in the insulation system shall be approved by the Roof Membrane
- 53 Manufacturer.
- 54 L. There shall be no deviation made from this Specification or the approved shop drawing without
- 55 prior written approval by the Manufacturer and Architect.
- 56 M. Shop drawings of proposed alternate details shall be submitted to the Architect for approval prior to
- 57 the start of construction.
- 58 N. Proposed alternate details and application procedures shall comply with the Specifications,
- 59 Drawings and Manufacturer's recommendations.

- 1 O. The Contractor shall keep a copy of the Roof Membrane Manufacturer's installation instructions  
2 and these Specifications on site at all times.
- 3 P. **Vegetated Roof Assemblies Installer Qualifications:** A qualified vegetated roof assembly  
4 Installer, approved, authorized or licensed by vegetated roofing system provider, whose work has  
5 resulted in successful establishment of vegetated roofs from pre-vegetated trays.
- 6 1. Field Supervision: Require Installer to maintain an experienced full-time supervisor on  
7 Project site when vegetated roof assembly work is in progress.
- 8 Q. Single Source Responsibility: Vegetated green roof components shall be from a single source.  
9 Installer may request inspection or oversight during installation from the Green Roof Provider.
- 10 R. There shall be no deviation from this Specification or the Drawings. Installer assumes liability for  
11 any deviations from Specifications and/or Drawings.
- 12 S. Installer Qualifications: Installer shall be qualified to install the vegetative green roof system. If  
13 Installer does not meet the minimum requirements, Green Roof Provider technical representative  
14 shall be present for at least 1 work day to verify training and module handling.
- 15 T. Roofing Inspection: By Owner or designated Waterproofing Provider to verify that the waterproofing  
16 surface is approved for installation of the vegetated green roof system.
- 17 1. At a minimum, a slip sheet or protection layer (6 ounce non-woven geotextile or  
18 equivalent) may be required to protect the work surface and waterproofing warranty. Verify  
19 and document the need for a slip sheet or protection layer.
- 20 2. Verify existing roof loads and roof load limitations prior to hoisting green roof materials.
- 21 U. Once the green roof installation is complete, an inspection shall be conducted by a technical  
22 representative of the Green Roof Installer and/or the Green Roof Provider to verify that the green  
23 roof system was installed properly.

#### 24 1.5 REGULATORY REQUIREMENTS

- 25 A. Materials and construction shall meet the following:
- 26 1. Underwriters Laboratories, Inc. (UL): Class A Fire Hazard Classification.
- 27 2. Factory Mutual Engineering Corporation (FM): Windstorm Resistance Classification, FM  
28 Data Sheets 1-28 (September, 1991 Revision) and 1-49 (Class I-90 Construction); Fire  
29 Classification, Class 1 (FM Approval Standards).
- 30 3. International Conference of Building Officials (ICBO)
- 31 4. Uniform Building Code (UBC).
- 32 5. Regional, State and Local Building Codes and/or Ordinances.

#### 33 1.6 REFERENCES

- 34 A. References shall refer to the most recent standard.
- 35 1. American Society for Testing and Materials (ASTM).
- 36 2. Federal Specifications (FS).
- 37 3. Factory Mutual System (FM).

#### 38 1.7 DEFINITIONS

- 39 A. Contract Documents: All specifications and Drawings that collectively describe the requirements for  
40 construction of the Project.
- 41 B. Vegetated Green Roof: An area of landscaped planting constructed over a waterproofed substrate  
42 and separated from the natural ground by a structure.
- 43 C. Vegetated Green Roof System: The complete system of materials and components which are  
44 installed above the waterproofing and result in a vegetated green roof surface.
- 45 D. Extensive Green Roof: These extensive green roof systems are constructed in shallow soil depths  
46 nominal 4-inches with hearty, drought-tolerant plants such as sedums, herbs and groundcovers. In  
47 northern climates, extensive green roofs typically do not require permanent irrigation systems.  
48 However, irrigation may be needed in semi-arid and arid climates. Extensive green roof systems  
49 are low-maintenance and typically require occasional weeding or plant maintenance on an annual  
50 basis.
- 51 E. Growing Medium or Substrate: An engineered, blended mixture composed of composted organic  
52 matter and lightweight, coarse and porous aggregate. The substrate is blended to be lightweight  
53 and conducive to vigorous plant growth.
- 54 F. Filter Fabric: Woven geotextile that is placed within the module (optional) prior to filling media to  
55 reduce likelihood of fines being released via the drainage holes.
- 56
- 57
- 58
- 59

- 1 G. Sedum Tile or Mat: An integrated layer of sedum which covers the entire surface of growing media  
2 in the green roof modules. The sedum may be grown in the modules from plugs or cuttings, or  
3 alternatively pre-grown in a production field and harvested into tiles or mat and then rooted in the  
4 modules.
- 5 H. Green Roof System Installer (or 'Installer'): Company retained to install the green roof system as  
6 per this specification.
- 7 I. Waterproofing Provider: Company that provides and/or certifies all materials required for installation  
8 of the building/roof waterproofing, furnishes and verifies installation and water tightness and  
9 confirms acceptability prior to installation of the Green Roof System.
- 10 J. Captured Water: Water that is retained in the drainage layer of a vegetated roof assembly after new  
11 water additions have ceased and that cannot escape the roof except through evaporation or plant  
12 transpiration.
- 13 K. Finish Elevation: Elevation of finished growing-media surface of planting area.
- 14 L. Planting Area: Areas to be planted.
- 15 M. Plant; Plants; Plant Material: Vegetation in general, including trees, shrubs, vines, ground covers,  
16 ornamental grasses, bulbs, corms, tubers, or herbaceous vegetation.
- 17 N. Growing Medium: Manufactured, lightweight soil mixture that promotes good growing conditions for  
18 specific varieties of plants.
- 19 O. FLL Greenroof Guidelines: German Guidelines for Planning, Execution, and Upkeep of Green Roof  
20 Sites, Current Release. Worldwide acknowledged state-of-the-art technology as scientific  
21 foundation for successful and thriving green roofs.
- 22 P. FM Approval: Class Number 4477, Approval Standard for Vegetated Roof System.
- 23

#### 24 **1.8 SPECIAL ROOFING CONTRACTOR REQUIREMENTS**

- 25 A. The Contractor shall provide a Project Foreman with a minimum of five (5) years documented  
26 experience in the supervision of roof system and vegetated roof assembly installation and shall be  
27 knowledgeable in the type of roof system specified herein.
- 28 B. The Contractor shall not change Foreman or crew without prior approval of the Architect.
- 29 C. The Contractor's Foreman shall be present on the job site during the majority of work hours and  
30 shall be accessible at all times to ensure good Project coordination and communication.
- 31 D. During the workday should the weather conditions appear to be changing adversely, the Foreman  
32 shall take preventative measures to allow the roof to be closed to a watertight condition to avoid  
33 exposure of buildings, equipment and materials.
- 34 E. All Work that requires saw cutting, vacuuming and other similar functions that create substantial  
35 noise and/or vibration shall be coordinated well in advance of the Work with the Owner and the  
36 Architect.
- 37 F. Prior to the start of any roof project, and daily after the start, the Contractor shall review the type of  
38 space below the roof being worked on to ensure that all special requirements because of  
39 occupancy are complied with prior to start of the Work.
- 40 G. Take all necessary precautions to protect the Owner's property as well as adjacent property,  
41 including trees, shrubs, buildings, sanitary and storm sewers, water piping, gas piping, electric  
42 conduit or cable, etc. from any and all damage which may result due to work on this Project.
- 43 H. Repair any Work, damaged by failure to provide proper and adequate protection, to its original  
44 state to the satisfaction of the Owner or remove and replace with new Work at the Contractor's  
45 expense.
- 46

#### 47 **1.9 PREINSTALLATION CONFERENCE**

- 48 A. Pre-installation Conference: Conduct conference at the Madison Municipal Building; 210 Martin  
49 Luther King Jr Blvd., Madison, WI 53703
- 50 1. Attendance: Contractor, Installer, Owner Architect, Architect's Roof Consultant, Architect's  
51 Landscape Architect, vegetated roofing system and membrane roofing system  
52 manufacturer representatives, roofing installer, and those requested to attend.
- 53 2. Meeting Date: Minimum 2 weeks prior to beginning work of this Section, and to prior work  
54 of related Sections affecting work of this Section.
- 55 3. Agenda:
- 56 a. Discuss flood testing and other special considerations for this project.
- 57 b. Discuss expectations for slip sheets, protection course and vegetated roof  
58 assemblies including, but not limited to: pre-vegetated trays, edging for trays, stand-  
59 alone edging, stone mulch, and pavers on tabs.

- 1 c. Discuss post-installation care including establishment period and maintenance  
2 regimen.  
3

4 **1.10 SUBMITTALS - ROOFING**

- 5 A. Submit shop drawings as required. Drawings shall show roof edge condition details, roof  
6 penetration flashing details, standard roof section and all other details required for proper roof  
7 system installation that are not shown in or that differ from the Specifications and Drawings.  
8 B. Submit a list of materials for use in the Work.  
9 C. Submit product data for membrane and flashing with temperature range for application of  
10 membrane.  
11 D. Submit membrane Manufacturer's installation instructions.  
12 E. A total of three (3) copies of each submittal are required.  
13 F. Submit copies of proposed manufacturer's guaranty.  
14 G. Submit written proof of contractor's approval by specified system manufacturer.  
15

16 **1.11 SUBMITTALS - VEGETATED ROOF ASSEMBLIES**

- 17 A. Product Data: For each vegetated roof assembly.  
18 1. Include construction details, material descriptions, dimensions of individual components  
19 and profiles, and finishes.  
20 2. Include material descriptions for each growing medium.  
21 3. Include material descriptions for each plant type and characteristics.  
22 B. Sustainable Design Submittals:  
23 1. Product Data: For recycled content, indicating postconsumer and pre-consumer recycled  
24 content and manufacturing locations for each system.  
25 2. Product Data: For tray system product ingredients, disclose product ingredients, source,  
26 manufacturing locations, and recycling options content conforming to LEED requirements.  
27 C. Shop Drawings: For each vegetated roof assembly.  
28 1. Include plans, sections, and edger locations.  
29 2. Indicate dimensions, weights, and loads.  
30 3. Detail field assembly of components, depth of growing media, metal edger connections,  
31 and attachments to other work.  
32 4. Note any deviations from the drawings or specs and any limitations of the proposed  
33 vegetated roof assembly components or overall system.  
34

35 **1.12 INFORMATIONAL SUBMITTALS**

- 36 A. Qualification Data: For Installer.  
37 1. Written submittal by manufacturer indicating that installer is certified as qualified to  
38 perform the work of this section.  
39 B. Product Certificates: For each type of manufactured product.  
40 1. Manufacturer's technical data sheets for standard products.  
41 2. Analysis of other materials by a recognized laboratory, according to methods established  
42 by the Association of Official Analytical Chemists, where applicable.  
43 3. Product Test Reports: For complete analysis of each growing medium, for tests performed  
44 by manufacturer and witnessed by a qualified testing agency or by a qualified testing  
45 agency. Confirm that growing medium meets FFL Green Roof Guidelines.  
46 4. Field quality-control reports.  
47 5. Sample Warranty: For special warranties.  
48

49 **1.13 PRODUCT DELIVERY, STORAGE AND HANDLING**

- 50 A. Deliver all materials in Manufacturer's original, unopened containers with Manufacturer's labels  
51 intact and legible.  
52 B. Store rolls of roofing membrane, cans and drums of cement, primers and coatings on end. Do not  
53 use rolls of roofing membrane that have been flattened out of round and/or been used for  
54 weighting.  
55 C. Materials shall be stored so as to protect them completely from damage by the elements and  
56 temperatures. Storage of materials on ground and/or rooftop shall be protected with waterproof  
57 canvas covering and stored on raised platforms. The use of pallets or similar type equipment will  
58 be acceptable.  
59 1. Waterproof canvas covering shall be applied in a watertight manner and securely tied at  
60 the end of each workday or work period.

2. Use of Manufacturer's product protection wrapping is not acceptable for worksite type protection. Wrapping shall be side-punctured or end-punctured or slashed before covering with canvas.
3. No tears in the waterproof canvas covering will be allowed.
- D. Material storage in warehouse, storage trailer, or tent is recommended.
- E. Keep lids tightly sealed on all emulsions, solvent-based adhesives and cements to keep volatiles from escaping.
- F. Handling Materials
  1. Do not store or transport roofing materials on the roof in a manner that may exceed the live load capacity of the deck system or the structure. The Architect during routine observations may make recommendations as to loading.
  2. Do not transport roofing materials over or store materials on a finished section, without prior approval of the Architect.
  3. The Contractor's Foremen shall have a hand held thermometer on the roof to check application temperature.
- G. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and Federal laws if applicable. Store away from sources of ignition and extremely high temperatures. Avoid exposure to heat, sparks, and open flames.
- H. Bulk Materials:
  1. Do not dump or store bulk materials on or near structures, utilities, walkways and pavements, or existing roof areas or plants.
  2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of debris-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
  3. Store growing medium in a dry area, free of contaminants which may adversely affect the engineered blend, including weed seeds.
  4. Accompany each delivery of bulk materials with product certificates.
- I. Plant Materials:
  1. Maintain health of plants as recommended by nursery guidelines prior to installation. Store vegetated planters and materials over plywood panels or protective sheeting on the roof.
  2. Pre-vegetated trays may be stored in a cool location, below 75 degrees for a maximum of 24 hours. Do not leave pre-vegetated trays in hot storage areas or sitting in full sun locations on the project site or on the roof.
  3. Provide water source for irrigating plants per manufacturer's recommendations.
- J. Handle and store materials, and place equipment in a manner to avoid overloading roof structure or damaging roofing membrane.
- K. Protect the roof deck and waterproofing membranes using appropriate materials such as plywood sheeting. Avoid using sharp tools and keep the roof surfaces clean and free of soil, grit, or debris.

#### 1.14 ENVIRONMENTAL REQUIREMENTS

- A. Do not apply roof membrane or base flashings during inclement weather or when air temperature is below (or is expected to be below) 40°F (5°C).
- B. Do not start tear off of existing materials when inclement weather is expected.
- C. Vegetated Roofing Assemblies Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit installation to be performed when optimum results may be obtained. Install plant materials when temperatures are between 40 deg F (5 deg C) and 95 deg F (35 deg C), except as otherwise instructed by manufacturer. Do not install if extended freezing temperatures are expected or if ambient soil temperature is expected to remain below 50 deg F (10 deg C). Apply products during favorable weather conditions according to manufacturer's written instructions and warranty requirements.

#### 1.15 VEGETATED ROOF PERFORMANCE REQUIREMENTS

- A. Vegetated roof covering system shall:
  1. Support sedums and other vegetated groundcovers.
  2. Provide efficient drainage of moisture that is in excess of that required for the vigorous growth of the installed vegetation.
  3. Protect roof waterproofing materials from damage caused by exposure to ultraviolet radiation, physical abuse, and rapid temperature fluctuations.

- 1  
2  
3  
4. Retain moisture in accordance with ASTM E2398.

1.16 **GUARANTEES, WARRANTIES, CERTIFICATES**

- 4 A. Furnish two copies of the following to the Architect:  
5 1. Contractor's Warranty: The Contractor shall warrant, in writing, that the roof system shall  
6 remain leak free for a period of two (2) years following completion and that the roof system  
7 has been installed according to material Manufacturer's current specification. The  
8 warranty shall cover labor and materials. The MRCA printed guarantee shall be used as a  
9 standard. Roofing Contractor shall verify that the Extended Overburden Warranty for  
10 Vegetated Roof Assembly (see below) is covered by either the Roofing Contractor or Roof  
11 Membrane System Manufacturer.  
12 2. Single Source Warranty for Vegetated Roof Assembly: Provide materials and labor  
13 warranty for both full roof assembly and vegetated roof system (including pre-vegetated  
14 tray systems, metal edging, stone mulch, pavers on tabs, and other individual components  
15 and assemblies that make up the Vegetated Roof Assembly) for length of roofing  
16 membrane warranty along with removal of overburden.  
17 a. Contractor and manufacturer should review this with Architect to confirm that the  
18 system will meet all requirements of all intended warranties.  
19 3. Membrane Manufacturer's No Dollar Limit Warranty: The roof system Manufacturer shall  
20 furnish a Cost of Repair/Replacement Manufacturer's Materials Roofing Guarantee. The  
21 guarantee shall include the costs of repairs or replacement of the membrane and flashing,  
22 and insulation systems damaged as a result of the membrane failure and necessary to  
23 stop leaks which occur during a period of THIRTY (30) years from the date of completion,  
24 as a result of workmanship or deterioration of the membrane system or base flashing.  
25 The guarantee shall cover both labor and materials.  
26 4. Extended Overburden Warranty for Vegetated Roof Assembly: Manufacturer will provide  
27 removal and replacement of vegetated roof assembly.  
28 a. Warranty Period: Twenty years  
29 5. Membrane Manufacturer's Owner Service Manual: Provide for the Owner an  
30 informational manual to include the Manufacturer's approved emergency repair  
31 procedures and materials, maintenance procedures and customer service information.  
32

1.17 **CLOSEOUT SUBMITTALS**

- 34 A. Maintenance Data: For vegetated roof assembly and plants, including a recommended  
35 maintenance plan with procedures for inspection and care during a calendar year. Submit before  
36 start of required warranty and maintenance periods.  
37 B. Continuing Maintenance Proposal: From vegetated roof assembly Installer to Owner, in the form of  
38 a standard two-year maintenance agreement, starting on date initial maintenance service is  
39 concluded. State services, obligations, conditions, and terms for agreement period and for future  
40 renewal options.  
41  
42

**PART 2 - PRODUCTS**

2.1 **ACCEPTABLE MANUFACTURERS**

- 46 A. There will be no substitute roof membrane manufacturers considered for this membrane option.  
47 B. Roof Membrane, Insulation and Vegetated Roofing Manufacturer for this system option (Option B)  
48 shall be Soprema.  
49 C. Obtain vegetated roof assembly components, growing medium, plants, and accessories from single  
50 source from single manufacturer.  
51 D. Provide products by Manufacturers specified herein which meet the approval of the specified  
52 manufacturer. No non-approved materials will be used by the Contractor.  
53 E. **No material specified or approved shall contain asbestos.**  
54 F. All materials shall be new unless noted otherwise.  
55

2.2 **MATERIALS**

- 57 Roof Insulation Membrane System:  
58 A. Insulation – thickness as shown on the Drawings  
59 1. Flat Stock:

- 1 a. Polyisocyanurate: ASTM C 1289 Type II and compressive strength of 25 pounds  
2 per square inch nominal, dimensional stability of 2% maximum linear change (@  
3 158°F and 97% relative humidity for 7 days) and a curing time of 24 hours plus  
4 an additional 24 hours per inch of thickness at a minimum of 60°F before  
5 Manufacturer shipment. Rigid board insulation with fiberglass facers such as  
6 SOPRA-ISO by Soprema or manufacturer approved equal. No substitutions will  
7 be allowed that would void the intended warranty. Fiberglass facers are required.  
8 4' X 4' maximum board size for adhered application, 4' x 8' maximum board size  
9 for mechanically attached application.
- 10 b. Cover Board: 1/4" 4 x 4 "Sopraboard" by Soprema.
- 11 2. Tapered:
- 12 a. Saddles and Crickets: Tapered ASTM C 1289. (except as noted on the  
13 Drawings, provide taper as required to achieve a minimum net slope of 1/4" per  
14 foot slope) tapered polyisocyanurate system with fiberglass facers, such as  
15 "SOPRA-ISO Tapered" by Soprema or manufacturer approved equal. All boards  
16 shall be factory primed.
- 17 b. Tapered Polyisocyanurate Edge Strip: Tapered ASTM C 1289. tapered  
18 polyisocyanurate system with fiberglass facers, such as "Gemini Series Tapered  
19 Edge Strip" by Atlas Roofing Corporation or approved equal.
- 20 c. Pre-manufactured tapered sump: tapered ASTM 1289, such as "Panel Q Hinged  
21 Target Sump" by Hunter Panels.
- 22 B. Asphalt: Hot asphalt may be used on this Project as an insulation adhesive only.
- 23 C. Adhesive: Such as Duotack Insulation Adhesive by Soprema of roofing asphalt may be used to  
24 adhere insulation coverboard and saddles and crickets.
- 25 D. Base Sheet: Modified Sopra G by Soprema.
- 26 E. Fasteners:
- 27 1. Insulation to metal deck: Fasteners shall be self-drilling, self-tapping, organic  
28 fluoropolymer coated screws (minimum 30 Kesternich Cycles) with a minimum 0.222"  
29 shank diameter with G-90 galvanized metal plate devices, minimum 2-7/8" hexagonal,  
30 such as those manufactured by Olympic Manufacturing Group ([www.olyfast.com](http://www.olyfast.com)), ITW  
31 Buildex ([www.itwbuildex.com](http://www.itwbuildex.com)), or DekFast ([www.sfsintecusa.com](http://www.sfsintecusa.com)), length as required.  
32 Fasteners shall be FM approved for the specific use. In areas of metal deck with conduit  
33 nested within the flutes of the deck, as identified by the Contractor prior to insulation  
34 installation, "Lexsuco Clips" by GAF Materials Corporation ([www.gaf.com](http://www.gaf.com)) shall be used.  
35 Fasteners shall be installed according to the Roof Insulation Installation Section of this  
36 Specification.
- 37 2. Insulation to wood deck: Fasteners shall be self-drilling, self-tapping, organic  
38 fluoropolymer coated screws (minimum 30 Kesternich Cycles) with a minimum 0.222"  
39 shank diameter with G-90 galvanized metal plate devices, minimum 2-7/8" hexagonal,  
40 such as those manufactured by Olympic Manufacturing Group ([www.olyfast.com](http://www.olyfast.com)), ITW  
41 Buildex ([www.itwbuildex.com](http://www.itwbuildex.com)), or DekFast ([www.sfsintecusa.com](http://www.sfsintecusa.com)), length as required.  
42 Fasteners shall be FM approved for the specific use.
- 43 3. Wood to wood: Fasteners (nails or lag screws) shall be galvanized and long enough to  
44 penetrate into substrate 1-1/4". Withdrawal resistance shall be 100 pounds per nail  
45 minimum.
- 46 4. Wood to masonry/concrete: Fasteners shall be 1/2" minimum diameter metal expansion  
47 stud anchors in pre-drilled holes such as "Kwik Bolt 3 Stud Expansion Anchor" by Hilti, Inc.  
48 ([www.hilti.co](http://www.hilti.co)) or approved equal.
- 49 5. Wood to metal deck: Fasteners shall be self-drilling, self-tapping, organic fluoropolymer  
50 coated screws (minimum 30 Kesternich Cycles) with a minimum 0.201" shank diameter  
51 such as "Type 14-10 Heavy Duty All Purpose Screw" by Olympic Manufacturing Group  
52 ([www.olyfast.com](http://www.olyfast.com)) or approved equal (fasteners shall be long enough to penetrate metal  
53 minimum 3/4").
- 54 6. Concrete Anchor – General: Other fasteners not specifically described shall be as  
55 selected by the Contractor subject to approval by the Architect. All fasteners shall meet  
56 the requirements set forth herein.
- 57 F. Fiber Cant: Nominal 4 X 4 perlite or 4 X 4 split lumber #2 grade or better, or as indicated on the  
58 Drawings.



- 1 G. Insulated Tapered Edge Strips (as required): ASTM C 728 Type 1. Tapered perlite rigid board  
2 insulation as shown on the Drawings such as "Tapered Fesco Board" by Johns Manville, or  
3 approved equal.  
4 H. Asphalt Primer: Refer to roof membrane specification section(s) herein for Asphalt Primer.  
5 I. Other Materials: All other materials not specifically described but required for a complete and  
6 proper installation of the Work in this Section, shall be as selected by the Contractor subject to  
7 approval by the Architect.  
8

9 Roof Membrane System:

- 10 A. Base Membrane (this installation will require 2 base membrane plies – refer to drawings): Modified  
11 asphalt base sheet meeting ASTM D5147 such as Sopralene 180 sanded 2.2 or Sopralene Flam  
12 180 by Soprema.  
13 B. Surface Membrane: WH UL Class A, fire resistance rated, chemically or thermally bonded,  
14 Styrene-Butadiene-Styrene (SBS) modified asphalt membrane such as Sopralene 180 FR GR WH  
15 or Sopralene Flam 180 FR GR WH by Soprema.  
16 C. Base Flashing Stripping Ply: Modified asphalt base sheet meeting ASTM D5147 such as Sopralene  
17 180 sanded 2.2 or Sopralene Flam by Soprema.  
18 D. Base Flashing Surface Ply: Chemically or thermally bonded, modified asphalt membrane meeting  
19 ASTM D5147 such as Sopralene 180 FR GR WH or Sopralene Flam 180 FR GR WH by Soprema.  
20 E. Fluid Applied Flashing Membrane: Catalyzed Acrylic Resin Flashing System consisting of a liquid-  
21 applied, fully reinforced, multi-component acrylic membrane such as Alsan RS 230 Flashing. The  
22 flashing system consists of a catalyzed acrylic resin (polymethyl methacrylate –or – PMMA),  
23 primer, basecoat and topcoat, combined with a non-woven polyester fleece.  
24 F. Lead Flashing: FS QQ-L11-201, Grade B, 4 lb./sq. ft. lead at drain and plumbing vent details; 30"  
25 X 30" required minimum dimension for drains and 12" required minimum roof flange dimension for  
26 plumbing vents.  
27 G. Mastic: Asbestos-FREE grade, Sopramastic SBS Elastic Cement" to conform to FS SS-C-153C  
28 Type I and ASTM D2822 Type I standards.  
29 H. Fasteners (Miscellaneous):  
30 1. Fasteners such as nails, screws and bolts, etc. shall be compatible with roof membrane  
31 and flashing system. They shall be of type and size as shown on the Drawings,  
32 recommended by the roof membrane Manufacturer or specified herein.  
33 2. Screws used to secure metal to blocking shall be No. 8 minimum, galvanized penetrating  
34 wood blocking a minimum 1-1/2" and shall have watertight neoprene washers under head.  
35 The installed withdrawal resistance shall be a minimum of 150 pounds per screw.  
36 3. Nails used to secure wood such as fascias, cant strips, blocking and nailers to other wood  
37 members shall be galvanized and long enough to penetrate 1-1/4". Two rows are  
38 required, staggered when feasible. Spacing in any one row shall not exceed 24". Spacing  
39 shall not exceed 12", 8' each way from outside corners. Withdrawal resistance shall be  
40 100 pounds per nail minimum. (Lag screws of equivalent strength may be used if  
41 desired.)  
42 4. Fasteners used to secure lumber to masonry or concrete shall be 1/2" minimum diameter  
43 metal expansion stud anchors in pre-drilled holes such as "Kwik-Bolt II Stud Expansion  
44 Anchor" by Hilti, Inc. or approved equal. Space fasteners at 24" o.c. (maximum).  
45 5. Fasteners used to secure lumber to metal deck shall be self-drilling, self-tapping, organic  
46 fluoropolymer coated screws (minimum 30 Kesternich Cycles) with a minimum 0.201"  
47 shank diameter such as "Type 14-10 Heavy Duty All Purpose Screw" by Olympic  
48 Manufacturing or approved equal (2-1/4" length required for 2x nailer or blocking). Space  
49 fasteners at 12" o.c. (maximum). **AND/OR** nut, bolt and washer assemblies, 1/2"  
50 minimum diameter, spaced 4' o.c. and have galvanized metal or stainless steel  
51 consistency. Stagger if lumber is 6" or wider. At outside corners fasteners shall be  
52 spaced 2' o.c., 8' each way from the corner. Minimum withdrawal resistance shall be 800  
53 pounds per fastener.  
54 6. Fasteners used to secure metal to metal shall be hardened, self-tapping, sheet metal  
55 gimlet point type, with hex/washer head and be of compatible material.  
56 7. Other fasteners not specifically described shall be as selected by the Contractor subject to  
57 approval by the Architect. All fasteners shall meet the requirements set forth in FM Data  
58 Sheets 1-28 and 1-49 as appropriate.  
59 I. Asphalt Primer: ASTM D41 primer such as Elastocol 500 by Soprema.

- 1 J. Roof Drain Assemblies: Obtain replacement clamps, rings, and strainers. All strainers shall be
- 2 cast iron.
- 3 K. Polyvinyl Chloride (PVC) Piping: Conforming to requirements for Schedule 40, DWV pattern,
- 4 ASTM Specification D1785 and D2665.
- 5 L. Solvent Free Adhesive: Such as Colply EF Adhesive by Soprema.
- 6 M. Solvent Free Flashing: Such as Colply EF Flashing Cement by Soprema.
- 7 N. Surfacing Granules: Additional surface granules of the type and color of the cap sheet shall be
- 8 used to cover "bleed-out" areas.
- 9 O. Other Materials: All other materials not specifically described but required for a complete and
- 10 proper installation of the work in this Section, shall be as selected by the Contractor subject to
- 11 approval by the Architect.

12 Vegetated Roof System

- 13 A. Tray-Type Vegetated Roof Assembly: Modular assembly consisting of manufacturer's standard
- 14 trays for field assembly adjacent to and interlocking with each other over roofing system.
- 15 1. Basis-of-Design Product: Provide Columbia Green Technologies Pre-Grown Tray, no
- 16 substitutions.
- 17 2. Tray Depth, Nominal: 4-5/8 inches (117.5 mm).
- 18 3. Tray Size: 24 by 24 inches (610 by 610 mm).
- 19 4. Tray Material: Injection molded, 100 mil polypropylene, 88 percent post-consumer
- 20 recycled content.
- 21 5. Tray Design: Trays must be fully interlocking and overlap adjacent trays by a minimum of
- 22 1/4 inch (6.5 mm). Tray bottom to have ridges and trough design to maximize air flow and
- 23 retain stormwater.
- 24 6. Connection Holes and Fasteners:
- 25 a. Four 3/8 inch (9.5 mm) holes, aligned and centered in each vertical side panel.
- 26 b. Plastic Tray Pin: Provided by manufacturer.
- 27 c. Hook and Plastic Tray Pin: For integrated drip irrigation. Provided by
- 28 manufacturer.
- 29 7. Growing Medium Depth: Manufacturer's standard media depth for pre-grown trays.
- 30 8. Assembly Weight: Manufacturer's given weight, fully saturated, is 30-32 lbs/sf. Assembly
- 31 shall not ever exceed 40 lbs/sq. ft., including growing media and plants and saturated with
- 32 captured water, but not including weight of roofing system.
- 33 9. Recycled Content: Trays shall have post-consumer recycled content of not less than 88
- 34 percent.
- 35 B. Growing Medium: Vegetated roof assembly manufacturer's lightweight, manufactured soil mixture
- 36 designed for Extensive Green Roof areas indicated in the drawings.
- 37 1. Basis of Design Product: Columbia Green Technologies; Extensive Growing Medium.
- 38 2. General Condition at Time of Planting: Free of aggregates 1/2 inch (13 mm) or larger in
- 39 any dimension; free of roots, plants, clods, pockets of sand, paint, building debris, oils,
- 40 solvents, roofing materials, and other extraneous materials harmful to plant growth; free of
- 41 weeds, disease-causing plant pathogens, and other undesirable organisms.
- 42 3. Maximum Media Density: ASTM E 2399, 80 lb/cu. ft. (1280 kg/cu. m) for growing-medium
- 43 mixture.
- 44 4. Maximum Media Water Retention: ASTM E 2399, 35 to 65 percent by volume for growing-
- 45 medium mixture at maximum media density per FLL Green Roof Guidelines.
- 46 C. Plants
- 47 1. Pre-grown Tray: Species provided by manufacturer, grown in tray to project specifications
- 48 with minimum 90 percent plant coverage. Match hardiness zone.
- 49 2. Sourced or approved by Columbia Green Technologies for warranty to apply.
- 50 3. Conform to Project landscape design requirements, recommendations of local
- 51 horticulturalists, and requirements of authorities having jurisdiction, including Fire Marshal,
- 52 for specific recommendations and regulations.
- 53 D. Access Boxes: Vegetated roof assembly manufacturer's aluminum drain boxes with removable,
- 54 rigid covers for accessing drains, valves, and switches beneath the finish elevation of growing
- 55 medium; secure each cover with four noncorrosive screws.
- 56 1. Size: 12 inches (305 mm) square by depth of vegetated roof assembly at each location.
- 57 E. Soil Retainer: Vegetated roof assembly manufacturer's extruded-aluminum edging.
- 58 1. Basis-of-Design Product: Columbia Green Technologies; Standard Tray Edger.

- 1                   2.       Tray Edger: 5.5 inch (140 mm) height 18 gauge aluminum with prefabricated tray pin  
2                   receiving slot for tray attachment.  
3                   a.       Color: Mill finish.  
4                   b.       Corners: Provide manufacturer's Prefabricated Standard Tray Edger Inside  
5                   Corner and Prefabricated Outside Corner at 90 degree corners. Match color to  
6                   tray edger.  
7                   3.       Method of Attachment, Tray System: Tray edger is held in place by the weight of the  
8                   system. Use manufacturer's standard removable pin fastener to attach edger to sides of  
9                   tray.

10  
11 **PART 3 – EXECUTION**

12  
13 **ROOFING**

14  
15 **3.1       DEFINITIONS**

- 16       A.       The term “phased construction” or “phased application” shall mean the roof system construction or  
17       application process in which all parts of cross-section of a roof system (including vapor retarder),  
18       roof insulation, roof membrane and surfacing are not completed for a particular roof area during  
19       one day or work period.

20  
21 **3.2       EXAMINATION**

- 22       A.       The Contractor shall have the sole responsibility for the accuracy of all measurements and for the  
23       estimate of material quantities required and necessary to satisfy the requirements of these  
24       Specifications.

25  
26 **3.3       SUBSTRATE PREPARATION**

- 27       A.       Remove the existing construction to the extent shown on the drawings.  
28       B.       Do not cut the existing structural components.  
29       C.       Clean and dry substrate.  
30       D.       Deck Repairs: If deck repairs are required, the Contractor shall contact the Architect immediately.  
31       (All required deck repairs shall be as directed by the Architect and shall be by Change Order.)

32  
33 **3.4       OTHER REPAIRS AND CONSTRUCTION**

- 34       A.       Replace all deteriorated construction not originally scheduled for replacement. Repairs shall be by  
35       Change Order and as directed by the Architect.

36  
37 **3.5       ROOF MEMBRANE WORKMANSHIP**

- 38       A.       All roofing work shall be accomplished with a Foreman fully trained and knowledgeable in the  
39       application procedures of the specified roof membrane. The Foreman shall oversee the work of all  
40       working personnel who are thoroughly skilled in the application of specified materials. All  
41       workmanship to be of the very best quality and shall be done in such a manner as to fulfill the intent  
42       of the Drawings and Specifications.  
43       B.       For thermally bonded applications all propane work shall be completed in accordance with  
44       NRCA/MRCA CERTA program requirements. All propane equipment shall be handled by CERTA-  
45       certified operators only.  
46       C.       Weather Condition Limitations: Proceed with roofing work only when existing and forecasted  
47       weather conditions will permit Work to be performed in accordance with the requirements of this  
48       Specification.  
49       D.       After starting the Work, the Contractor shall be responsible for complete moisture integrity of the  
50       roofing and flashing membrane and for providing a properly applied roof. Therefore, the Contractor  
51       shall:  
52               1.       Establish and follow application procedures to insure that adequate quantities of materials  
53               are used.  
54               2.       Maintain competent Foreman continuously supervising the Work with authority to discard  
55               unsuitable materials and remove unsatisfactory workmen from the Project.  
56               3.       Observe all fire precautions involving the storage and handling of roofing materials.  
57               Provide adequate quantity of fire extinguishers at the worksite, especially at the kettles,  
58               torches, or open flames.  
59               4.       Comply with current roofing safety standards at all times.

- 1 5. Supervise installation of and be responsible for seeing that roof mechanical and electrical  
2 equipment, roof drains, etc. are properly set without damage to the roof. Make roof and  
3 flashing repairs as necessary and advise the Architect in writing of all potential leaks as  
4 may be caused by other trades not under the Contractor's control.
- 5 6. Under no conditions shall any roofing materials be applied before sunrise, or at anytime  
6 when there are indications of moisture present (rain, mist, dew, frost, and snow).
- 7 7. Install only as much roofing material as can be completed and covered in accordance with  
8 the requirements of this Specification in any one day or work period.
- 9 8. Apply roofing membrane as directed by the Manufacturer and in strict accordance with this  
10 Project Manual.
- 11 9. Avoid walking on membrane while being laid, roofing mechanic shall set and kick the roll  
12 of roofing membrane from the insulation or deck side, not from the side previously covered  
13 with roofing membrane.
- 14 10. Insure that all wheeled equipment on the roof be equipped with pneumatic tires.
- 15 11. Permit no traffic over, nor stack roofing equipment or materials on completed new roofing  
16 surfaces without adequate protection with 1/2" plywood.
- 17 12. Insure that all fishmouths are cut (do not attempt to walk down) and objects causing  
18 separation are removed. Patch the areas if the cut is made after the bitumen has set.
- 19 13. Install flashings at openings, projections and walls adjoining new roofing every day or  
20 work period. If circumstances do not allow this, these areas shall be made watertight at  
21 the end of each day or work period.
- 22 14. At the end of each day's Work, install temporary water cut-offs at all points where the roof  
23 membrane does not abut a wall, wood edge member or expansion joint. Water Cut-Off:  
24 At end of day's work, or when precipitation is imminent, construct a water cut-off at all  
25 open edges. Cut-offs can be built using plastic cement and roofing felts, constructed to  
26 withstand protracted periods of service. Cut-offs must be completely removed prior to the  
27 resumption of roofing. The water cut-off shall be removed completely before continuing  
28 the roof installation. If breaks occur in the water cut-offs or any other part of the roof  
29 membrane and water damages the roof insulation, all damaged roof insulation, vapor  
30 retarder and roof membrane over the damaged insulation shall be removed and replaced  
31 with new materials.
- 32 15. When using propane torch and/or hot air welding equipment, follow all specified  
33 procedures outlined by the roof membrane Manufacturer.
- 34 16. Comply with other workmanship requirements as outlined in other Sections of this  
35 Specification.

### 3.6 PHASED CONSTRUCTION CRITERIA

- 37 A. Phased construction of the roof membrane, outside the normal recommendations of the membrane  
38 manufacturer will not be permitted.

### 3.7 ROOF INSULATION INSTALLATION

- 39 A. Insulation Attachment, All Deck Types:
  - 40 1. Mechanically attached - Mechanically fasten base sheet or insulation, as noted on the  
41 Drawings, in a Factory Mutual 1-90 pattern. Verify fastening pattern with Architect.
  - 42 2. Loose-laid - Install insulation without attachment.
  - 43 3. Foam Adhesive Adhered – Adhere insulation as noted on Drawings in full applications of  
44 adhesive.
- 45 B. Install all base layers of insulation as indicated on the drawings.
- 46 C. The two opposite sides of any base layer insulation board shall be directly supported to provide the  
47 maximum bearing width (minimum 1.5"). Board edges shall be trimmed as required.
- 48 D. Install insulation coverboard atop base layer as indicated on the Drawings (adhered with hot  
49 asphalt or low rise foam adhesive).
- 50 E. Install tapered insulation for saddles and crickets as indicated on the Drawings (adhered with hot  
51 asphalt or low rise foam adhesive).
- 52 F. Install cover board insulation as indicated on the drawings atop preceding layers of insulation,  
53 including saddles and crickets. Cut or score insulation boards to conform to angles of new  
54 substrate (adhered with hot asphalt or low rise foam adhesive).
- 55 G. Limit gaps to 1/8" maximum between boards. Stagger all board joints within the field of the roof.  
56 Offset the end and side joints a minimum of 6" from the joints of the preceding layer.
- 57 H. Cover all installed insulation with roofing membrane by the end of each day.

1 **3.8 ROOF MEMBRANE APPLICATION**

- 2 A. Prior to roof membrane application, coordinate all HVAC work with the Owner's HVAC  
3 representative. Proper coordination of this work will be the responsibility of the Contractor.  
4 B. Execute Work such that the membrane can be sealed on a down slope surface at the end of each  
5 day.  
6 C. Atop insulation install all modified asphalt membrane materials in strict accordance with the  
7 membrane manufacturer's requirements.  
8 D. Install longitudinal runs of roof membrane at right angles to the main slope direction (at roof slopes  
9 not exceeding 1/2" per foot) of the field of the roof (or continuous with the roof section's long  
10 dimension). Begin membrane installation at the low point of the roof. Shingle membranes such  
11 that water does not run against seams and laps.  
12 E. All membrane materials shall be laid free from wrinkles, buckles and voids and shall be turned up  
13 and thermally bonded to cant strips and trimmed at vertical walls.  
14 F. Membrane construction shall not be phased. "Phasing" shall be defined by the manufacturer.  
15 G. At end of day's work, or when precipitation is imminent, construct a water cut-off at all open edges.  
16 Cut-offs can be built using plastic cement and roofing felts, constructed to withstand protracted  
17 periods of service. Cut-offs must be completely removed prior to the resumption of roofing.  
18 H. At the end of every day, install "three-course" flashing system consisting of alternating layers of  
19 reinforcement material and mastic to all wall terminations.  
20

21 **3.9 BASE FLASHING INSTALLATION**

- 22 A. Install new wood blocking and metal where required and as specified in other Sections of this  
23 Specification.  
24 B. All rooftop equipment (including plumbing vents, base flashings, exhaust fans, skylights, vents,  
25 etc.) shall be raised by the roofing Contractor with specified and/or approved material to provide a  
26 minimum of 8" between the surface membrane and the top of the base flashing.  
27 C. Install the base flashing according to the Drawings and roof membrane Manufacturer's  
28 requirements.  
29 D. Nail at 8" o.c. top edge and vertical laps of the base flashing to the substrate.  
30 E. Install "three-course" flashing system consisting of alternating layers of reinforcement material and  
31 mastic to the tops of all exposed base flashings.  
32 F. Extend plumbing vents as necessary to assure a minimum of 8" of flashing height as measured  
33 from the surface membrane to the top of the vent stack. Furnish and install PVC piping with EPDM  
34 couplers as required.  
35 G. Install lead flashing at plumbing vents. Lead shall be installed in mastic over base sheet  
36 underlayment and flashed with base sheet underlayment material (as shown on the Drawings) prior  
37 to membrane installation. Prime lead prior to installation.  
38 H. Install lead flashing at all drain locations. Lead shall be installed in mastic over base sheet  
39 underlayment and flashed with base sheet underlayment material (as shown on the Drawings) prior  
40 to membrane installation. Prime lead prior to installation.  
41 I. Prime all sheet metal that is to be stripped into the roof membrane. Allow primer to dry before  
42 stripping in.  
43 J. Comply with applicable recommendations of Factory Mutual Prevention Data 1-49.  
44 K. All flashings on the section being rehabilitated shall be completed or made watertight by the end of  
45 the working day.  
46

47 **3.10 MISCELLANEOUS DETAILS**

- 48 A. Roof Drains  
49 1. Disassemble and remove domes and clamping collars scheduled to remain. Clean and  
50 examine sumps and leader components as directed. Replace all missing or broken  
51 components. Install new drain and bolts.  
52 2. Install and seal roof membrane and flashings at drains according to the Drawings.  
53 3. All roof drain systems shall be installed to allow positive water flow into the roof drain from  
54 the roof surface.  
55 4. Replace strainers in drains at the end of each working day.  
56

57 **VEGETATED ROOF ASSEMBLIES**

58 **3.11 EXAMINATION**

- 59 A. Examine each area to receive vegetated roof assembly for compliance with requirements for  
60 installation tolerances and other conditions affecting performance.

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1. **Verify that** roof insulation over roofing membrane is in place, secure, and flush along all seams.
  2. Verify that perimeter and other flashings are in place and secure along entire lengths where they will be covered by vegetated roof assembly.
  3. Verify protection course over membrane roofing is in place and conforming to roofing manufacturer instructions, as inspected and accepted by roofing manufacturer's technical representative.
- B. Inspect growing medium.
1. Verify that no foreign or deleterious material or liquid, such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in growing medium within a planting area.
  2. If growing medium is contaminated by foreign or deleterious material or liquid, remove growing medium and contamination and replace with new growing medium.

### 3.12 INSTALLATION, GENERAL

- A. Protection Course: Cover roofing system with protection board if required by roofing manufacturer with butted and fully taped joints before roofing system is subject to vegetated roof assembly installation work.
- B. Sweep with broom and then use air compressor to blow remaining dust and debris from substrate.
- C. Install vegetated roof assembly according to manufacturer's written instructions.
- D. Prepare Surface:
  1. All surfaces to be smooth, free of debris, soil, and grit prior to placing modules. All surfaces shall be maintained clean and free of debris, soil, and grit during installation. Never walk upon such materials as they may damage waterproofing membrane. If required, clean the surface as recommended by Waterproofing Provider.
- E. Protect Roof Surface and Structures:
  1. Traffic over the working area shall be restricted and controlled to qualified personnel only. Provide safety signage, barriers and safety equipment, as appropriate.
  2. Protect heavily traveled areas or use protected layers during mobilization of materials and equipment to the work area, as recommend by the Waterproofing Provider.
  3. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction.
- F. Inspect the Work Area:
  1. Perform a pre-installation inspection of the work areas
  2. Install slop sheet or protection later above the roof membrane waterproofing in accordance with manufacturer's guidance. The roof surface shall be smooth, free of debris and grit before installing a slop sheet or protective layer.
  3. Perform module installation only after appropriate roof waterproofing system has been installed, tested for leaks, and certified to be ready for installation of green roof system. Verify that roof assembly is watertight and free draining.

### 3.13 TRAY PLACEMENT

- A. Install trays according to manufacturer's written instructions and details.
- B. Place trays directly over protection cover provided under roofing work of this Section.
- C. Position bottom troughs of trays perpendicular to direction of roof slope, except minor crickets.
- D. Orient and overlap interlocking sides to hold trays in place.

### 3.14 TRAY EDGER INSTALLATION

- A. Install edger according to manufacturer's written instructions and details.
- B. Install tray edger at vegetated roof perimeter to conceal tray sides.
- C. Place short end of edging under tray so that it is held in place by weight of tray. Ensure inverted "U" section at top of edger conceals tray edge.
- D. Abut lengths of edging neatly. Allow 1/4 inch (6 mm) gap maximum between edging sections. Adjust and trim edging to align sections and achieve a tight fit.
- E. Corners: Utilize manufacturer's prefabricated corners.
- F. Access Boxes: Install access box at each drain, valve, and switch. Install top of boxes 0.5 - 1 inches above the finish elevation of growing medium where applicable.

1 **3.15 PLANTING**

- 2 A. Thoroughly water plant material immediately after planting, at the end of each work day, and after  
3 the entire installation of plant material is completed.  
4 B. Inspect planting work at the end of each day and after entire installation is complete. Immediately  
5 repair any areas that show signs of subsidence, un-evenness, or extreme plant stress with new  
6 materials conforming to this Section.  
7

8 **3.16 FIELD QUALITY CONTROL**

- 9 A. Testing Agency: Owner will engage a qualified testing agency to perform tests.  
10 B. Perform the following tests:  
11 1. Flood Testing: Flood test each deck area for leaks, according to procedures in  
12 ASTM D 5957, after completing and protecting roofing membrane but before placing  
13 overlaying construction. Install temporary containment assemblies, plug or dam drains,  
14 and flood with potable water.  
15 a. Flood to an average depth of 2-1/2 inches (64 mm), with a minimum depth of 1  
16 inch (25 mm) and a maximum depth of 4 inches (100 mm). Maintain 2 inches (50  
17 mm) of clearance from top of sheet flashings.  
18 b. Flood each area for **72** hours.  
19 C. Correct deficiencies in work that do not comply with requirements.  
20 D. Prepare test and inspection reports.  
21

22 **3.17 ADJUSTING**

- 23 A. Make adjustments and alignments of trays and metal edger as necessary to give a uniform and  
24 finished appearance.  
25 B. Replace plant material that appears to be stressed or damaged.

26 **3.18 CLEANING**

- 27 A. During planting and maintenance, keep adjacent areas and construction clean and maintain work  
28 area in an orderly condition.  
29

30 **3.19 PROTECTION**

- 31 A. Protect vegetated roof assemblies from damage, including growing-medium contamination, due to  
32 operations of other contractors and trades. Repair or replace damaged vegetated roof assemblies.  
33

34 **3.20 MAINTENANCE SERVICE**

- 35 A. Maintenance Service: Provide maintenance by skilled employees of vegetated roof assembly  
36 Installer approved by roofing-membrane manufacturer. Begin maintenance immediately after plants  
37 are installed and continue until plantings are acceptably healthy and well established but for not  
38 less than the specified maintenance period.  
39 1. Assembly and Plant Maintenance: During maintenance period, maintain plantings by  
40 cultivating, watering, hand-weeding, fertilizing (if necessary), adjusting and repairing, and  
41 performing other operations as required to establish healthy, viable plantings.  
42 a. Replace growing medium that becomes displaced or eroded because of settling  
43 or other processes.  
44 b. Apply treatments as required to keep plant materials, planted areas, and growing  
45 medium free of pests and pathogens or disease. Use integrated pest  
46 management practices whenever possible to minimize the use of pesticides and  
47 reduce hazards. Treatments include physical controls such as hosing off foliage,  
48 mechanical controls such as traps, and biological control agents.  
49 c. Use only products and methods acceptable to roofing-membrane manufacturer.  
50 d. Following maintenance period, instruct Owner and furnish written maintenance  
51 instructions as necessary for planting materials to develop and maintain healthy  
52 root structure.  
53 2. Maintenance Period: 24 months from date of Planting Completion.  
54 B. Record all green roof maintenance events. Include name of person, date and activity.  
55 1. If growing media test, record lab, test and results.  
56 2. If fertilizer, record type and amount applied per 1000 sf.  
57 3. Record time needed for bi-weekly weed walk and drain inspection.  
58 C. Foot Traffic: Limit foot traffic to a random path a couple times per week by one person. Avoid  
59 walking in a single path, standing in one place, or trampling plants. If parapet or adjoining wall

1 must be serviced, plants may be covered with plywood or foam sheeting for up to 4 hours  
2 intermittently, provided foliage is not wet or frozen and conditions are not too hot or sunny.

3 D. Spring Maintenance (March to June):

- 4 1. Soil Testing and Fertilization. Approximately 2-3 weeks before spring "growth flush",  
5 administer an annual soil test for PH and fertility levels. Growth flush varies by region,  
6 consult biweekly maintenance protocol email for specific recommended testing date in  
7 project's region.  
8 2. Maintain pH in the range of 6.5 to 8.0. In the event that pH falls below 6.0, consult the testing  
9 lab for appropriate recommendations to increase alkalinity. If the soil is above 8.0, it can be  
10 made more acidic with elemental Sulphur or an application of acidifying fertilizer.  
11 3. Maintain fertility in the normal range using a typical field soil fertility test as provided by A&L  
12 labs or equivalent testing lab. Evaluate the various nutrient levels such as Nitrogen (N or  
13 NO3N), Potassium (K), Phosphorus (P). If the soil contains a low (L) amount of these  
14 nutrients, conduct a single application of controlled release fertilizer, such as Nutricote® or  
15 Osmocote®, at the lab recommended rate. Ensure that fertilizer contains NO Herbicides or  
16 Pesticides. Follow the fertilizer labeled directions for application rate and use a rotary  
17 spreader to ensure even fertilizer application. Runoff potential does exist and should be  
18 evaluated by the applicator in accord with the site specifics; the greater the runoff sensitivity,  
19 the lower the application rate. All applications of fertilizer are the sole responsibility of the  
20 applicator.  
21 4. Coordinate with irrigation contractor to ensure that irrigation system is brought back on-line  
22 at the appropriate time to avoid freezing but to provide adequate water to plants starting in  
23 the spring.  
24 5. Conduct Monthly Inspections:  
25 a. Weed Walk: Pull and dispose of all weeds before they flower and set seed.  
26 NEVER allow any woody plant to establish in a green roof system, unless they  
27 have been specified in intensive green roof areas as part of this project.  
28 b. Displaced Soil: Nesting birds may displace soil. Replace lost soil using only  
29 manufacturer's specific, tested, approved engineered green roof growing media  
30 based on the intensive or extensive area in which the displacement occurs.  
31 c. Drainage Inspection: Inspect roof drains for any debris, pebbles or leaves and  
32 remove to ensure proper drainage.  
33 d. Debris Removal: Remove any debris blown onto the roof immediately to ensure  
34 no damage to plants.  
35 e. Pest Control: Monitor pest presence, as most pest problems are the result of an  
36 imbalance in the relationship of pest organism and its natural biological controls  
37 and these problems may self-correct. If pest problems are persistent, use  
38 organic and natural biological control agents to restore balance. Pesticide use is  
39 discouraged and should always be considered secondary to cultural and  
40 biological control measures, as pesticides can contaminate runoff water and  
41 cause environmental damage. Pesticides shall only be applied by qualified and  
42 licensed applicators, and only as required. All applications of pesticides are the  
43 sole responsibility of the applicator.  
44 f. Examine paver and stone mulch areas. Correct any areas that have settled,  
45 where stone mulch has been displaced, where pavers have separated away from  
46 one another, and/or correct any other unsatisfactory conditions related to the  
47 pavers, stone mulch, and edging for the duration of the maintenance period.

48 E. Summer Maintenance (June to September):

- 49 1. Conduct Monthly Inspections as outlined above for Spring Maintenance.

50 F. Fall Maintenance (October to November):

- 51 1. Conduct Monthly Inspections as outlined above for Sprint Maintenance.  
52 2. **Do Not Fertilize** during the fall. It may stimulate tender growth and compromise the cold  
53 hardiness of the plant materials.  
54 3. **Do Not Water Period:** For northern temperate zones, do not water within 4 weeks of the  
55 expected average frost date. Normally, there is plenty of moisture this time of year, and  
56 adding additional water may compromise the durability of the plants to endure winter's cold.  
57 For this reason, watering during the winter is also not recommended.

58 G. Winter Maintenance:

- 59 1. Avoid walking on frozen plants and roof surfaces as they are slippery and dangerous.



- 1                    2.    If clear pathways are needed, avoid using salt and other deicing chemicals, which may kill
- 2                                    plants and damage pavers. Instead, use sand or cat litter as anti-slip agents. Consider use
- 3                                    of heat strips with pavers, provided they can be applied without damage to the roofing
- 4                                    membrane.
- 5                    3.    Avoid piling the snow in a single place. Disperse snow evenly over the green roof plantings
- 6                                    as excess snow piling can potentially damage plants by insulating the plants and keeping
- 7                                    them warm and wet, thereby triggering fungal diseases.
- 8                    H.    Watering:
- 9                                    1.    Water only during establishment period outlined in LEED SSc6.1.

10  
11 **3.21 ACCEPTANCE**

- 12                    A.    Conduct post installation inspection to determine acceptance of vegetated green roof assemblies.
- 13                                    Inspection to be made by Construction Manager or by Owner's Representative upon Vegetative
- 14                                    Roof Assembly Contractor's request; five working days' notice required.
- 15                    B.    Installer is responsible to complete requirements to obtain confirmation of warranty from the green
- 16                                    roof systems manufacturer(s).
- 17                    C.    Installer is responsible to ensure proper maintenance until work has been accepted by
- 18                                    representative of Owner or Construction Manager.
- 19                    D.    Upon acceptance, and at the end of the maintenance and warranty period, Owner assumes
- 20                                    responsibility for maintenance unless otherwise specified.

21  
22 **END OF SECTION**

SECTION 07 62 00  
SHEET METAL FLASHING AND TRIM

- 1
- 2
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- 25 3.5 [CLEANING AND PROTECTION](#)

26 **PART 1 - GENERAL**

27 **1.1 RELATED DOCUMENTS**

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

30 **1.2 SUMMARY**

- 31 A. Section Includes:
- 32 1. Formed wall sheet metal flashing fabrications.
  - 33 2. Formed low slope roofing counter flashing fabrications.
- 34 B. Related Work:
- 35 1. Section 04 22 00 - Concrete Unit Masonry.
  - 36 2. Section 07 52 13 - Modified Bituminous Roofing (APP).
  - 37 3. Section 07 52 16 - Modified bituminous Roofing (SBS).
  - 38 4. Section 07 71 00 - Roof Specialties: for copings, roof edge drainage and reglets.

39 **1.3 PREINSTALLATION MEETINGS**

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

41 **1.4 ACTION SUBMITTALS**

- 42 A. Product Data: For each type of product.
- 43 B. Sustainable Design Submittals:
- 44 1. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and  
45 cost.
- 46 C. Shop Drawings: For sheet metal flashing and trim.
- 47 1. Include plans, elevations, sections, and attachment details.
  - 48 2. Distinguish between shop- and field-assembled work.
  - 49 3. Include identification of finish for each item.
  - 50 4. Include pattern of seams and details of termination points, expansion joints and expansion-joint  
51 covers, direction of expansion, roof-penetration flashing, and connections to adjoining work.
- 52 D. Samples: For each exposed product and for each color and texture specified.

- 1 **1.5 INFORMATIONAL SUBMITTALS**  
2 A. Product certificates.  
3 B. Product test reports.  
4 C. Sample warranty.
- 5 **1.6 CLOSEOUT SUBMITTALS**  
6 A. Maintenance data.
- 7 **1.7 QUALITY ASSURANCE**  
8 A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar  
9 to that required for this Project and whose products have a record of successful in-service performance.
- 10 **1.8 WARRANTY**  
11 A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim  
12 that shows evidence of deterioration of factory-applied finishes within specified warranty period.  
13 1. Finish Warranty Period: 20 years from date of Substantial Completion.

14 **PART 2 - PRODUCTS**

- 15 **2.1 PERFORMANCE REQUIREMENTS**  
16 A. General: Sheet metal flashing and trim assemblies shall withstand wind loads, structural movement,  
17 thermally induced movement, and exposure to weather without failure due to defective manufacture,  
18 fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not  
19 rattle, leak, or loosen, and shall remain watertight.  
20 B. Sheet Metal Standard for Flashing and Trim: Comply with SMACNA's "Architectural Sheet Metal Manual"  
21 requirements for dimensions and profiles shown unless more stringent requirements are indicated.  
22 C. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less  
23 than 25 percent.  
24 D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.  
25 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.
- 26 **2.2 SHEET METALS**  
27 A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable,  
28 temporary protective film before shipping.  
29 B. Zinc-Tin Alloy-Coated Stainless-Steel Sheet (**FLASH-3**): ASTM A 240/A 240M, Type 304, dead-soft, fully  
30 annealed, stainless-steel sheet of minimum uncoated thickness indicated; coated on both sides with zinc-  
31 tin alloy (50 percent zinc, 50 percent tin), with factory-applied gray preweathering.  
32 C. Aluminum Sheet: ASTM B 209, alloy as standard with manufacturer for finish required, with temper as  
33 required to suit forming operations and performance required.  
34 1. Alclad Finish: Metallurgically bonded surfacing alloy on both sides, forming aluminum sheet with  
35 reflective luster.  
36 D. Metallic-Coated Steel Sheet: Provide zinc-coated (galvanized) steel sheet according to  
37 ASTM A 653/A 653M, **G90** coating designation or aluminum-zinc alloy-coated steel sheet according to  
38 ASTM A 792/A 792M, Class AZ50 coating designation, Grade 40; prepainted by coil-coating process to  
39 comply with ASTM A 755/A 755M.  
40 1. Exposed Coil-Coated Finish:  
41 a. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70  
42 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed  
43 metal surfaces to comply with coating and resin manufacturers' written instructions.  
44 2. Color: As selected by Architect from manufacturer's full range.
- 45 **2.3 UNDERLAYMENT MATERIALS**  
46 A. Self-Adhering, High-Temperature Sheet: Minimum 30 mils thick, consisting of a slip-resistant polyethylene-  
47 or polypropylene-film top surface laminated to a layer of butyl- or SBS-modified asphalt adhesive, with  
48 release-paper backing; specifically designed to withstand high metal temperatures beneath metal roofing.  
49 Provide primer according to written recommendations of underlayment manufacturer.  
50 1. Thermal Stability: ASTM D 1970; stable after testing at 240 deg F or higher.  
51 2. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F or lower.  
52 B. Slip Sheet: Rosin-sized building paper, 3 lb/100 sq. ft. minimum.

1 **2.4 MISCELLANEOUS MATERIALS**

- 2 A. General: Provide materials and types of fasteners, solder, protective coatings, sealants, and other  
3 miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended  
4 by manufacturer of primary sheet metal[ **or manufactured item**] unless otherwise indicated.
- 5 B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other  
6 suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet  
7 metal.
- 8 1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.  
9 a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied  
10 coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed  
11 fasteners bearing on weather side of metal.  
12 b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being  
13 fastened.
- 14 2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.  
15 3. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.  
16 4. Fasteners for Zinc-Coated (Galvanized) Steel Sheet: Series 300 stainless steel or hot-dip galvanized  
17 steel according to ASTM A 153/A 153M or ASTM F 2329.
- 18 C. Solder:  
19 1. For base materials a mixture of tin and lead [with maximum lead content of 0.2 percent.
- 20 D. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-  
21 paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch  
22 thick.
- 23 E. Elastomeric Sealant: ASTM C 920, elastomeric silicone polymer sealant; of type, grade, class, and use  
24 classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- 25 F. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by  
26 aluminum manufacturer for exterior nonmoving joints, including riveted joints.
- 27 G. Bituminous Coating: Cold-applied asphalt emulsion according to ASTM D 1187.
- 28 H. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

29 **2.5 FABRICATION, GENERAL**

- 30 A. General: Custom fabricate sheet metal flashing and trim to comply with details shown and recommendations  
31 in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other  
32 characteristics of item required. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
- 33 1. Obtain field measurements for accurate fit before shop fabrication.  
34 2. Form sheet metal flashing and trim to fit substrates without excessive oil canning, buckling, and tool  
35 marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.  
36 3. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces  
37 exposed to view.
- 38 B. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.  
39 1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl  
40 sealant concealed within joints.  
41 2. Use lapped expansion joints only where indicated on Drawings.
- 42 C. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal to provide for proper  
43 installation of elastomeric sealant according to cited sheet metal standard.
- 44 D. Fabricate cleats and attachment devices from same material as accessory being anchored or from  
45 compatible, noncorrosive metal.
- 46 E. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard for  
47 application, but not less than thickness of metal being secured.
- 48 F. Seams: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.

49 **2.6 LOW-SLOPE ROOF SHEET METAL FABRICATIONS**

- 50 A. Base Flashing (**FLASH-3**): Shop fabricate interior and exterior corners. Fabricate from the following  
51 materials:  
52 1. Zinc-Tin Alloy-Coated Stainless-Steel Sheet.
- 53 B. Counterflashing : Fabricate from the following materials:  
54 1. Aluminum: 0.032 inch thick.
- 55 C. Roof-Penetration Flashing: Fabricate from the following materials:  
56 1. Galvanized Steel: 0.028 inch thick.
- 57 D. Roof-Drain Flashing: Fabricate from the following materials:  
58 1. Stainless Steel: 0.016 inch thick.

1 **2.7 WALL SHEET METAL FABRICATIONS**

- 2 A. Through-Wall Flashing: Fabricate continuous flashings in minimum 96-inch-long, but not exceeding 12-foot-  
3 long, sections, under copings, and at shelf angles. Fabricate discontinuous lintel, sill, and similar flashings  
4 to extend 6 inches beyond each side of wall openings; and form with 2-inch-high, end dams. Fabricate from  
5 the following materials:
- 6 1. Stainless Steel: 0.016 inch thick.
- 7 B. Opening Flashings in Frame Construction: Fabricate head, sill and similar flashings to extend 4 inches  
8 beyond wall openings. Form head and sill flashing with 2-inch-high, end dams. Fabricate from the following  
9 materials:
- 10 1. Stainless Steel: 0.016 inch thick.
- 11 C. Wall Expansion-Joint Cover: Fabricate from the following materials:
- 12 1. Stainless Steel: 0.019 inch thick.

13 **PART 3 - EXECUTION**

14 **3.1 UNDERLAYMENT INSTALLATION**

- 15 A. Felt Underlayment: Install felt underlayment, wrinkle free, using adhesive to minimize use of mechanical  
16 fasteners under sheet metal flashing and trim. Apply in shingle fashion to shed water, with lapped joints of  
17 not less than 2 inches.
- 18 B. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free. Prime substrate  
19 if recommended by underlayment manufacturer. Comply with temperature restrictions of underlayment  
20 manufacturer for installation; use primer for installing underlayment at low temperatures. Apply in shingle  
21 fashion to shed water, with end laps of not less than 6 inches staggered 24 inches between courses. Overlap  
22 side edges not less than 3-1/2 inches. Roll laps and edges with roller. Cover underlayment within 14 days.

23 **3.2 INSTALLATION, GENERAL**

- 24 A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with  
25 provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators,  
26 sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
- 27 1. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with  
28 minimum exposure of solder, welds, and sealant.
  - 29 2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify  
30 shapes and dimensions of surfaces to be covered before fabricating sheet metal.
  - 31 3. Space cleats not more than 12 inches apart. Attach each cleat with at least two fasteners. Bend tabs  
32 over fasteners.
  - 33 4. Install exposed sheet metal flashing and trim with limited oil canning, and free of buckling and tool  
34 marks.
  - 35 5. Torch cutting of sheet metal flashing and trim is not permitted.
- 36 B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated  
37 wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces  
38 with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or  
39 cited sheet metal standard.
- 40 1. Coat concealed side of uncoated-aluminum and stainless-steel sheet metal flashing and trim with  
41 bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
  - 42 2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood  
43 substrates, install underlayment and cover with slip sheet.
- 44 C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints  
45 at maximum of 10 feet with no joints within 24 inches of corner or intersection.
- 46 1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant  
47 concealed within joints.
  - 48 2. Use lapped expansion joints only where indicated on Drawings.
- 49 D. Fasteners: Use fastener sizes that penetrate wood blocking or sheathing not less than 1-1/4 inches for nails  
50 and not less than 3/4 inch for wood screws.
- 51 E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize  
52 possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.
- 53 F. Seal joints as required for watertight construction. Prepare joints and apply sealants to comply with  
54 requirements in Section 07 92 00 "Joint Sealants."
- 55 G. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets  
56 with solder to width of 1-1/2 inches; however, reduce pre-tinning where pre-tinned surface would show in  
57 completed Work.

- 1 1. Do not solder aluminum sheet.
- 2 2. Do not use torches for soldering.
- 3 3. Heat surfaces to receive solder, and flow solder into joint. Fill joint completely. Completely remove
- 4 flux and spatter from exposed surfaces.
- 5 4. Stainless-Steel Soldering: Tin edges of uncoated sheets, using solder for stainless steel and acid
- 6 flux. Promptly remove acid flux residue from metal after tinning and soldering. Comply with solder
- 7 manufacturer's recommended methods for cleaning and neutralization.
- 8 5. Copper Soldering: Tin edges of uncoated sheets, using solder for copper.
- 9 H. Rivets: Rivet joints in uncoated aluminum where necessary for strength.

10 **3.3 ROOF FLASHING INSTALLATION**

- 11 A. General: Install sheet metal flashing and trim to comply with performance requirements and cited sheet
- 12 metal standard. Provide concealed fasteners where possible, and set units true to line, levels, and slopes.
- 13 Install work with laps, joints, and seams that are permanently watertight and weather resistant.
- 14 B. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for
- 15 elastomeric sealant, extending minimum of 4 inches over base flashing. Install stainless-steel draw band
- 16 and tighten.
- 17 C. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert
- 18 counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches over
- 19 base flashing. Lap counterflashing joints minimum of 4 inches.
- 20 D. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and
- 21 other items penetrating roof. Seal with elastomeric sealant and clamp flashing to pipes that penetrate roof.

22 **3.4 WALL FLASHING INSTALLATION**

- 23 A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to cited
- 24 sheet metal standard unless otherwise indicated. Coordinate installation of wall flashing with installation of
- 25 wall-opening components such as windows, doors, and louvers.
- 26 B. Through-Wall Flashing: Installation of through-wall flashing is specified in Section 04 22 00 "Concrete Unit
- 27 Masonry."

28 **3.5 CLEANING AND PROTECTION**

- 29 A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- 30 B. Clean and neutralize flux materials. Clean off excess solder.
- 31 C. Clean off excess sealants.
- 32 D. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed
- 33 unless otherwise indicated in manufacturer's written installation instructions.

34 **END OF SECTION**

SECTION 07 62 50  
HISTORIC SHEET METAL FLASHINGS AND TRIM

- 1
- 2
- 3
- 4 PART 1 – GENERAL
- 5 1.1 SUMMARY OF WORK
- 6 1.2 QUALITY CONTROL
- 7 1.3 REFERENCES
- 8 1.4 CONTRACTOR REQUIREMENTS
- 9 1.5 SUBMITTALS
- 10 1.6 MATERIAL HANDLING
- 11 1.7 WARRANTIES
- 12 PART 2 – PRODUCTS
- 13 2.1 MANUFACTURERS
- 14 2.2 MATERIALS
- 15 2.3 FABRICATION
- 16 PART 3 – EXECUTION
- 17 3.1 EXAMINATION
- 18 3.2 INSTALLATION
- 19

20 **PART 1 - GENERAL**

21

22 **1.1 SUMMARY OF WORK**

- 23 A. This Section includes all labor, material, equipment and related services necessary to furnish and
- 24 install the following Work.
- 25 1. Sheet metal counterflashings and receivers.
- 26

27 **1.2 QUALITY CONTROL**

- 28 A. There shall be no deviation made from this Specification or the approved shop drawing without
- 29 prior written approval by the Manufacturer and Architect.
- 30 B. Shop drawings of proposed alternate details shall be submitted to Architect for approval prior to
- 31 start of construction.
- 32 C. Proposed alternate details and application procedures shall comply with the intent of these
- 33 Specifications, Drawings and/or Manufacturer's recommendations.
- 34

35 **1.3 REFERENCES**

- 36 A. References shall refer to the most recent standard.
- 37 1. American Society for Testing and Materials (ASTM).
- 38 2. Sheet Metal and Air Conditioning Contractor's National Association (SMACNA).
- 39

40 **1.4 CONTRACTOR REQUIREMENTS**

- 41 A. The Contractor shall not change the Project Foreman without prior approval of the Architect.
- 42 B. The Contractor shall not change the crew without 5 days notice to the Architect.
- 43 C. The Contractor's Foreman shall be present on the job site during work hours.
- 44 D. A competent Foreman shall oversee all roofing work. The Foreman shall have the authority to
- 45 remove unfit workers from the project along with wet, damaged or unsuitable materials. All workers
- 46 shall be skilled in the application of the materials and all workmanship shall be of the highest
- 47 quality.
- 48 E. Roofing work shall not be performed when adverse weather conditions are existing, forecasted or
- 49 when indications of moisture are present. Roofing materials shall not be applied before sunrise.
- 50 F. Roofing work shall not be performed when air temperatures are (or are expected to be) below 40°F.
- 51 G. All Work that requires saw cutting, vacuuming and other similar functions that create substantial
- 52 noise and/or vibration shall be coordinated well in advance of the Work with the Owner and the
- 53 Architect.
- 54 H. Prior to the start of the Project, and daily after the start, the Contractor shall review the type of
- 55 space below the roof being worked on, and comply with all special requirements due to occupancy
- 56 type.

- 1 I. Take all necessary precautions to protect the Owner's property as well as adjacent property,  
2 including trees, shrubs, buildings, sanitary and storm sewers, water piping, gas piping, electric  
3 conduit or cable, etc., from any and all damage which may result due to Work on this Project.  
4 J. The Contractor shall provide a weathertight condition throughout the duration of this project. At the  
5 Contractor's expense, the Contractor shall repair or replace (as determined by the Architect) any  
6 Work or property damaged by failure to provide a weathertight condition.  
7

8 **1.5 SUBMITTALS**

- 9 A. Submit shop drawings. Details required for roof system installation that are not shown or differ  
10 from the Specifications shall be submitted to the Architect. All dimensions and installation methods  
11 shall be detailed on shop drawings.  
12 B. Submit a list of materials for use in the Work.  
13 C. Submit standard samples for approval.  
14 D. Submit shop drawing of counterflashing and receiver.  
15 E. A total of three (3) copies of each submittal are required.  
16

17 **1.6 MATERIAL HANDLING**

- 18 A. Deliver all materials in Manufacturer's original, unopened packaging with Manufacturer's labels  
19 intact and legible and store as required by the Manufacturer.  
20 B. All materials sensitive to moisture and UV radiation shall be covered with a properly secured,  
21 water-resistant, breathable covering, such as canvas tarps at the end of each work period and  
22 during adverse weather. The Manufacturers' shrink wrap covering shall be slashed. Materials  
23 shall be raised above the ground or roof and placed on pallets or platforms.  
24 C. Do not overload the roof deck or structural assembly.  
25 D. Do not transport roofing materials over or store materials on a finished roof section, without prior  
26 approval of the Architect.  
27 E. The Contractor shall replace at his own expense all materials damaged due to improper handling.  
28

29 **1.7 WARRANTIES**

- 30 A. Furnish two copies of the following to the Architect:  
31 1. Contractor's Warranty: The Contractor shall warrant, the workmanship in writing for a  
32 period of two (2) years following completion and that the Work has been installed  
33 according to material Manufacturer's current specifications and according to this  
34 Specification. The warranty shall cover labor and materials.  
35 2. Manufacturer's Warranty: Provide Manufacturer's standard warranty guaranteeing color,  
36 fade, chalking and film integrity for a period of 20 years when tested against the  
37 Weatherometer Method 6152, acceptable per FED TEST METHOD 141 for prefinished  
38 metals with resin coating.  
39

40 **PART 2 - PRODUCTS**

41  
42 **2.1 MANUFACTURERS**

- 43 A. Provide materials from the Manufacturers listed in this section.  
44 B. Materials shall meet all specified standards.  
45 C. All materials shall be new unless noted otherwise.  
46 D. New materials shall not contain asbestos.  
47

48 **2.2 MATERIALS**

- 49 A. Counterflashing: Shall be 24 gauge, two-piece 304-2B stainless steel.  
50 B. Miscellaneous Sheet Metal: Galvanized steel, ASTM A525 Class G-90 zinc coating, 24 gage with  
51 minimum 1.25 oz. per square foot galvanized coating.  
52 C. Continuous Cleat: 22 gage-galvanized steel with minimum 1.25 oz. per square foot galvanized  
53 Fasteners (Miscellaneous)  
54 1. Fasteners such as nails, screws, etc. shall be of same material as metal flashing on which  
55 they are used. They shall be of type and size as shown on the Drawings or specified  
56 herein.  
57  
58 2. Screws used to secure metal to blocking shall be #8 minimum, penetrate wood blocking  
59 minimum 1-1/2" and shall have metal washers and watertight neoprene washers under



- 1 hex head. The installed withdrawal resistance shall be a minimum of 150 pounds per  
2 screw.
- 3 3. Fasteners used to secure metal to metal shall be hardened, self-tapping, sheet metal  
4 gimlet point type, with hex/washer head and be of compatible material.
- 5 4. Fasteners used to secure sheet metal to masonry or stone shall be 1/4" minimum  
6 diameter metal expansion stud anchors in pre-drilled holes such as "Kwik-Bolt II Stud  
7 Expansion Anchor" by Hilti, Inc. or approved equal. Space fasteners at 24" o.c. maximum  
8 spacing.
- 9 5. Fasteners used to secure gutter spacers to hemmed edge shall be 3/8" diameter cadmium  
10 plated nut, bolt and washer assemblies.
- 11 D. Solder: FS QQ-S-571 or ASTM B32. Use 50/50 for all applicable work unless otherwise specified.
- 12 E. Soldering Flux: FS O-F-506, type best suited for specific material.
- 13 F. Other Materials: All other materials not specifically described but required for a complete and  
14 proper installation of the Work in this Section, shall be as selected by the Contractor subject to the  
15 approval by the Architect.

16  
17 **2.3 FABRICATION**

- 18 A. Form sections square, true and accurate to size, free from distortion and other defects detrimental  
19 to appearance or performance.
- 20 B. Provide cross-break to top surface of coping metal and at all exposed surfaces of all metals which  
21 exceed 8" in cross dimension.
- 22 C. Fascia Panel Assembly
- 23 1. Fabricate side lap joints in male/female configuration for air and water tightness and  
24 structural integrity between adjacent panels.
- 25 2. Fabricate side lap joints to permit concealed fastening of panels to structure.
- 26 3. Fabricate panels with a flatness deviation not to exceed 0.030" in 18" in any direction  
27 when measured with a metal straight edge.
- 28 4. Panels exhibiting rippling, waving or oil canning exceeding 0.030" in 18" in any direction  
29 when measured with a metal straight edge will be rejected.

30  
31 **PART 3 - EXECUTION**

32  
33 **3.1 EXAMINATION**

- 34 A. Examine supporting members and substrate for layout, alignment and soundness.
- 35 B. Verify that surfaces are free from debris and unnecessary protrusions.

36  
37 **3.2 INSTALLATION**

- 38 A. Counterflashing and Receivers
- 39 1. Saw-cut or rake out mortar joints to form new reglet approximately 1" minimum uniform  
40 depth at elevation of a minimum 10" above the surface of the roof membrane, as shown  
41 on the Drawings.
- 42 2. Secure spring locked reglet receivers in clean and sound saw cuts at mortar joint.
- 43 3. The reglet receiver shall be notched and lapped at all corners and joints.
- 44 4. Receiver shall be attached at 24" O.C. minimum.
- 45 5. Secure flashings to reglet receivers using specified type fasteners at 18" o.c. maximum  
46 and as noted on the Drawings.
- 47 6. Fit flashing tight in place. Make corners square, surfaces true and straight in planes, and  
48 lines accurate to profiles.
- 49 7. The counterflashing shall be notched and lapped at inside corners and joints and seamed  
50 at outside corners.
- 51 8. Maintain lines of constant elevation around entire perimeter unless noted otherwise on the  
52 Drawings.
- 53 9. Apply continuous bead of sealant to masonry/metal intersection at top of reglet. Tool to  
54 smooth finish.
- 55 10. Where existing structural expansion joint intersects sheet metal work, provide "slip joint" in  
56 sheet metal work to accommodate movement of the structure.

57  
58 **END OF SECTION**

SECTION 07 71 00  
ROOF SPECIALTIES

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- 24 3.5 [ROOF-EDGE DRAINAGE-SYSTEM INSTALLATION](#)
- 25 3.6 [REGLET AND COUNTERFLASHING INSTALLATION](#)
- 26 3.7 [CLEANING AND PROTECTION](#)

27 **PART 1 - GENERAL**

28 **1.1 SUMMARY**

- 29 A. Section Includes:
  - 30 1. Copings (COPING-1).
  - 31 2. Gravel stops.
  - 32 3. Roof-edge drainage systems (SCUPPER-1).
  - 33 4. Reglets and counterflashings (REGLET-1).
- 34 B. Preinstallation Conference: Conduct conference at Project site.

35 **1.2 ACTION SUBMITTALS**

- 36 A. Product Data: For each type of product.
- 37 B. Sustainable Design Submittals:
  - 38 1. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and
  - 39 cost.
- 40 C. Shop Drawings: For roof specialties.
  - 41 1. Include plans, elevations, expansion-joint locations, keyed details, and attachments to other work.
  - 42 Distinguish between plant- and field-assembled work.
- 43 D. Samples: For each type of roof specialty and for each color and texture specified.

44 **1.3 INFORMATIONAL SUBMITTALS**

- 45 A. Product Test Reports: For tests performed by a qualified testing agency.
- 46 B. Sample warranty.

47 **1.4 CLOSEOUT SUBMITTALS**

- 48 A. Maintenance Data: For roofing specialties to include in maintenance manuals.

49 **1.5 QUALITY ASSURANCE**

- 50 A. Manufacturer Qualifications: A qualified manufacturer offering products meeting requirements that are SPRI
- 51 ES-1 tested to specified design pressure.

1 **1.6 WARRANTY**

- 2 A. Special Warranty on Painted Finishes: Manufacturer agrees to repair finish or replace roof specialties that  
3 show evidence of deterioration of factory-applied finishes within specified warranty period.  
4 1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:  
5 a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.  
6 b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.  
7 c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.  
8 2. Finish Warranty Period: 10 years from date of Substantial Completion.

9 **PART 2 - PRODUCTS**

10 **2.1 PERFORMANCE REQUIREMENTS**

- 11 A. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less  
12 than 25 percent.  
13 B. SPRI Wind Design Standard: Manufacture and install copings tested according to SPRI ES-1 and capable  
14 of resisting the following design pressures:  
15 1. Design Pressure: As indicated on Drawings.  
16 C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to  
17 prevent buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants,  
18 failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress  
19 as a result of thermal movements. Base calculations on surface temperatures of materials due to both solar  
20 heat gain and nighttime-sky heat loss.  
21 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

22 **2.2 COPINGS**

- 23 A. Metal Copings (**COPING-1**): Manufactured coping system consisting of metal coping cap in section lengths  
24 not exceeding 12 feet, concealed anchorage; with corner units, end cap units, and concealed splice plates  
25 with finish matching coping caps.  
26 1. Metallic-Coated Steel Sheet Coping Caps: Zinc-coated (galvanized) steel, nominal thickness as  
27 required to meet performance requirements.  
28 a. Surface: Smooth, flat finish.  
29 b. Finish: Three-coat fluoropolymer.  
30 c. Color: Refer Material Tag Index.  
31 2. Corners: Factory mitered and soldered.  
32 3. Coping-Cap Attachment Method: face leg hooked to continuous cleat with back leg fastener  
33 exposed, fabricated from coping-cap material.  
34 a. Face-Leg Cleats: Concealed, continuous stainless steel.

35 **2.3 ROOF EDGE GRAVEL STOP**

- 36 A. One-Piece Gravel Stops: Manufactured, one-piece, metal gravel stop in section lengths not exceeding 12  
37 feet (3.6 m), with a horizontal flange and vertical leg fascia terminating in a drip edge, and concealed splice  
38 plates of same material, finish, and shape as gravel stop. Provide matching corner units.  
39 1. Metallic-Coated Steel Sheet Gravel Stops: Zinc-coated (galvanized) steel, nominal thickness as  
40 required to meet performance requirements.  
41 a. Surface: Smooth, flat finish.  
42 b. Finish: Three-coat fluoropolymer.  
43 c. Color: Color: Refer Material ID List.  
44

- 1 **2.4 ROOF-EDGE DRAINAGE SYSTEMS**
- 2 A. Parapet Scuppers (**SCUPPER-1**): Manufactured with closure flange trim to exterior, 4-inch-wide wall flanges
- 3 to interior, and base extending 4 inches beyond cant or tapered strip into field of roof.
- 4 1. Zinc-Coated Steel: Nominal 0.028-inch thickness.
- 5 2. Downspouts: Open-face rectangular complete with mitered elbows, manufactured from the following
- 6 exposed metal. Furnish with metal hangers, from same material as downspouts, and anchors.
- 7 a. Zinc-Coated Steel: Nominal 0.034-inch thickness.
- 8 b. Size: Refer to Drawings.
- 9 3. Conductor Heads: Manufactured conductor heads, each with flanged back and stiffened top edge,
- 10 and of dimensions and shape indicated, complete with outlet tube that nests into upper end of
- 11 downspout.
- 12 a. Zinc-Coated Steel: Nominal 0.028-inch thickness.
- 13 B. Zinc-Coated Steel Finish: Three-coat fluoropolymer.
- 14 1. Color: Refer Material ID List.
- 15 **2.5 MANUFACTURED REGLETS**
- 16 A. Reglets (**REGLET-1**): Units of type, material, and profile required, formed to provide secure interlocking of
- 17 separate reglet and counterflashing pieces, and compatible with flashing indicated with factory-mitered and
- 18 -welded corners and junctions and with interlocking counterflashing on exterior face, of same metal as reglet.
- 19 1. Material: Zinc-Tin Alloy-Coated Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304.
- 20 **2.6 REGLETS AND COUNTERFLASHINGS**
- 21 A. Reglets (**REGLET-1**): Manufactured units formed to provide secure interlocking of separate reglet and
- 22 counterflashing pieces.
- 23 B. Counterflashing; Refer to Section 07 62 00.
- 24 **2.7 UNDERLAYMENT MATERIALS**
- 25 A. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils thick, consisting of slip-resisting
- 26 polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-
- 27 paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.
- 28 1. Thermal Stability: ASTM D 1970/D 1970M; stable after testing at 240 deg F.
- 29 2. Low-Temperature Flexibility: ASTM D 1970/D 1970M; passes after testing at minus 20 deg F.
- 30 **2.8 MISCELLANEOUS MATERIALS**
- 31 A. Fasteners: Manufacturer's recommended fasteners, suitable for application and designed to meet
- 32 performance requirements. Furnish the following unless otherwise indicated:
- 33 1. Exposed Penetrating Fasteners: Gasketed screws with hex washer heads matching color of sheet
- 34 metal.
- 35 2. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.
- 36 3. Fasteners for Zinc-Coated (Galvanized) Steel Sheet: Series 300 stainless steel or hot-dip zinc-
- 37 coated steel according to ASTM A 153/A 153M or ASTM F 2329 with finish matching sheet finish.
- 38 B. Elastomeric Sealant: ASTM C 920, elastomeric silicone polymer sealant of type, grade, class, and use
- 39 classifications required by roofing-specialty manufacturer for each application.
- 40 C. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.
- 41

1 **PART 3 - EXECUTION**

2 **3.1 UNDERLAYMENT INSTALLATION**

- 3 A. Self-Adhering Sheet Underlayment: Apply primer if required by manufacturer. Comply with temperature  
4 restrictions of underlayment manufacturer for installation. Apply wrinkle free, in shingle fashion to shed  
5 water, and with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges  
6 not less than 3-1/2 inches. Roll laps with roller. Cover underlayment within 14 days.
- 7 1. Apply continuously under copings.
  - 8 2. Coordinate application of self-adhering sheet underlayment under roof specialties with requirements  
9 for continuity with adjacent air barrier materials.

10 **3.2 INSTALLATION, GENERAL**

- 11 A. General: Install roof specialties according to manufacturer's written instructions. Anchor roof specialties  
12 securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective  
13 coatings, separators, underlayments, sealants, and other miscellaneous items as required to complete roof-  
14 specialty systems.
- 15 1. Install roof specialties level, plumb, true to line and elevation; with limited oil-canning and without  
16 warping, jogs in alignment, buckling, or tool marks.
  - 17 2. Provide uniform, neat seams with minimum exposure of solder and sealant.
  - 18 3. Install roof specialties to fit substrates and to result in weathertight performance. Verify shapes and  
19 dimensions of surfaces to be covered before manufacture.
  - 20 4. Torch cutting of roof specialties is not permitted.
  - 21 5. Do not use graphite pencils to mark metal surfaces.
- 22 B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with  
23 each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other  
24 permanent separation as recommended by manufacturer.
- 25 1. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof  
26 specialties for waterproof performance.
- 27 C. Expansion Provisions: Allow for thermal expansion of exposed roof specialties.
- 28 1. Space movement joints at a maximum of 12 feet with no joints within 18 inches of corners or  
29 intersections unless otherwise indicated on Drawings.
  - 30 2. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for  
31 50 percent movement each way. Adjust setting proportionately for installation at higher ambient  
32 temperatures.
- 33 D. Fastener Sizes: Use fasteners of sizes that penetrate wood blocking or sheathing not less than 1-1/4 inches  
34 for nails and not less than 3/4 inch for wood screws.
- 35 E. Seal concealed joints with sealant as required by roofing-specialty manufacturer.
- 36 F. Seal joints as required for weathertight construction. Place sealant to be completely concealed in joint. Do  
37 not install sealants at temperatures below 40 deg F.

38 **3.3 COPING INSTALLATION**

- 39 A. Install cleats, anchor plates, and other anchoring and attachment accessories and devices with concealed  
40 fasteners.
- 41 B. Anchor copings with manufacturer's required devices, fasteners, and fastener spacing to meet performance  
42 requirements.
- 43 1. Interlock face-leg drip edge into continuous cleat anchored to substrate at manufacturer's required  
44 spacing that meets performance requirements. Anchor back leg of coping with screw fasteners and  
45 elastomeric washers at manufacturer's required spacing that meets performance requirements.

46 **3.4 ROOF-EDGE SPECIALITIES INSTALLATION**

- 47 A. Install cleats, cants, and other anchoring and attachment accessories and devices with concealed fasteners.
- 48 B. Anchor roof edgings with manufacturer's required devices, fasteners, and fastener spacing to meet  
49 performance requirements.

50 **3.5 ROOF-EDGE DRAINAGE-SYSTEM INSTALLATION**

- 51 A. General: Install components to produce a complete roof-edge drainage system according to manufacturer's  
52 written instructions. Coordinate installation of roof perimeter flashing with installation of roof-edge drainage  
53 system.
- 54 B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in cited sheet  
55 metal standard unless otherwise indicated. Interlock bottom edge of roof edge flashing with continuous cleat  
56 anchored to substrate.

- 1 C. Copings: Anchor to resist uplift and outward forces according to recommendations in cited sheet metal  
2 standard unless otherwise indicated.  
3 D. Downspouts: Join sections with manufacturer's standard telescoping joints. Provide hangers with fasteners  
4 designed to hold downspouts securely to walls and 1 inch away from walls; locate fasteners at top and  
5 bottom and at approximately 48 inches o.c.  
6 1. Provide elbows at base of downspouts at grade to direct water away from building.  
7 E. Parapet Scuppers: Install scuppers through parapet where indicated. Continuously support scupper, set to  
8 correct elevation, and seal flanges to interior wall face, over cants or tapered edge strips, and under roofing  
9 membrane.

10 **3.6 REGLET AND COUNTERFLASHING INSTALLATION**

- 11 A. Embedded Reglets: See Drawings for installation of reglets.  
12 B. Surface-Mounted Reglets: Install reglets to receive flashings where flashing without embedded reglets is  
13 required. Install at height so that inserted counterflashings overlap 4 inches over top edge of base flashings.

14 **3.7 CLEANING AND PROTECTION**

- 15 A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.  
16 B. Remove temporary protective coverings and strippable films as roof specialties are installed.

17 **END OF SECTION**

SECTION 07 71 29

MANUFACTURED ROOF EXPANSION JOINTS

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7 1.4 [ACTION SUBMITTALS](#)  
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11 PART 2 – PRODUCTS  
12 2.1 [PERFORMANCE REQUIREMENTS](#)  
13 2.2 [BELLOWS-TYPE ROOF EXPANSION JOINTS \(ROOFJNT-1\)](#)  
14 2.3 [MATERIALS](#)  
15 PART 3 – EXECUTION  
16 3.1 [INSTALLATION](#)

17 **PART 1 - GENERAL**

18 **1.1 RELATED DOCUMENTS**

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

21 **1.2 SUMMARY**

- 22 A. Section includes flanged bellows-type roof expansion joints.

23 **1.3 PREINSTALLATION MEETINGS**

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

25 **1.4 ACTION SUBMITTALS**

- 26 A. Product Data: For each type of product.  
27 B. Sustainable Design Submittals:  
28 1. Product Data: For adhesives, indicating VOC content.  
29 2. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting  
30 materials.  
31 C. Shop Drawings: For roof expansion joints.  
32 D. Samples: For each exposed product and for each color specified.

33 **1.5 INFORMATIONAL SUBMITTALS**

- 34 A. Qualification Data: For Installer.  
35 B. Product Test Reports: For each fire-barrier provided as part of a roof-expansion-joint assembly, for tests  
36 performed by a qualified testing agency.  
37 C. Sample Warranties: For special warranty.

38 **1.6 QUALITY ASSURANCE**

- 39 A. Installer Qualifications: Installer of roofing membrane.

40 **1.7 WARRANTY**

- 41 A. Special Warranty: Manufacturer and Installer agree to repair or replace roof expansion joints and  
42 components that leak, deteriorate beyond normal weathering, or otherwise fail in materials or workmanship  
43 within specified warranty period.  
44 1. Warranty Period: 5 years from date of Substantial Completion.

1 **PART 2 - PRODUCTS**

2 **2.1 PERFORMANCE REQUIREMENTS**

3 A. Fire-Test-Response Characteristics: Provide fire-barrier assemblies with fire-test-response characteristics  
4 as determined by testing identical products, per test method indicated, by UL or another testing agency  
5 acceptable to authorities having jurisdiction. Fire-barrier products shall bear classification marking of  
6 qualified testing agency.

7 1. Exterior Wall Rating; One hour.

8 **2.2 BELLOWS-TYPE ROOF EXPANSION JOINTS (ROOFJNT-1)**

9 A. Source Limitations: Obtain bellows-type roof expansion joints approved by roofing manufacturer and that  
10 are part of roofing membrane warranty.

11 B. Flanged Bellows Roof Expansion Joint (ROOFJNT-1): Manufactured, continuous, waterproof, joint-cover  
12 assembly, consisting of exposed membrane bellows, laminated to flexible, closed-cell support foam, and  
13 secured along each edge to a metal flange for nailing to substrate. Provide factory-fabricated units for corner  
14 and joint intersections and horizontal and vertical transitions including those to other building expansion  
15 joints.

16 1. Bellows: EPDM flexible membrane.

17 2. Flanges: Galvanized steel.

18 3. Vapor barrier.

19 4. Fire rated.

20 C. Basis of Design: Johns Manville: Expand-O-Flash EJ expansion joint cover with 520 Fire Barrier (bottom  
21 mount).

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

24 1. C/S Group: Model: BRJ EJ with fire barrier.

25 2. Johns Manville. Comparable joint system.

26 3. InPro Corporation (IPC); Jointmaster 672 Series with Vapor Barrier and 972 fire blanket.

27 4. Cover Membrane: Flexible membrane, factory laminated to bellows and covering entire joint  
28 assembly and curbs.

29 E. Fire-Resistance Rating: Comply with ASTM E 1966 or UL 2079; testing by a qualified testing agency to resist  
30 the spread of fire and to accommodate building thermal movements without impairing its ability to resist the  
31 passage of fire and hot gases. Identify products with appropriate markings of applicable testing agency.

32 1. Rating: Not less than 1-hour.

33 2. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another  
34 qualified testing agency.

35 **2.3 MATERIALS**

36 A. Galvanized-Steel Sheet: ASTM A 653/A 653M, hot-dip zinc-coating designation G90.

37 B. EPDM Membrane: ASTM D 4637, Type standard with manufacturer for application.

38 C. Adhesives: As recommended by roof-expansion-joint manufacturer.

39 1. Adhesives shall have a VOC content of [70] <Insert value> g/L or less.

40 2. Adhesive shall comply with the testing and product requirements of the California Department of  
41 Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical  
42 Emissions from Indoor Sources Using Environmental Chambers."

43 D. Fasteners: Manufacturer's recommended fasteners, suitable for application and designed to withstand  
44 design loads.

45 1. Exposed Fasteners: Gasketed. Use screws with hex washer heads matching color of material being  
46 fastened.  
47



1 **PART 3 - EXECUTION**

2 **3.1 INSTALLATION**

- 3 A. General: Comply with manufacturer's written instructions for handling and installing roof expansion joints.
- 4 1. Anchor roof expansion joints securely in place, with provisions for required movement.
- 5 2. Install roof expansion joints true to line and elevation; with limited oil-canning and without warping,
- 6 jogs in alignment, buckling, or tool marks.
- 7 3. Provide for linear thermal expansion of roof expansion joint materials.
- 8 4. Provide uniform profile of roof expansion joint throughout its length; do not stretch or squeeze
- 9 membranes.
- 10 5. Provide uniform, neat seams.
- 11 6. Install roof expansion joints to fit substrates and to result in watertight performance.
- 12 B. Directional Changes and Other Expansion-Control Joint Systems: Install factory-fabricated units at
- 13 directional changes and at transitions between roof expansion joints and exterior expansion-control joint
- 14 systems specified in Section 07 95 00 "Expansion Control" to provide continuous, uninterrupted, and
- 15 watertight joints.
- 16 C. Splices: Splice roof expansion joints with materials provided by roof-expansion-joint manufacturer for this
- 17 purpose.
- 18 1. Install waterproof splices and prefabricated end dams to prevent leakage of secondary-seal
- 19 membrane.
- 20 D. Fire Barrier: Install fire barrier where indicated to provide continuous, uninterrupted fire resistance throughout
- 21 length of roof expansion joint, including transitions and end joints.
- 22 E. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with
- 23 each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other
- 24 permanent separation as recommended by manufacturer.

25

**END OF SECTION**

SECTION 07 72 00  
ROOF ACCESSORIES

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- 12 2.1 [ROOF HATCH](#)
- 13 2.2 [MISCELLANEOUS MATERIALS](#)
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- 16 3.2 [REPAIR AND CLEANING](#)

17 **PART 1 - GENERAL**

18 **1.1 RELATED DOCUMENTS**

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

21 **1.2 SUMMARY**

- 22 A. Section Includes:
- 23 1. Roof hatches.
- 24 B. Related Work:
- 25 1. Section 06 10 00 – Rough Carpentry: for field constructed curbs (CURB-2)

26 **1.3 COORDINATION**

- 27 A. Coordinate layout and installation of roof accessories with roofing membrane and base flashing
- 28 and interfacing and adjoining construction to provide a leakproof, weathertight, secure, and noncorrosive
- 29 installation.
- 30 B. Coordinate dimensions with rough-in information or Shop Drawings of equipment to be supported.

31 **1.4 ACTION SUBMITTALS**

- 32 A. Product Data: For each type of roof accessory.
- 33 B. Shop Drawings: For roof accessories.

34 **1.5 INFORMATIONAL SUBMITTALS**

- 35 A. Sample warranties.

36 **1.6 CLOSEOUT SUBMITTALS**

- 37 A. Operation and Maintenance Data: For roof accessories to include in operation and maintenance manuals.

38 **1.7 WARRANTY**

- 39 A. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair
- 40 finishes or replace roof accessories that show evidence of deterioration of factory-applied finishes within
- 41 specified warranty period.
- 42 1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:
- 43 a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
- 44 b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
- 45 c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
- 46 2. Finish Warranty Period: 10 years from date of Substantial Completion.

1 **PART 2 - PRODUCTS**

2 **2.1 ROOF HATCH**

- 3 A. Roof Hatches (**HATCH-1**): Metal roof-hatch units with lids and insulated double-walled curbs, welded or  
4 mechanically fastened and sealed corner joints, continuous lid-to-curb counterflashing and weathertight  
5 perimeter gasketing, straight sides and integrally formed deck-mounting flange at perimeter bottom. Provide  
6 non-penetrating roof railings and gates.
- 7 1. Basis of Design: Bilco Type L, thermally broken, insulated aluminum roof hatch.
  - 8 2. Manufacturers: Subject to compliance with requirements, available manufacturers offering products  
9 that may be incorporated into the Work include, but are not limited to the following:
    - 10 a. Acudor Products, Inc.
    - 11 b. Babcock-Davis.
    - 12 c. Bilco Company (The).
- 13 B. Type and Size: Single-leaf lid, 30 by 96 inches.
- 14 C. Loads: Minimum 40-lbf/sq. ft. external live load and 20-lbf/sq. ft. internal uplift load.
- 15 D. Hatch Material (Cover and Frame): Aluminum sheet.
- 16 1. Thickness: Manufacturer's standard thickness for hatch size indicated.
  - 17 2. Finish: Mill.
- 18 E. Construction:
- 19 1. Insulation: Minimum one inch Fiberglass board or equivalent foam board at cover, frame and curb.
  - 20 2. Nailer: Factory-installed wood nailer continuous around hatch perimeter.
  - 21 3. Hatch Lid: Opaque, insulated, and double walled, with manufacturer's standard metal liner of same  
22 material and finish as outer metal lid.
  - 23 4. Curb Liner: Manufacturer's standard, of same material and finish as metal curb.
  - 24 5. Fabricate curbs to minimum height of 12 inches above roofing surface unless otherwise indicated.
  - 25 6. Sloping Roofs: Where slope or roof deck exceeds 1:48, fabricate curb with perimeter curb height that  
26 is constant. Equip hatch with water diverter or cricket on side that obstructs water flow.
- 27 F. Hardware: Spring operators, hold-open arm, stainless-steel spring latch with turn handles, stainless-steel  
28 butt- or pintle-type hinge system, and padlock hasps inside and outside.
- 29 1. Provide two-point latch on lids larger than 84 inches.
- 30 G. Hatch Rail System:
- 31 1. Hatch rail system satisfies the requirements of OSHA 29 CFR 1910.23 and meets OSHA strength  
32 requirements.
  - 33 2. Basis of Design: Bil-Guard ® 2.0 Hatch Railing System
    - 34 a. Aluminum rail construction.
    - 35 b. Fixed hatch railing system provides a permanent means of fall protection for roof hatch  
36 openings.
  - 37 3. Warranty: 25-year warranty against defects in material and workmanship.

38 **2.2 MISCELLANEOUS MATERIALS**

- 39 A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous  
40 items required by manufacturer for a complete installation.
- 41 B. Wood Nailers: Softwood lumber, pressure treated with waterborne preservatives for aboveground use,  
42 acceptable to authorities having jurisdiction, containing no arsenic or chromium, and complying with  
43 AWPA C2; not less than 1-1/2 inches thick.

44 **PART 3 - EXECUTION**

45 **3.1 INSTALLATION**

- 46 A. General: Verify dimensions of roof openings for roof accessories. Install roof accessories according to  
47 manufacturer's written instructions.
- 48 1. Install roof accessories level; plumb; true to line and elevation; and without warping, jogs in alignment,  
49 buckling, or tool marks.
  - 50 2. Anchor roof accessories securely in place so they are capable of resisting indicated loads.
  - 51 3. Use fasteners, separators, sealants, and other miscellaneous items as required to complete  
52 installation of roof accessories and fit them to substrates.
  - 53 4. Install roof accessories to resist exposure to weather without failing, rattling, leaking, or loosening of  
54 fasteners and seals.

- 1 B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with  
2 each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other  
3 permanent separation as recommended by manufacturer.  
4 C. Seal joints with elastomeric or butyl sealant as required by roof accessory manufacturer.

5 **3.2 REPAIR AND CLEANING**

- 6 A. Touch up factory-primed surfaces with compatible primer ready for field painting according to  
7 Section 09 91 13 "Exterior Painting."  
8 B. Clean exposed surfaces according to manufacturer's written instructions.  
9 C. Replace roof accessories that have been damaged or that cannot be successfully repaired by finish touchup  
10 or similar minor repair procedures.

11 **END OF SECTION**

SECTION 07 81 00  
APPLIED FIREPROOFING

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18 3.4 [CLEANING, PROTECTING, AND REPAIRING](#)

19 **PART 1 - GENERAL**

20 **1.1 RELATED DOCUMENTS**

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

23 **1.2 SUMMARY**

- 24 A. Section includes sprayed fire-resistive materials (SFRM).  
25 B. Related Requirements:  
26 1. Over coating with paint: Refer to Section 09 91 23 – Interior Painting.

27 **1.3 ACTION SUBMITTALS**

- 28 A. Product Data: For each type of product.  
29 B. Shop Drawings: Framing plans, schedules, or both, indicating the following:  
30 1. Extent of fireproofing for each construction and fire-resistance rating.  
31 2. Applicable fire-resistance design designations of a qualified testing and inspecting agency  
32 acceptable to authorities having jurisdiction.  
33 3. Minimum fireproofing thicknesses needed to achieve required fire-resistance rating of each structural  
34 component and assembly.  
35 4. Treatment of fireproofing after application.

36 **1.4 INFORMATIONAL SUBMITTALS**

- 37 A. Qualification Data: For Installer.  
38 B. Installer's Qualifications.  
39 C. LEED Submittal:  
40 1. Laboratory Test Reports for Credit EQ 4: For paints and coatings used inside the weatherproofing  
41 system, documentation indicating that products comply with the testing and product requirements of  
42 the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic  
43 Emissions from Various Sources Using Small-Scale Environmental Chambers."  
44 D. Product Certificates: For each type of fireproofing.  
45 E. Evaluation Reports: For fireproofing, from ICC-ES.  
46 F. Field quality-control reports.

47 **1.5 QUALITY ASSURANCE**

- 48 A. Installer Qualifications: A firm or individual certified, licensed, or otherwise qualified by fireproofing  
49 manufacturer as experienced and with sufficient trained staff to install manufacturer's products according to  
50 specified requirements.  
51

1 **1.6 FIELD CONDITIONS**

- 2 A. Environmental Limitations: Do not apply fireproofing when ambient or substrate temperature is 44 deg F or  
3 lower unless temporary protection and heat are provided to maintain temperature at or above this level for  
4 24 hours before, during, and for 24 hours after product application.  
5 B. Ventilation: Ventilate building spaces during and after application of fireproofing, providing complete air  
6 exchanges according to manufacturer's written instructions. Use natural means or, if they are inadequate,  
7 forced-air circulation until fireproofing dries thoroughly.

8 **PART 2 - PRODUCTS**

9 **2.1 MATERIALS, GENERAL**

- 10 A. Assemblies: Provide fireproofing, including auxiliary materials, according to requirements of each fire-  
11 resistance design and manufacturer's written instructions.  
12 B. Source Limitations: Obtain fireproofing for each fire-resistance design from single source.  
13 C. Fire-Resistance Design: Indicated on Drawings, tested according to ASTM E 119 or UL 263 by a qualified  
14 testing agency. Identify products with appropriate markings of applicable testing agency.  
15 1. Steel members are to be considered unrestrained unless specifically noted otherwise.  
16 D. Low-Emitting Materials: Fireproofing used within the weatherproofing system shall comply with the testing  
17 and product requirements of the California Department of Health Services' "Standard Practice for the Testing  
18 of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."  
19 E. Asbestos: Provide products containing no detectable asbestos.

20 **2.2 SPRAYED FIRE-RESISTIVE MATERIALS**

- 21 A. Standard Durability SFRM Interior locations and concealed conditions: Manufacturer's standard,  
22 factory-mixed, lightweight, dry formulation, complying with indicated fire-resistance design, and mixed with  
23 water at Project site to form a slurry or mortar before conveyance and application.  
24 1. Products: Subject to compliance with requirements, provide the following:  
25 a. Grace Construction Products; W.R. Grace & Co. -- Conn; Grace Construction Products;  
26 Monokote MK-6 Series.  
27 2. Bond Strength: Minimum 200-lbf/sq. ft.) cohesive and adhesive strength based on field testing  
28 according to ASTM E 736.  
29 3. Density: Not less than 15 lb/cu. ft. and as specified in the approved fire-resistance design, according  
30 to ASTM E 605.  
31 4. Thickness: As required for fire-resistance design indicated, measured according to requirements of  
32 fire-resistance design or ASTM E 605, whichever is thicker, but not less than 0.375 inch (9 mm).  
33 5. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency.  
34 Identify products with appropriate markings of applicable testing agency.  
35 a. Flame-Spread Index: 0.  
36 b. Smoke-Developed Index: 0.  
37 6. Compressive Strength: Minimum 10 lbf/sq. in. according to ASTM E 761.  
38 7. Corrosion Resistance: No evidence of corrosion according to ASTM E 937.  
39 8. Deflection: No cracking, spalling, or delamination according to ASTM E 759.  
40 9. Effect of Impact on Bonding: No cracking, spalling, or delamination according to ASTM E 760.  
41 10. Air Erosion: Maximum weight loss of 0.0 g/sq. ft. in 24 hours according to ASTM E 859.  
42 11. Fungal Resistance: Treat products with manufacturer's standard antimicrobial formulation to result  
43 in no growth on specimens per ASTM G 21.  
44 12. Finish: Spray-textured finish.

45 **2.3 AUXILIARY MATERIALS**

- 46 A. General: Provide auxiliary materials that are compatible with fireproofing and substrates and are approved  
47 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction for use in fire-  
48 resistance designs indicated.  
49

- 1 B. Substrate Primers: Primers approved by fireproofing manufacturer and complying with one or both of the  
2 following requirements:  
3 1. Primer and substrate are identical to those tested in required fire-resistance design by UL or another  
4 testing and inspecting agency acceptable to authorities having jurisdiction.  
5 2. Primer's bond strength in required fire-resistance design complies with specified bond strength for  
6 fireproofing and with requirements in UL's "Fire Resistance Directory" or in the listings of another  
7 qualified testing agency acceptable to authorities having jurisdiction, based on a series of bond tests  
8 according to ASTM E 736.  
9 C. Bonding Agent: Product approved by fireproofing manufacturer and complying with requirements in UL's  
10 "Fire Resistance Directory" or in the listings of another qualified testing agency acceptable to authorities  
11 having jurisdiction.

12 **PART 3 - EXECUTION**

13 **3.1 EXAMINATION**

- 14 A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for  
15 substrates and other conditions affecting performance of the Work and according to each fire-resistance  
16 design. Verify compliance with the following:  
17 1. Substrates are free of dirt, oil, grease, release agents, rolling compounds, mill scale, loose scale,  
18 incompatible primers, paints, and encapsulants, or other foreign substances capable of impairing  
19 bond of fireproofing with substrates under conditions of normal use or fire exposure.  
20 2. Objects penetrating fireproofing, including clips, hangers, support sleeves, and similar items, are  
21 securely attached to substrates.  
22 3. Substrates receiving fireproofing are not obstructed by ducts, piping, equipment, or other suspended  
23 construction that will interfere with fireproofing application.

24 **3.2 APPLICATION**

- 25 A. Construct fireproofing assemblies that are identical to fire-resistance design indicated and products as  
26 specified, tested, and substantiated by test reports; for thickness, primers, sealers, topcoats, finishing, and  
27 other materials and procedures affecting fireproofing work.  
28 B. Comply with fireproofing manufacturer's written instructions for mixing materials, application procedures,  
29 and types of equipment used to mix, convey, and apply fireproofing; as applicable to particular conditions of  
30 installation and as required to achieve fire-resistance ratings indicated.  
31 C. Coordinate application of fireproofing with other construction to minimize need to cut or remove fireproofing.  
32 1. Do not begin applying fireproofing until clips, hangers, supports, sleeves, and other items penetrating  
33 fireproofing are in place.  
34 2. Defer installing ducts, piping, and other items that would interfere with applying fireproofing until  
35 application of fireproofing is completed.  
36 D. Metal Decks:  
37 1. Do not apply fireproofing to underside of metal deck substrates until concrete topping, if any, has  
38 been completed.  
39 2. Do not apply fireproofing to underside of metal roof deck until roofing has been completed; prohibit  
40 roof traffic during application and drying of fireproofing.

41 **3.3 FIELD QUALITY CONTROL**

- 42 A. Special Inspections: Owner shall engage a qualified special inspector to perform the following special  
43 inspections:  
44 1. Test and inspect as required by the IBC, 1704.10.  
45 B. Perform the tests and inspections of completed Work in successive stages. Do not proceed with application  
46 of fireproofing for the next area until test results for previously completed applications of fireproofing show  
47 compliance with requirements. Tested values must equal or exceed values as specified and as indicated  
48 and required for approved fire-resistance design.  
49 C. Fireproofing will be considered defective if it does not pass tests and inspections.  
50 1. Remove and replace fireproofing that does not pass tests and inspections, and retest.  
51 2. Apply additional fireproofing, per manufacturer's written instructions, where test results indicate  
52 insufficient thickness, and retest.  
53 D. Prepare test and inspection reports.  
54

- 1 **3.4 CLEANING, PROTECTING, AND REPAIRING**  
2 A. Cleaning: Immediately after completing spraying operations in each containable area of Project, remove  
3 material overspray and fallout from surfaces of other construction and clean exposed surfaces to remove  
4 evidence of soiling.  
5 B. Protect fireproofing, according to advice of manufacturer and Installer, from damage resulting from  
6 construction operations or other causes, so fireproofing will be without damage or deterioration at time of  
7 Substantial Completion.  
8 C. As installation of other construction proceeds, inspect fireproofing and repair damaged areas and  
9 fireproofing removed due to work of other trades.  
10 D. Repair fireproofing damaged by other work before concealing it with other construction.  
11 E. Repair fireproofing by reapplying it using same method as original installation or using manufacturer's  
12 recommended trowel-applied product.

13 **END OF SECTION**



SECTION 07 84 13  
PENETRATION FIRESTOPPING

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22 **PART 1 - GENERAL**

23 **1.1 RELATED DOCUMENTS**

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

26 **1.2 SUMMARY**

- 27 A. Section Includes:
- 28 1. Penetrations in fire-resistance-rated walls (FB-1).
- 29 2. Penetrations in horizontal assemblies (FB-2).

30 **1.3 PREINSTALLATION MEETINGS**

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

32 **1.4 ACTION SUBMITTALS**

- 33 A. Product Data: For each type of product.
- 34 B. Sustainable Design Submittals:
- 35 1. Product Data: For sealants, indicating VOC content.
- 36 2. Laboratory Test Reports: For sealants, indicating compliance with requirements for low-emitting
- 37 materials.
- 38 C. Product Schedule: For each penetration firestopping system. Include location, illustration of firestopping
- 39 system, and design designation of qualified testing and inspecting agency.
- 40 1. Engineering Judgments: Where Project conditions require modification to a qualified testing and
- 41 inspecting agency's illustration for a particular penetration firestopping system, submit illustration,
- 42 with modifications marked, approved by penetration firestopping system manufacturer's fire-
- 43 protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.
- 44 Obtain approval of authorities having jurisdiction prior to submittal.

45 **1.5 INFORMATIONAL SUBMITTALS**

- 46 A. Qualification Data: For Installer.
- 47 B. Product test reports.

48 **1.6 CLOSEOUT SUBMITTALS**

- 49 A. Installer Certificates: From Installer indicating that penetration firestopping systems have been installed in
- 50 compliance with requirements and manufacturer's written instructions.

- 1 **1.7 QUALITY ASSURANCE**
- 2 A. Installer Qualifications: A firm that has been approved by FM Global according to FM Global 4991,  
3 "Approval of Firestop Contractors," or been evaluated by UL and found to comply with its "Qualified  
4 Firestop Contractor Program Requirements."
- 5 B. Fire-Test-Response Characteristics: Penetration firestopping shall comply with the following requirements:  
6 1. Penetration firestopping tests are performed by a qualified testing agency acceptable to authorities  
7 having jurisdiction.  
8 2. Penetration firestopping is identical to those tested per testing standard referenced in "Penetration  
9 Firestopping" Article. Provide rated systems complying with the following requirements:  
10 a. Penetration firestopping products bear classification marking of qualified testing and  
11 inspecting agency.  
12 b. Classification markings on penetration firestopping correspond to designations listed by the  
13 following:  
14 1) UL in its "Fire Resistance Directory."  
15 C. Preinstallation Conference: Conduct conference at Project site.
- 16 **1.8 PROJECT CONDITIONS**
- 17 A. Environmental Limitations: Do not install penetration firestopping when ambient or substrate temperatures  
18 are outside limits permitted by penetration firestopping manufacturers or when substrates are wet because  
19 of rain, frost, condensation, or other causes.
- 20 B. Install and cure penetration firestopping per manufacturer's written instructions using natural means of  
21 ventilations or, where this is inadequate, forced-air circulation.
- 22 **1.9 COORDINATION**
- 23 A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping is  
24 installed according to specified requirements.
- 25 B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration  
26 firestopping.

27 **PART 2 - PRODUCTS**

- 28 **2.1 PERFORMANCE REQUIREMENTS**
- 29 A. Fire-Test-Response Characteristics:  
30 1. Perform penetration firestopping system tests by a qualified testing agency acceptable to  
31 authorities having jurisdiction.  
32 2. Test per testing standards referenced in "Penetration Firestopping Systems" Article. Provide rated  
33 systems complying with the following requirements:  
34 a. Penetration firestopping systems shall bear classification marking of a qualified testing  
35 agency.  
36 1) UL in its "Fire Resistance Directory."  
37 2) Intertek Group in its "Directory of Listed Building Products."  
38 3) FM Global in its "Building Materials Approval Guide."
- 39 **2.2 PENETRATION FIRESTOPPING SYSTEMS (FB-1, FB-2)**
- 40 A. Penetration Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases,  
41 and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems  
42 shall be compatible with one another, with the substrates forming openings, and with penetrating items if  
43 any.  
44 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products  
45 that may be incorporated into the Work include, but are not limited to the following:  
46 a. 3M Fire Protection Products:  
47 b. Hilti, Inc.  
48 c. Tremco, Inc.
- 49 B. Penetrations in Fire-Resistance-Rated Walls: Penetration firestopping systems with ratings determined per  
50 ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.  
51 1. F-Rating: Not less than the fire-resistance rating of constructions penetrated.  
52

- 1 C. Penetrations in Horizontal Assemblies: Penetration firestopping systems with ratings determined per  
2 ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.  
3 1. F-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated.  
4 2. T-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated  
5 except for floor penetrations within the cavity of a wall.  
6 3. W-Rating: Provide penetration firestopping systems showing no evidence of water leakage when  
7 tested according to UL 1479.  
8 D. Penetrations in Smoke Barriers: Penetration firestopping systems with ratings determined per UL 1479,  
9 based on testing at a positive pressure differential of 0.30-inch wg.  
10 1. L-Rating: Not exceeding 5.0 cfm/sq. ft. of penetration opening at and no more than 50-cfm  
11 cumulative total for any 100 sq. ft. at both ambient and elevated temperatures.  
12 E. Exposed Penetration Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25  
13 and 450, respectively, per ASTM E 84.  
14 1. Sealant shall have a VOC content of 250 g/L or less.  
15 F. Accessories: Provide components for each penetration firestopping system that are needed to install fill  
16 materials and to maintain ratings required. Use only those components specified by penetration  
17 firestopping system manufacturer and approved by qualified testing and inspecting agency for conditions  
18 indicated.

19 **2.3 TELECOMMUNICATIONS AND ELECTRICAL APPLICATIONS**

- 20 A. Cable Bundling Protection:  
21 1. Composite Sheet (Intumescent): The intumescent sheet shall be capable of passing ASTM E 814  
22 (ANSI/UL 1479) Standard Method of Fire Tests for Through-Penetration Fire Stops up to the  
23 desired fire resistance rating.  
24 2. Basis of Design: 3M CS-195+ Composite Sheet.  
25 3. Systems Components:  
26 a. Fire barrier caulk or putty.  
27 b. Fire barrier wrap strip.  
28 c. Graphite intumescent seal.  
29 d. Sheet metal, anchors, washers and screws.  
30 e. Cardboard.  
31 4. Single Cable Tray - Wall (One and Two Hour Wall): Based on W-L-40004.  
32 5. Single and Multiple Cable Trays – Concrete Floor (One and Two Hours): Based on C-AJ-4003.  
33 6. Single Cable Tray – Concrete Curb Retrofit (One and Two Hours): Based on F-B-3004.

34 **2.4 FILL MATERIALS**

- 35 A. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and  
36 consisting of an outer metallic sleeve lined with an intumescent strip, a radial extended flange attached to  
37 one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.  
38 B. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to  
39 moisture.  
40 C. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent  
41 material sized to fit specific diameter of penetrant.  
42 D. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded  
43 to galvanized-steel sheet.  
44 E. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic  
45 fibers, or silicone compounds.  
46 F. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one  
47 side.  
48 G. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and  
49 lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking,  
50 homogeneous mortar.  
51 H. Pillows/Bags: Reusable heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a  
52 combination of mineral-fiber, water-insoluble expansion agents, and fire-retardant additives. Where  
53 exposed, cover openings with steel-reinforcing wire mesh to protect pillows/bags from being easily  
54 removed.  
55 I. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in  
56 place to produce a flexible, nonshrinking foam.  
57

- 1 J. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade  
2 indicated below:  
3 1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces,  
4 and nonsag formulation for openings in vertical and sloped surfaces, unless indicated firestopping  
5 limits use of nonsag grade for both opening conditions.

6 **PART 3 - EXECUTION**

7 **3.1 INSTALLATION**

- 8 A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening  
9 configurations, penetrating items, substrates, and other conditions affecting performance of the Work.  
10 B. General: Install penetration firestopping systems to comply with manufacturer's written installation  
11 instructions and published drawings for products and applications.  
12 C. Install forming materials and other accessories of types required to support fill materials during their  
13 application and in the position needed to produce cross-sectional shapes and depths required to achieve  
14 fire ratings.  
15 1. After installing fill materials and allowing them to fully cure, remove combustible forming materials  
16 and other accessories not forming permanent components of firestopping.  
17 D. Install fill materials by proven techniques to produce the following results:  
18 1. Fill voids and cavities formed by openings, forming materials, accessories and penetrating items to  
19 achieve required fire-resistance ratings.  
20 2. Apply materials so they contact and adhere to substrates formed by openings and penetrating  
21 items.  
22 3. For fill materials that will remain exposed after completing the Work, finish to produce smooth,  
23 uniform surfaces that are flush with adjoining finishes.

24 **3.2 IDENTIFICATION**

- 25 A. Wall Identification: Permanently label walls containing penetration firestopping systems with the words  
26 "FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS," using lettering not less than 3 inches  
27 high and with minimum 0.375-inch strokes.  
28 1. Locate in accessible concealed floor, floor-ceiling, or attic space at 15 feet from end of wall and at  
29 intervals not exceeding 30 feet.  
30 B. Penetration Identification: Identify each penetration firestopping system with legible metal or plastic labels.  
31 Attach labels permanently to surfaces adjacent to and within 6 inches of penetration firestopping system  
32 edge so labels are visible to anyone seeking to remove penetrating items or firestopping systems. Use  
33 mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to  
34 surfaces on which labels are placed. Include the following information on labels:  
35 1. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of  
36 Any Damage."  
37 2. Contractor's name, address, and phone number.  
38 3. Designation of applicable testing and inspecting agency.  
39 4. Date of installation.  
40 5. Manufacturer's name.  
41 6. Installer's name.

42 **3.3 FIELD QUALITY CONTROL**

- 43 A. Owner will engage a qualified testing agency to perform tests and inspections according to ASTM E 2174.  
44 B. Where deficiencies are found or penetration firestopping system is damaged or removed because of  
45 testing, repair or replace penetration firestopping system to comply with requirements.  
46 C. Proceed with enclosing penetration firestopping systems with other construction only after inspection  
47 reports are issued and installations comply with requirements.

48 **END OF SECTION**

**SECTION 07 84 43**  
**JOINT FIRESTOPPING**

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18 **PART 1 - GENERAL**

19 **1.1 RELATED DOCUMENTS**

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

22 **1.2 SUMMARY**

- 23 A. Section Includes:
- 24 1. Joints in or between fire-resistance-rated constructions.
  - 25 2. Joints at exterior curtain-wall/floor intersections.
  - 26 3. Joints in smoke barriers.

27 **1.3 PREINSTALLATION MEETINGS**

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

29 **1.4 ACTION SUBMITTALS**

- 30 A. Product Data: For each type of product.
- 31 B. Sustainable Design Submittals:
- 32 1. Product Data: For sealants, indicating VOC content.
- 33 C. Installer certification.
- 34 D. Product Schedule: For each joint firestopping system. Include location, illustration of firestopping system,  
35 and design designation of qualified testing agency.
- 36 1. Engineering Judgments: Where Project conditions require modification to a qualified testing  
37 agency's illustration for a particular joint firestopping system condition, submit illustration, with  
38 modifications marked, approved by joint firestopping system manufacturer's fire-protection engineer  
39 as an engineering judgment or equivalent fire-resistance-rated assembly.

40 **1.5 INFORMATIONAL SUBMITTALS**

- 41 A. Product test reports.

42 **1.6 CLOSEOUT SUBMITTALS**

- 43 A. Installer Certificates: From Installer indicating that joint firestopping systems have been installed in  
44 compliance with requirements and manufacturer's written instructions.

45 **1.7 QUALITY ASSURANCE**

- 46 A. Installer Qualifications: A firm that has been approved by FM Global according to FM Global 4991,  
47 "Approval of Firestop Contractors," or been evaluated by UL and found to comply with UL's "Qualified  
48 Firestop Contractor Program Requirements."

1 **PART 2 - PRODUCTS**

2 **2.1 PERFORMANCE REQUIREMENTS**

- 3 A. Fire-Test-Response Characteristics:
- 4 1. Perform joint firestopping system tests by a qualified testing agency acceptable to authorities
  - 5 having jurisdiction.
  - 6 2. Test per testing standards referenced in "Joint Firestopping Systems" Article. Provide rated
  - 7 systems complying with the following requirements:
  - 8 a. Joint firestopping systems shall bear classification marking of a qualified testing agency.
  - 9 1) UL in its "Fire Resistance Directory."
  - 10 2) Intertek Group in its "Directory of Listed Building Products."

11 **2.2 JOINT FIRESTOPPING SYSTEMS (JFS)**

- 12 A. Joint Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and
- 13 maintain original fire-resistance rating of assemblies in or between which joint firestopping systems are
- 14 installed. Joint firestopping systems shall accommodate building movements without impairing their ability
- 15 to resist the passage of fire and hot gases.
- 16 B. Joints in or between Fire-Resistance-Rated Construction: Provide joint firestopping systems with ratings
- 17 determined per ASTM E 1966 or UL 2079.
- 18 1. Fire-Resistance Rating: Equal to or exceeding the fire-resistance rating of the wall, floor, or roof in
  - 19 or between which it is installed.
- 20 C. Joints at Exterior Curtain-Wall/Floor Intersections: Provide joint firestopping systems with rating
- 21 determined per ASTM E 2307.
- 22 1. F-Rating: Equal to or exceeding the fire-resistance rating of the floor assembly.
- 23 D. Joints in Smoke Barriers: Provide fire-resistive joint systems with ratings determined per UL 2079 based
- 24 on testing at a positive pressure differential of 0.30-inch wg.
- 25 1. L-Rating: Not exceeding 5.0 cfm/ft. of joint at both ambient and elevated temperatures.
- 26 E. Exposed Joint Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and
- 27 450, respectively, as determined per ASTM E 84.
- 28 1. Sealant shall have a VOC content of 250 g/L or less.
- 29 F. Accessories: Provide components of fire-resistive joint systems, including primers and forming materials,
- 30 that are needed to install elastomeric fill materials and to maintain ratings required. Use only components
- 31 specified by joint firestopping system manufacturer and approved by the qualified testing agency for
- 32 conditions indicated.

33 **PART 3 - EXECUTION**

34 **3.1 INSTALLATION**

- 35 A. Examine substrates and conditions, with Installer present, for compliance with requirements for joint
- 36 configurations, substrates, and other conditions affecting performance of the Work.
- 37 B. General: Install fire-resistive joint systems to comply with manufacturer's written installation instructions
- 38 and published drawings for products and applications indicated.
- 39 C. Install forming materials and other accessories of types required to support elastomeric fill materials during
- 40 their application and in position needed to produce cross-sectional shapes and depths required to achieve
- 41 fire ratings indicated.
- 42 1. After installing elastomeric fill materials and allowing them to fully cure, remove combustible
  - 43 forming materials and other accessories not indicated as permanent components of fire-resistive
  - 44 joint system.
- 45 D. Install elastomeric fill materials for fire-resistive joint systems by proven techniques to produce the
- 46 following results:
- 47 1. Elastomeric fill voids and cavities formed by joints and forming materials as required to achieve fire-
  - 48 resistance ratings indicated.
  - 49 2. Apply elastomeric fill materials so they contact and adhere to substrates formed by joints.
  - 50 3. For elastomeric fill materials that will remain exposed after completing the Work, finish to produce
  - 51 smooth, uniform surfaces that are flush with adjoining finishes.
- 52

1 **3.2 IDENTIFICATION**

2 A. Joint Identification: Identify joint firestopping systems with legible metal or plastic labels. Attach labels  
3 permanently to surfaces adjacent to and within 6 inches of joint edge so labels are visible to anyone  
4 seeking to remove or joint firestopping system. Use mechanical fasteners or self-adhering-type labels with  
5 adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the  
6 following information on labels:

- 7 1. The words "Warning - Joint Firestopping - Do Not Disturb. Notify Building Management of Any  
8 Damage."
- 9 2. Contractor's name, address, and phone number.
- 10 3. Designation of applicable testing agency.
- 11 4. Date of installation.
- 12 5. Manufacturer's name.
- 13 6. Installer's name.

14 **3.3 FIELD QUALITY CONTROL**

15 A. Inspecting Agency: Owner will engage a qualified testing agency to perform tests and inspections  
16 according to ASTM E 2393.

17 B. Where deficiencies are found or joint firestopping systems are damaged or removed due to testing, repair  
18 or replace joint firestopping systems so they comply with requirements.

19 C. Proceed with enclosing joint firestopping systems with other construction only after inspection reports are  
20 issued and installations comply with requirements.

21 **END OF SECTION**

**SECTION 07 92 00**  
**JOINT SEALANTS**

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25 **PART 1 - GENERAL**

26 **1.1 RELATED DOCUMENTS**

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

29 **1.2 SUMMARY**

- 30 A. Section Includes:
- 31 1. Silicone joint sealants.
  - 32 2. Nonstaining silicone joint sealants.
  - 33 3. Mildew-resistant joint sealants.
  - 34 4. Latex joint sealants.

35 **1.3 PREINSTALLATION MEETINGS**

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

37 **1.4 ACTION SUBMITTALS**

- 38 A. Product Data: For each joint-sealant product.
- 39 B. Sustainable Design Submittals:
- 40 1. Product Data: For sealants, indicating VOC content.
  - 41 2. Laboratory Test Reports: For sealants, indicating compliance with requirements for low-emitting  
42 materials.
- 43 C. Samples: For each kind and color of joint sealant required.
- 44 D. Joint-Sealant Schedule: Include the following information:
- 45 1. Joint-sealant application, joint location, and designation.
  - 46 2. Joint-sealant manufacturer and product name.
  - 47 3. Joint-sealant formulation.
  - 48 4. Joint-sealant color.
- 49



- 1 **1.5 INFORMATIONAL SUBMITTALS**  
2 A. Product test reports.  
3 B. Preconstruction laboratory test reports.  
4 C. Preconstruction field-adhesion-test reports.  
5 D. Field-adhesion-test reports.  
6 E. Sample warranties.
- 7 **1.6 QUALITY ASSURANCE**  
8 A. Testing Agency Qualifications: Qualified according to ASTM C 1021 to conduct the testing indicated.
- 9 **1.7 PRECONSTRUCTION TESTING**  
10 A. Preconstruction Laboratory Testing: Submit to joint-sealant manufacturers, for testing indicated below,  
11 samples of materials that will contact or affect joint sealants.  
12 1. Adhesion Testing: Use ASTM C 794 to determine whether priming and other specific joint  
13 preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint  
14 substrates.  
15 2. Compatibility Testing: Use ASTM C 1087 to determine sealant compatibility when in contact with  
16 glazing and gasket materials.  
17 3. Stain Testing: Use ASTM C 1248 to determine stain potential of sealant when in contact with stone  
18 and masonry substrates.  
19 B. Preconstruction Field-Adhesion Testing: Before installing sealants, field test their adhesion to Project joint  
20 substrates. Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in  
21 Appendix X1.1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.
- 22 **1.8 WARRANTY**  
23 A. Special Installer's Warranty: Installer agrees to repair or replace joint sealants that do not comply with  
24 performance and other requirements specified in this Section within specified warranty period.  
25 1. Warranty Period: Two years from date of Substantial Completion.  
26 B. Special Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those  
27 joint sealants that do not comply with performance and other requirements specified in this Section within  
28 specified warranty period.  
29 1. Warranty Period: Five years from date of Substantial Completion.

30 **PART 2 - PRODUCTS**

- 31 **2.1 JOINT SEALANTS, GENERAL**  
32 A. VOC Content: Sealants and sealant primers shall comply with the following:  
33 1. Architectural sealants shall have a VOC content of 250 g/L or less.  
34 2. Sealants and sealant primers for nonporous substrates shall have a VOC content of 250 g/L or less.  
35 3. Sealants and sealant primers for porous substrates shall have a VOC content of 775 g/L or less.  
36 B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.
- 37 **2.2 NONSTAINING SILICONE JOINT SEALANTS**  
38 A. Nonstaining Joint Sealants: No staining of substrates when tested according to ASTM C 1248.  
39 B. Silicone, Nonstaining, S, NS, 50, NT: Nonstaining, single-component, nonsag, plus 50 percent and minus 50  
40 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S,  
41 Grade NS, Class 50, Use NT.  
42 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products  
43 that may be incorporated into the Work include, but are not limited to the following:  
44 a. Dow Corning Corporation.  
45 b. Pecora Corporation.  
46 c. Sika Corporation; Joint Sealants.  
47 d. Tremco Incorporated.  
48

- 1 **2.3 URETHANE JOINT SEALANTS**
- 2 A. Urethane, S, NS, 50, T, NT: Single-component, nonsag, plus 50 percent and minus 50 percent movement
- 3 capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C 920, Type S, Grade NS, Class 25,
- 4 Uses T and NT.
- 5 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products
- 6 that may be incorporated into the Work include, but are not limited to the following:
- 7 a. BASF Corporation; Construction Systems.
- 8 b. LymTal International Inc.
- 9 **2.4 IMMERSIBLE JOINT SEALANTS**
- 10 A. Immersible Joint Sealants. Suitable for immersion in liquids; ASTM C 1247, Class 1; tested in deionized
- 11 water unless otherwise indicated
- 12 B. Urethane, Immersible, S, P, 50, T, NT, I: Immersible, single-component, pourable, plus 50 percent and
- 13 minus 50 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C 920,
- 14 Type S, Grade P, Class 25, Uses T, NT, and I.
- 15 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products
- 16 that may be incorporated into the Work include, but are not limited to the following:
- 17 a. Sika Corporation; Joint Sealants.
- 18 b. Tremco Incorporated.
- 19 c. W. R. Meadows, Inc.
- 20 **2.5 MILDEW-RESISTANT JOINT SEALANTS**
- 21 A. Mildew-Resistant Joint Sealants: Formulated for prolonged exposure to humidity with fungicide to prevent
- 22 mold and mildew growth.
- 23 B. Silicone, Mildew Resistant, Acid Curing, S, NS, 50, NT: Mildew-resistant, single-component, nonsag, plus 50
- 24 percent and minus 50 percent movement capability, nontraffic-use, acid-curing silicone joint sealant;
- 25 ASTM C 920, Type S, Grade NS, Class 25, Use NT.
- 26 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products
- 27 that may be incorporated into the Work include, but are not limited to the following:
- 28 a. Dow Corning Corporation.
- 29 b. GE Construction Sealants; Momentive Performance Materials Inc.
- 30 c. Tremco Incorporated.
- 31 C. Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.
- 32 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products
- 33 that may be incorporated into the Work include, but are not limited to the following:
- 34 a. BASF Corporation; Construction Systems.
- 35 b. Pecora Corporation.
- 36 c. Tremco Incorporated.
- 37 **2.6 JOINT-SEALANT BACKING**
- 38 A. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), and of size
- 39 and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
- 40 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products
- 41 that may be incorporated into the Work include, but are not limited to the following:
- 42 a. Alcot Plastics Ltd.
- 43 b. BASF Corporation; Construction Systems.
- 44 c. Construction Foam Products; a division of Nomaco, Inc.
- 45 B. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer.
- 46 C. Preformed Expanding Foam Sealant (JS-EXP): Backerseal (Greyflex) by Emseal.
- 47 1. Secondary Seal and Backer for Sealant: Size and application as indicated.
- 48 2. Refer to Drawings for application and installation notes.
- 49 **2.7 MISCELLANEOUS MATERIALS**
- 50 A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint
- 51 substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- 52 B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant
- 53 backing materials.
- 54 C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to
- 55 joints.

1 **PART 3 - EXECUTION**

2 **3.1 PREPARATION**

- 3 A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
- 4 1. Remove laitance and form-release agents from concrete.
- 5 2. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion.
- 6 B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience.
- 7 C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces.
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12 **3.2 INSTALLATION OF JOINT SEALANTS**

- 13 A. General: Comply with ASTM C 1193 and joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- 14 B. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
- 15 C. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- 16 D. Preformed Expanding Foam Sealant:
- 17 1. For installation behind liquid-sealant and backer-rod:
- 18 a. Set backerseal sufficiently deep into joint to allow for installation of properly sized backer-rod set at its appropriate depth.
- 19 2. For installation behind directly-applied sealant:
- 20 a. Set backerseal back from the face of the joint to maintain effective joint geometry of 1 to 2.
- 21 b. Before applying primary wet sealant, ensure that backerseal is firmly expanded in the joint.
- 22 c. Primary sealant shall be well tooled against backerseal.
- 23 E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
- 24 1. Place sealants so they directly contact and fully wet joint substrates.
- 25 2. Completely fill recesses in each joint configuration.
- 26 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- 27 F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
- 28 1. Provide concave joint profile per Figure 8A in ASTM C 1193 unless otherwise indicated.
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38 **3.3 FIELD QUALITY CONTROL**

- 39 A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:
- 40 1. Extent of Testing: Test completed and cured sealant joints as follows:
- 41 a. Perform 5 tests for the first 1000 feet of joint length for each kind of sealant and joint substrate.
- 42 2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.
- 43 B. Evaluation of Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.
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- 1 **3.4 JOINT-SEALANT SCHEDULE**
- 2 A. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces **<JS-1>**.
- 3 1. Joint Locations:
- 4 a. Isolation and contraction joints in cast-in-place concrete slabs.
- 5 b. Joints in stone paving units, including steps.
- 6 c. Tile control and expansion joints.
- 7 d. Joints between different materials listed above.
- 8 e. Other joints as indicated on Drawings.
- 9 2. Joint Sealant: Urethane, M, P, 50, T, NT.
- 10 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- 11 B. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces subject to water immersion **<JS-2>**.
- 12 1. Joint Locations:
- 13 a. Joints in pedestrian plazas.
- 14 b. Other joints as indicated on Drawings.
- 15 2. Joint Sealant: Urethane, immersible, S, P, 50, T, NT, I.
- 16 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- 17 C. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces **<JS-3>**.
- 18 1. Joint Locations:
- 19 a. Construction joints in cast-in-place concrete.
- 20 b. Joints between plant-precast architectural concrete units.
- 21 c. Control and expansion joints in unit masonry.
- 22 d. Joints in dimension stone cladding.
- 23 e. Joints between stone or masonry exterior envelope components/assemblies and window and
- 24 door frames and/or subframes.
- 25 f. Other joints as indicated on Drawings.
- 26 2. Joint Sealant: Silicone, nonstaining, S, NS, 50, NT.
- 27 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors
- 28 D. Joint-Sealant Application: Interior joints in horizontal traffic surfaces **<JS-4>**.
- 29 1. Joint Locations:
- 30 a. Isolation joints in cast-in-place concrete slabs.
- 31 b. Control and expansion joints in stone flooring.
- 32 c. Control and expansion joints in brick flooring.
- 33 d. Control and expansion joints in tile flooring.
- 34 e. Other joints as indicated on Drawings.
- 35 2. Joint Sealant: Urethane, S, P, 50, T, NT.
- 36 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- 37 E. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces **JS-5**.
- 38 1. Joint Locations:
- 39 a. Control and expansion joints on exposed interior surfaces of exterior walls.
- 40 b. Tile control and expansion joints.
- 41 c. Vertical joints on exposed surfaces of unit masonry walls and partitions.
- 42 d. Joints on underside of plant-precast structural concrete
- 43 e. Other joints as indicated on Drawings.
- 44 2. Joint Sealant: Urethane, S, NS, 50, NT.
- 45 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- 46 F. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces not subject to
- 47 significant movement **<JS-6>**.
- 48 1. Joint Locations:
- 49 a. Control joints on exposed interior surfaces of exterior walls.
- 50 b. Perimeter joints between interior wall surfaces and frames of interior doors, windows and
- 51 elevator entrances.
- 52 c. Other joints as indicated on Drawings.
- 53 2. Joint Sealant: Acrylic latex.
- 54 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
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- 1 G. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic  
2 surfaces <JS-7>.
- 3 1. Joint Locations:
- 4 a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
- 5 b. Tile control and expansion joints where indicated.
- 6 c. Other joints as indicated on Drawings.
- 7 2. Joint Sealant: Silicone, mildew resistant, acid curing, S, NS, 50, NT.
- 8 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- 9 H. Joint-Sealant Application: Concealed mastics <JS-8>.
- 10 1. Joint Locations:
- 11 a. Aluminum thresholds.
- 12 b. Sill plates.
- 13 c. Other joints as indicated on Drawings.

14 **END OF SECTION**

SECTION 07 92 19  
ACOUSTICAL JOINT SEALANTS

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2  
3 PART 1 – GENERAL  
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6 1.3 [ACTION SUBMITTALS](#)  
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16 3.4 [PROTECTION](#)

17 **PART 1 - GENERAL**

18 **1.1 RELATED DOCUMENTS**

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

21 **1.2 SUMMARY**

- 22 A. Section includes acoustical joint sealants.

23 **1.3 ACTION SUBMITTALS**

- 24 A. Product Data: For each acoustical joint sealant.  
25 B. Sustainable Design Submittals:  
26 1. Product Data: For sealants, indicating VOC content.  
27 2. Laboratory Test Reports: For sealants, indicating compliance with requirements for low-emitting  
28 materials.  
29 C. Samples: For each kind and color of acoustical joint sealant required.  
30 D. Acoustical-Joint-Sealant Schedule: Include the following information:  
31 1. Joint-sealant application, joint location, and designation.  
32 2. Joint-sealant manufacturer and product name.  
33 3. Joint-sealant formulation.  
34 4. Joint-sealant color.

35 **1.4 INFORMATIONAL SUBMITTALS**

- 36 A. Product test reports.  
37 B. Sample warranties.

38 **1.5 WARRANTY**

- 39 A. Special Installer's Warranty: Installer agrees to repair or replace acoustical joint sealants that do not comply  
40 with performance and other requirements specified in this Section within specified warranty period.  
41 1. Warranty Period: Two years from date of Substantial Completion.  
42 B. Special Manufacturer's Warranty: Manufacturer agrees to furnish acoustical joint sealants to repair or  
43 replace those joint sealants that do not comply with performance and other requirements specified in this  
44 Section within specified warranty period.  
45 1. Warranty Period: 5 years from date of Substantial Completion.

1 **PART 2 - PRODUCTS**

2 **2.1 PERFORMANCE REQUIREMENTS**

- 3 A. Provide acoustical joint-sealant products that effectively reduce airborne sound transmission through  
4 perimeter joints and openings in building construction, as demonstrated by testing representative assemblies  
5 according to ASTM E 90.  
6 1. Sealant shall have a VOC content of 250 g/L or less.

7 **2.2 ACOUSTICAL JOINT SEALANTS**

- 8 A. Acoustical Sealant [**AJS-1**]: Manufacturer's standard nonsag, paintable, nonstaining latex acoustical sealant  
9 complying with ASTM C 834.  
10 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products  
11 that may be incorporated into the Work include, but are not limited to the following:  
12 a. Dynatrol I-XL, Pecora Corporation.  
13 b. 860, 890 or 895 series Silicone Sealant, Pecora Corporation.  
14 c. Ultra Pruf II Silicone Sealant, General Electric Company.  
15 d. SpecSeal ES100, Specified Technologies, Inc.  
16 e. Sonoplastic NP1, Manufacturer.  
17 f. Spectrem 3, Tremco Commercial Sealants & Waterproofing.  
18 g. Dymonic, Tremco Commercial Sealants & Waterproofing.  
19 h. Vulkem 45, Tremco Commercial Sealants & Waterproofing.  
20 i. Speedspray 572, Hilti.  
21 j. CP 506 Smoke and Acoustic Sealant, Hilti.  
22 k. BA-98, Pecora Corporation.  
23 l. Acoustic Sealant, Tremco Commercial Sealants & Waterproofing.  
24 2. Colors of Exposed Acoustical Joint Sealants: As selected by Architect from manufacturer's full range  
25 of colors.  
26 B. For backbox putty, select one of the following, including all manufacturer-recommended accessories, in  
27 conformance with Division 7 - Sealants:  
28 1. SpecSeal SSP Intumescent Putty, Specified Technologies, Inc., Somerville, NJ  
29 2. IsoBacker, Kinetics Noise Products  
30 3. Firestop Putty Pads, Acoustical Solutions  
31 C. Primer: Material recommended by acoustical-joint-sealant manufacturer where required for adhesion of  
32 sealant to joint substrates.  
33 D. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant  
34 backing materials.  
35 E. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to  
36 joints.  
37

1 **PART 3 - EXECUTION**

2 **3.1 PREPARATION**

- 3 A. Surface Cleaning of Joints: Clean out joints immediately before installing acoustical joint sealants to comply  
4 with joint-sealant manufacturer's written instructions.  
5 B. Joint Priming: Prime joint substrates where recommended by acoustical-joint-sealant manufacturer.  
6 C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining  
7 surfaces.

8 **3.2 INSTALLATION OF ACOUSTICAL JOINT SEALANTS**

- 9 A. Comply with acoustical joint-sealant manufacturer's written installation instructions unless more stringent  
10 requirements apply.  
11 B. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and  
12 penetrations with a continuous bead of acoustical joint sealant. Install acoustical joint sealants at both faces  
13 of partitions, at perimeters, and through penetrations. Comply with ASTM C 919, ASTM C 1193, and  
14 manufacturer's written recommendations for closing off sound-flanking paths around or through assemblies,  
15 including sealing partitions to underside of floor slabs above acoustical ceilings.  
16 C. Acoustical Ceiling Areas: Apply acoustical joint sealant at perimeter edge moldings of acoustical ceiling  
17 areas in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.

18 **3.3 CLEANING**

- 19 A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with  
20 cleaning materials approved in writing by manufacturers of acoustical joint sealants and of products in which  
21 joints occur.

22 **3.4 PROTECTION**

- 23 A. Protect acoustical joint sealants during and after curing period from contact with contaminating substances  
24 and from damage resulting from construction operations or other causes so sealants are without  
25 deterioration or damage at time of Substantial Completion. If, despite such protection, damage or  
26 deterioration occurs, cut out, remove, and repair damaged or deteriorated acoustical joint sealants  
27 immediately so installations with repaired areas are indistinguishable from original work.

28 **END OF SECTION**



SECTION 07 95 00  
EXPANSION CONTROL

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16 **PART 1 - GENERAL**

17 **1.1 RELATED DOCUMENTS**

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

20 **1.2 SUMMARY**

- 21 A. Section Includes:
- 22 1. Interior floor expansion control systems.
- 23 2. Exterior wall expansion control systems.

24 **1.3 ACTION SUBMITTALS**

- 25 A. Shop Drawings: For each expansion control system specified. Include plans, elevations, sections, details,
- 26 splices, block out requirement, attachments to other work, and line diagrams.
- 27 B. Samples: For each exposed expansion control system and for each color and texture specified.

28 **PART 2 - PRODUCTS**

29 **2.1 SYSTEM DESCRIPTION**

- 30 A. General: Provide expansion control systems of design, basic profile, materials, and operation indicated.
- 31 Provide units with capability to accommodate variations in adjacent surfaces.
- 32 1. Furnish units in longest practicable lengths to minimize field splicing. Install with hairline mitered
- 33 corners where expansion control systems change direction or abut other materials.
- 34 2. Include factory-fabricated closure materials and transition pieces, T-joints, corners, curbs, cross-
- 35 connections, and other accessories as required to provide continuous expansion control systems.
- 36 B. Coordination: Coordinate installation of exterior wall expansion control systems with roof expansion control
- 37 systems to ensure that wall transitions are watertight. Roof expansion joint assemblies are specified
- 38 elsewhere.

39 **2.2 PERFORMANCE REQUIREMENTS**

- 40 A. Fire-Resistance Ratings: Where indicated, provide expansion control systems with fire barriers identical to
- 41 those of systems tested for fire resistance per UL 2079 or ASTM E 1966 by a testing and inspecting agency
- 42 acceptable to authorities having jurisdiction.
- 43 1. Hose Stream Test: Wall-to-wall and wall-to-ceiling systems shall be subjected to hose stream testing.
- 44

2.3 INTERIOR EXPANSION CONTROL SYSTEMS (JNT-1)

A. Floor-to-Floor:

1. The work shall consist of furnishing and installing waterproof expansion joints in accordance with the details shown on the plans and the requirements of the specifications. Expansion joints shall be silicone-coated, precompressed foam seal installed into metal rail system leveled and bolted to the structural slab and incorporating integral side flashing sheets for watertight encapsulation into the floor slab.

2. LEED Building Performance Requirements: The VOC of the silicone shall not exceed 50 grams/liter.

B. Basis-of-Design Product: DSM-FP as manufactured by Emseal Joint Systems Ltd and as indicated on drawings for horizontal expansion joint locations as (JNT-1).

1. Sealant system shall be comprised of two subassemblies: a) the joint sealing assembly and b) the structural-slab mounted supporting legs with integral waterproofing side sheets. The two subassemblies shall be comprised of the following components: 1) cellular polyurethane foam impregnated with hydrophobic 100% acrylic, water-based emulsion, factory coated with highway-grade, fuel resistant silicone; 2) field-applied epoxy adhesive primer, 3) field-injected silicone sealant bands, 4.) structural-slab mounted retainer legs, 5.) integral heat weldable NBR modified PVC waterproofing side sheets, 6.) stainless steel capping strips, 7.) hi-mod epoxy-gel leveling bed and dielectric separator layer, 8) carbon Steel Grade II zinc dichromate yellow finish, UNC 16, anchors and nuts and, and 9.) hi-mod anchor epoxy.

2. Material shall be capable of movements of +50%, -50% (100% total) of nominal material size. Sizes as scheduled. Depth of seal as recommended by manufacturer.

3. Silicone coating to be highway-grade, low-modulus, jet-fuel resistant silicone factory-applied to the foam while it is partially pre-compressed to a width greater than maximum joint extension and cured before final compression.

4. Epoxy-mortar setting/leveling bed shall be provided to act as dielectric separator as well as to ensure that the system is fully supported and at the appropriate elevation throughout its length.

5. Manufacturer's field-applied epoxy gel adhesive shall be applied to the faces of the previously installed mounting leg assembly. DSM-FP foam seal is lowered into the adhesive slightly recessed from the surface. Field-injected silicone sealant bands shall be injected at the bellow to leg assembly interface to complete the waterproofing.

6. The side flashing sheets shall be 12" (300 mm) wide and .012" (3mm) thick.

7. Side flashing sheets are locked into a reglet in top surface of retainer leg on each side of joint. With the side flashing sheets pulled out of the way deck waterproofing membrane is installed on the deck and brought over and up the DSM-FP system retainer legs. The side flashing sheets are lowered into the liquid membrane (or into the non-sag mastic component of a sheet waterproofing system and sandwiched with another layer of waterproofing. Wearing course material is installed up to the stainless steel retaining caps on the mounting rails. Concrete as a wear course is poured up to a 1/4 inch (6 mm) form strip placed against the stainless steel retainer caps. After the concrete has cured, the form strip is removed and the control joint caulked with a liquid sealant.

C. Fabrication:

1. DSM-FP shall be supplied precompressed to less than the joint size, packaged in shrink-wrapped lengths (sticks).

2. Expansion joint supporting aluminum rail extrusions shall be factory set at mid-point of movement range and held at this dimension by spacers to be removed after attachment of the rails to the deck. Furnish in lengths to minimize number of end joints.

- 1 **2.4 EXTERIOR WALL EXPANSION CONTROL SYSTEMS (JNT-2)**  
2 A. Source Limitations: Obtain expansion control systems from single source from single manufacturer.  
3 B. Wall Corner Expansion Control Joint: Surface Mount Wall/Corner.  
4 1. Basis-of-Design Product: JointMaster 620-A09 Series – Pleated Seal.  
5 a. Insulated Vapor Barrier for vertical applications.  
6 b. Drainage fittings for vertical applications.  
7 c. Installation adhesive as required.  
8 2. Design Criteria:  
9 a. Nominal Joint Width: As indicated on Drawings.  
10 b. Minimum Joint Width: As indicated on Drawings.  
11 c. Maximum Joint Width: As indicated on Drawings.  
12 d. Movement Capability: -25 percent/+75 percent.  
13 e. Type of Movement: As indicated on Drawings.  
14 f. Fire-Resistance Rating: Provide expansion control system and fire-barrier assembly with a  
15 rating not less than 1 hour.  
16 3. Materials:  
17 a. Elastomeric Seal: Pleated santoprene seal with durometer of 70 shore A. Colors to be  
18 selected from manufacturer's standard range.  
19 1) Seal shall be GREENGUARD Gold certified.  
20 b. Insulated Vapor Barrier: Owens Corning EcoTouch Batt insulation sandwiched by an adhered  
21 and pinned 45 mil fabric reinforced EPDM.  
22 c. Fire Barrier: Blanket System with hose stream test to walls required for indicated fire  
23 resistance rating.  
24 d. Fasteners, accessories and other materials required for complete installation in accordance  
25 with the manufacturer's instructions.  
26 e. Centering Bars (where required) shall be fabricated from zinc coated steel.  
27 4. Fabrication:  
28 a. Field assemble components provided in standard lengths with pre-packaged fasteners and  
29 accessories.  
30 b. Fabricate special transitions and corner fittings as required. Miter and weld elastomeric seal  
31 as applicable.

32 **PART 3 - EXECUTION**

33 **3.1 PREPARATION**

- 34 A. Prepare substrates according to expansion control system manufacturer's written instructions.  
35 B. Coordinate and furnish anchorages, setting drawings, and instructions for installing expansion control  
36 systems.  
37 C. Cast-In Frames: Coordinate and furnish frames to be cast into concrete.

38 **3.2 INSTALLATION**

- 39 A. Comply with manufacturer's written instructions for storing, handling, and installing expansion control  
40 systems and materials unless more stringent requirements are indicated.  
41 B. Interior Floor Expansion Joint (JNT-1):  
42 1. Manufacturer's field technician shall be present during initial preparation, inspection, and material  
43 installation.  
44 C. Seals in Metal Frames: Install seals and membranes in frames to comply with manufacturer's written  
45 instructions. Install with minimum number of end joints.  
46 1. Provide in continuous lengths for straight sections.  
47 2. Seal transitions according to manufacturer's written instructions. Vulcanize or heat-weld field-spliced  
48 joints as recommended by manufacturer.  
49 3. Installation: Mechanically lock seals into frames or adhere to frames with adhesive or pressure-  
50 sensitive tape as recommended by manufacturer.  
51 D. Foam Seals: Install with adhesive recommended by manufacturer.  
52 E. Terminate exposed ends of expansion control systems with field- or factory-fabricated termination devices.  
53

- 1 **3.3 PROTECTION**
- 2 A. Do not remove protective covering until finish work in adjacent areas is complete.
- 3 B. Protect the installation from damage by work of other Sections.

4 **END OF SECTION**

SECTION 08 11 13  
HOLLOW METAL DOORS AND FRAMES

1  
2  
3 PART 1 – GENERAL  
4 1.1 [RELATED DOCUMENTS](#)  
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6 1.3 [DEFINITIONS](#)  
7 1.4 [COORDINATION](#)  
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22 PART 3 – EXECUTION  
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25 **PART 1 - GENERAL**

26 **1.1 RELATED DOCUMENTS**

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

29 **1.2 SUMMARY**

- 30 A. Section includes hollow-metal work.  
31 B. Related Sections:  
32 1. Section 08 34 73.13 "Metal Sound Control Door Assemblies".

33 **1.3 DEFINITIONS**

- 34 A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803  
35 or SDI A250.8.

36 **1.4 COORDINATION**

- 37 A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and  
38 directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with  
39 integral anchors. Deliver such items to Project site in time for installation.  
40 B. Coordinate requirements for installation of door hardware, electrified door hardware, and access control  
41 and security systems.

42 **1.5 PREINSTALLATION MEETINGS**

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

44 **1.6 ACTION SUBMITTALS**

- 45 A. Product Data: For each type of product.  
46 B. Sustainable Design Submittals:  
47 1. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content  
48 and cost.

- 1 C. Shop Drawings: Include elevations, door edge details, frame profiles, metal thicknesses, preparations for
- 2 hardware, and other details.
- 3 D. Samples for Initial Selection: For units with factory-applied color finishes.
- 4 E. Samples for Verification: For each type of exposed finish required.
- 5 F. Schedule: Prepared by or under the supervision of supplier, using same reference numbers for details and
- 6 openings as those on Drawings.

7 **1.7 INFORMATIONAL SUBMITTALS**

- 8 A. Product test reports.

9 **PART 2 - PRODUCTS**

10 **2.1 MANUFACTURERS**

- 11 A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that
- 12 may be incorporated into the Work include, but are not limited to the following:
- 13 1. Amweld Building Products, LLC
- 14 2. Curries Company; ASSA ABLOY.
- 15 3. LaForce, Inc.
- 16 4. Steelcraft; an Allegion brand

17 **2.2 REGULATORY REQUIREMENTS**

- 18 A. Fire-Rated Assemblies: Complying with NFPA 80 and listed and labeled by a qualified testing agency
- 19 acceptable to authorities having jurisdiction for fire-protection ratings and temperature-rise limits indicated,
- 20 based on testing at positive pressure according to NFPA 252 or UL 10C.
- 21 1. Smoke- and Draft-Control Assemblies: Provide an assembly with gaskets listed and labeled for
- 22 smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction,
- 23 based on testing according to UL 1784 and installed in compliance with NFPA 105.
- 24 B. Fire-Rated, Borrowed-Lite Assemblies: Complying with NFPA 80 and listed and labeled by a testing and
- 25 inspecting agency acceptable to authorities having jurisdiction for fire-protection ratings indicated, based
- 26 on testing according to NFPA 257 or UL 9.

27 **2.3 INTERIOR DOORS AND FRAMES**

- 28 A. Standard-Duty Doors and Frames: SDI A250.8, Level 1. At locations indicated in the Door and Frame
- 29 Schedule.
- 30 1. Physical Performance: Level C according to SDI A250.4.
- 31 2. Doors:
- 32 a. Type: As indicated in the Door and Frame Schedule.
- 33 b. Thickness: 1-3/4 inches.
- 34 c. Face: Uncoated, cold-rolled steel sheet, minimum thickness of 0.032 inch.
- 35 d. Edge Construction: Model 1, Full Flush.
- 36 e. Core: Manufacturer's standard kraft-paper honeycomb, polystyrene, polyurethane,
- 37 polyisocyanurate, mineral-board, or vertical steel-stiffener core.
- 38 1) Fire Door Core: As required to provide fire-protection and temperature-rise ratings
- 39 indicated.
- 40 2) Acoustic Rated Door: As required to provide acoustic ratings indicated.
- 41 3. Frames:
- 42 a. Materials: Uncoated, cold-rolled steel sheet, minimum thickness of 0.042 inch.
- 43 b. Sidelite and Transom Frames: Fabricated from same thickness material as adjacent door
- 44 frame.
- 45 c. Construction: Full profile welded.
- 46 4. Exposed Finish: Factory Prime, factory or field painted PT-3G unless noted otherwise on drawings..
- 47

- 1 B. "Extra-Heavy-Duty Doors and Frames" Paragraph below describes interior-use assemblies fabricated to  
2 SDI requirements and containing doors with 0.053-inch (1.3-mm) thick, 16-gage face sheets and laminated  
3 cores.

4 **2.4 EXTERIOR HOLLOW-METAL DOORS AND FRAMES**

- 5 A. Heavy-Duty Doors and Frames: SDI A250.8, Level 2. At locations indicated in the Door and Frame  
6 Schedule.  
7 1. Physical Performance: Level B according to SDI A250.4.  
8 2. Doors:  
9 a. Type: As indicated in the Door and Frame Schedule.  
10 b. Thickness: 1-3/4 inches.  
11 c. Face: Metallic-coated steel sheet, minimum thickness of 0.042 inch, with minimum A40  
12 coating.  
13 d. Edge Construction: Model 1, Full Flush.  
14 e. Core: Manufacturer's standard insulation material: Polystyrene, Polyurethane or  
15 Polyisocyanurate.  
16 3. Thermal-Rated Doors: Provide doors fabricated with thermal-resistance value (R-value) of not less  
17 than 6.0 deg F x h x sq. ft./Btu when tested according to ASTM C 1363.  
18 4. Frames:  
19 a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch, with minimum A40  
20 coating.  
21 b. Construction: Full profile welded.  
22 5. Exposed Finish: Factory Prime, factory or field painted PT-7A unless noted otherwise on drawings.

23 **2.5 BORROWED LITES**

- 24 A. Hollow-metal frames of **uncoated** steel sheet, minimum thickness of **0.053 inch**.  
25 B. Construction: Full profile welded.

26 **2.6 FRAME ANCHORS**

- 27 A. Jamb Anchors:  
28 1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than  
29 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long;  
30 or wire anchors not less than 0.177 inch thick.  
31 2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.  
32 3. Compression Type for Drywall Slip-on Frames: Adjustable compression anchors.  
33 4. Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch-diameter bolts  
34 with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement  
35 plate, welded to frame at each anchor location.  
36 B. Floor Anchors: Formed from same material as frames, minimum thickness of 0.042 inch, and as follows:  
37 1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.  
38 2. Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips, allowing not less  
39 than 2-inch height adjustment. Terminate bottom of frames at finish floor surface.

40 **2.7 MATERIALS**

- 41 A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer  
42 recycled content not less than **25** percent.  
43 B. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed  
44 applications.  
45 C. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or  
46 surface defects; pickled and oiled.  
47 D. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B.  
48 E. Frame Anchors: ASTM A 879/A 879M, Commercial Steel (CS), 04Z coating designation; mill  
49 phosphatized.  
50 1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or  
51 ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.  
52 F. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.  
53 G. Power-Actuated Fasteners in Concrete: From corrosion-resistant materials.  
54 H. Grout: ASTM C 476, except with a maximum slump of 4 inches, as measured according to  
55 ASTM C 143/C 143M.  
56 I. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing).  
57 J. Glazing: Section 08 80 00 "Glazing."

1 K. Bituminous Coating: Cold-applied asphalt mastic, compounded for 15-mil dry film thickness per coat.

2 **2.8 FABRICATION**

3 A. Fabricate hollow-metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to  
4 required sizes and profiles, with minimum radius for metal thickness. Where practical, fit and assemble  
5 units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot  
6 be permanently factory assembled before shipment.

7 B. Hollow-Metal Doors:

8 1. Exterior Doors: Provide weep-hole openings in bottoms of exterior doors to permit moisture to  
9 escape. Seal joints in top edges of doors against water penetration.

10 2. Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80  
11 for fire-performance rating or where indicated.

12 C. Hollow-Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations,  
13 provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.

14 1. Sidelite and Transom Bar Frames: Provide closed tubular members with no visible face seams or  
15 joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by  
16 butt welding.

17 2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless  
18 otherwise indicated.

19 3. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.

20 4. Floor Anchors: Weld anchors to bottoms of jambs with at least four spot welds per anchor;  
21 however, for slip-on drywall frames, provide anchor clips or countersunk holes at bottoms of jambs.

22 5. Jamb Anchors: Provide number and spacing of anchors as follows:

23 a. Masonry Type: Locate anchors not more than 16 inches from top and bottom of frame.  
24 Space anchors not more than 32 inches o.c., to match coursing, and as follows:

25 1) Two anchors per jamb up to 60 inches high.

26 2) Three anchors per jamb from 60 to 90 inches high.

27 3) Four anchors per jamb from 90 to 120 inches high.

28 4) Four anchors per jamb plus one additional anchor per jamb for each 24 inches or  
29 fraction thereof above 120 inches high.

30 b. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame.  
31 Space anchors not more than 32 inches o.c. and as follows:

32 1) Three anchors per jamb up to 60 inches high.

33 2) Four anchors per jamb from 60 to 90 inches high.

34 3) Five anchors per jamb from 90 to 96 inches high.

35 4) Five anchors per jamb plus one additional anchor per jamb for each 24 inches or  
36 fraction thereof above 96 inches high.

37 c. Compression Type: Not less than two anchors in each frame.

38 d. Postinstalled Expansion Type: Locate anchors not more than 6 inches from top and bottom  
39 of frame. Space anchors not more than 26 inches o.c.

40 6. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers.

41 a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.

42 b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.

43 D. Removable Center Mullions: Interior frames scheduled for pairs of doors shall be provided with removable  
44 center mullion. Refer to Section 08 71 00 – Door Hardware for door frame and door hardware preparation  
45 required.  
46



- 1 E. Hardware Preparation: Factory prepare hollow-metal work to receive templated mortised hardware;  
2 include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door  
3 Hardware Schedule, and templates.  
4 1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door  
5 hardware.  
6 2. Comply with applicable requirements in SDI A250.6 and BHMA A156.115 for preparation of hollow-  
7 metal work for hardware.  
8 F. Stops and Moldings: Provide stops and moldings around glazed lites and louvers where indicated. Form  
9 corners of stops and moldings with mitered hairline joints.  
10 1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow-metal work.  
11 2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is  
12 capable of being removed independently.  
13 3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and  
14 frames.  
15 4. Provide loose stops and moldings on inside of hollow-metal work.  
16 5. Coordinate rabbet width between fixed and removable stops with glazing and installation types  
17 indicated.

18 **2.9 STEEL FINISHES**

- 19 A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.  
20 1. Shop Primer: SDI A250.10.  
21 B. Factory Finish: SDI A250.3.  
22 1. Color and Gloss: As selected by Architect from manufacturer's full range.

23 **2.10 ACCESSORIES**

- 24 A. Louvers: Provide sightproof louvers for interior doors, where indicated, which comply with SDI 111C, with  
25 blades or baffles formed of 0.020-inch-thick, cold-rolled steel sheet set into 0.032-inch-thick steel frame.  
26 1. Fire-Rated Automatic Louvers: Movable blades closed by actuating fusible link, and listed and  
27 labeled for use in fire-rated door assemblies of type and fire-resistance rating indicated.  
28 B. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.  
29 C. Grout Guards: Formed from same material as frames, not less than 0.016 inch thick.

30 **PART 3 - EXECUTION**

31 **3.1 INSTALLATION**

- 32 A. Hollow-Metal Frames: Install hollow-metal frames for doors, transoms, sidelites, borrowed lites, and other  
33 openings, of size and profile indicated. Comply with SDI A250.11 or NAAMM-HMMA 840 as required by  
34 standards specified.  
35 1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors  
36 are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and  
37 undamaged.  
38 a. At fire-rated openings, install frames according to NFPA 80.  
39 b. Where frames are fabricated in sections because of shipping or handling limitations, field  
40 splice at approved locations by welding face joint continuously; grind, fill, dress, and make  
41 splice smooth, flush, and invisible on exposed faces.  
42 c. Install frames with removable stops located on secure side of opening.  
43 d. Install door silencers in frames before grouting.  
44 e. Remove temporary braces necessary for installation only after frames have been properly  
45 set and secured.  
46 f. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to  
47 comply with installation tolerances.  
48 g. Field apply bituminous coating to backs of frames that will be filled with grout containing  
49 antifreezing agents.  
50 2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure  
51 with postinstalled expansion anchors.  
52 a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion  
53 anchors if so indicated and approved on Shop Drawings.  
54 3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation inside frames.  
55 4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames  
56 and masonry with grout.

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5. Concrete Walls: Solidly fill space between frames and concrete with mineral-fiber insulation.
  6. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
  7. In-Place Metal or Wood-Stud Partitions: Secure slip-on drywall frames in place according to manufacturer's written instructions.
  8. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
    - a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
    - b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
    - c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
    - d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.
- B. Hollow-Metal Doors: Fit hollow-metal doors accurately in frames, within clearances specified below. Shim as necessary.
1. Non-Fire-Rated Steel Doors:
    - a. Between Door and Frame Jambs and Head: 1/8 inch plus or minus 1/32 inch.
    - b. Between Edges of Pairs of Doors: 1/8 inch to 1/4 inch plus or minus 1/32 inch.
    - c. At Bottom of Door: 5/8 inch plus or minus 1/32 inch.
    - d. Between Door Face and Stop: 1/16 inch to 1/8 inch plus or minus 1/32 inch.
  2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
  3. Smoke-Control Doors: Install doors and gaskets according to NFPA 105.
- C. Glazing: Comply with installation requirements in Section 08 80 00 "Glazing" and with hollow-metal manufacturer's written instructions.
1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches o.c. from each corner.

28 **3.2 ADJUSTING AND CLEANING**

- 29 A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection.
- 30 Leave work in complete and proper operating condition. Remove and replace defective work, including
- 31 hollow-metal work that is warped, bowed, or otherwise unacceptable.
- 32 B. Remove grout and other bonding material from hollow-metal work immediately after installation.
- 33 C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and
- 34 apply touchup of compatible air-drying, rust-inhibitive primer.
- 35 D. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according
- 36 to manufacturer's written instructions.
- 37 E. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting
- 38 Sections.
- 39

**END OF SECTION**

SECTION 08 21 10  
WOOD DOORS REHABILITATION

PART 1 – GENERAL

- 1.1 [RELATED DOCUMENTS](#)
- 1.2 [SCOPE OF WORK](#)
- 1.3 [SUBMITTALS](#)
- 1.4 [QUALITY ASSURANCE](#)
- 1.5 [DELIVERY, STORAGE, AND HANDLING](#)
- 1.6 [PROJECT CONDITIONS](#)
- 1.7 [WARRANTY](#)

PART 2 – PRODUCTS

- 2.1 [MATERIALS](#)
- 2.2 [NEW DOORS](#)
- 2.3 [EXISTING DOORS](#)

PART 3 – EXECUTION

- 3.1 [FABRICATION](#)
- 3.2 [INSTALLATION](#)
- 3.3 [ADJUSTING AND PROTECTION](#)

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Applicable provisions of Division 1 shall govern work of this Section.

**1.2 SCOPE OF WORK**

- A. Work of this Section includes the following:
  - 1. Renovation of existing stile and rail panel wood doors.
  - 2. New stile and rail panel wood doors to match existing doors.
  - 3. Replacement of leather covering on existing Room 260 wood core doors.
  - 4. Replacement of leather desk top panel at Judge's Bench in Room 260.
  - 5. Installation of relocated existing wood doors.
  - 6. Repair of wood panels in doors.
- B. Extent and location of each type of wood door is indicated on drawings and in schedules.
- C. Related Work:
  - 1. Section 060312 – Historic Wood Repair. Wood door frames and other woodwork in juxtaposition to wood doors.
  - 2. Section 099300 - Staining and Varnishes.

**1.3 SUBMITTALS**

- A. Shop Drawings: Submit shop drawings indicating location and size of each door, elevation of each kind of door, details of construction, location and extent of hardware blocking, fire ratings and other pertinent data.
  - 1. Identify doors in accordance with established method in the bid documents.
  - 2. Indicate dimensions and locations of cutouts for locksets and other cutouts adjacent to light openings.
- B. Samples: Submit samples, 1-0" square or as indicated, for the required finish representing range of color and grain appearance and color and finished appearance of leather-covered doors.

- 1 C. Samples: 6" square of solid wood and veneer panels for new stile and rail doors.
- 2
- 3 D. Confirm AWI Grade of doors being manufactured in writing.
- 4
- 5 E. Submit samples of leather illustrating range of color and veining. Minimum size shall be 24" square.
- 6

7 **1.4 QUALITY ASSURANCE**

- 8
- 9 A. Architectural Woodwork Institute (AWI) Quality Standard: "Architectural Woodwork Quality Standards".
- 10
- 11 B. Western Wood Products Association (WWPA) grading rules for selection of wood by appearance
- 12 requirements.
- 13
- 14 C. Fire-Rated Wood Doors: Provide wood doors which are identical in materials and construction to units
- 15 tested in door and frame assemblies per ASTM E 152 and which are labeled and listed for ratings
- 16 indicated by UL.
- 17
- 18 D. Manufacturer: Obtain doors from a single manufacturer.
- 19
- 20 E. Off-site storage locations for existing doors during refurbishing and for new doors prior to delivery to site
- 21 shall be approved by Architect.
- 22

23 **1.5 DELIVERY, STORAGE, AND HANDLING**

- 24
- 25 A. Protect doors during transit, storage and handling to prevent damage, soiling and deterioration.
- 26 Comply with requirements of referenced standards and recommendations.
- 27
- 28 B. Identify each door with individual opening numbers which correlate with designation system used on
- 29 shop drawings and bid documents for door, frames, and hardware, using designations established in
- 30 the bid documents.
- 31

32 **1.6 PROJECT CONDITIONS**

- 33
- 34 A. Conditioning: Do not deliver or install doors until conditions for temperature and relative humidity have
- 35 been stabilized and can be maintained in site storage and installation areas during remainder of
- 36 construction period to comply with AWI quality standard including Section 100-S-3 "Moisture Content".
- 37

38 **1.7 WARRANTY**

- 39
- 40 A. Submit written agreement in door manufacturer's standard form signed by Manufacturer, Installer and
- 41 Contractor, agreeing to repair or replace defective doors that have warped (bow, cup or twist) or that
- 42 show telegraphing of core construction in face veneers, or do not conform to tolerance limitations of
- 43 referenced quality standards.
- 44
- 45 1. Warranty shall also include reinstallation which may be required due to repair or replacement of
- 46 defective doors where defect was not apparent prior to hanging.
- 47 2. Warranty shall be in effect for two years after date of Substantial Completion.
- 48
- 49 B. Replace or refinish doors where Contractor's work contributed to rejection or to voiding of
- 50 manufacturer's warranty.
- 51

52 **PART 2 - PRODUCTS**

53 **2.1 MATERIALS**

- 54
- 55 A. New Wood Doors.
- 56
- 57
- 58 1. Finished faces, panels and edges quartersawn white oak, select grade B and better for superior
- 59 finish in accordance with WWPA grading or to match existing wood doors and as approved by

- 1 Architect.  
2  
3 2. Cores: For AWI Premium Grade doors.  
4  
5 3. Fire rated doors: Panels shall include 5/8 inch, Type X gypsum wallboard as shown in drawings.  
6  
7 B. Existing Wood Doors.  
8  
9 1. Re-use existing quartersawn white oak wood doors stored on-site as designated in Door  
10 Schedule.  
11 2. Stripping and re-finishing shall be done on-site by Section 099300 contractor.  
12  
13 C. Leather Covered Doors and Judge's Bench desk top.  
14  
15 1. Designated existing flush doors with leather coverings shall have leather replaced with new  
16 leather and brass buttons to match existing.  
17 2. New Leather: 4-5 oz, Aniline dyed, full grain leather to be used for doors and Judge's Bench top.  
18 Single piece for each side of door, no joints in leather except at edges covered by wood trim.  
19 3. Adhesive: Masters of Barge as recommended for this specific use.  
20 4. Fastening Devices: Upholstery buttons/nails, pyramid shape nails, with flat top, finish to match  
21 existing buttons. Location and spacing shall match existing.  
22

## 2.2 NEW DOORS

- 23  
24  
25 A. Comply with tolerance requirements of AWI for Premium Grade doors, final hardware schedules, shop  
26 drawings and hardware templates.  
27  
28 B. Glass Openings: Neatly cut and trim openings for glass in doors to match existing doors and existing  
29 molding profiles.  
30  
31 C. Fabricate new wood doors to match existing doors in 2-1/4 inch and 2 inch nominal thicknesses in  
32 dimensions, joining and finished appearance and in compliance with AWI Standard 1400 for Premium  
33 Grade Rail and Stile door construction.  
34  
35 1. Face construction of stiles and rails may be made of two widths of veneer for wide widths  
36 provided the veneers are split adjacent to each other from the same board and turned and laid  
37 side by side to match grains. Carefully plane edges and tightly fit sheets together.  
38 2. Cores shall match existing and be made up of 1-3/4 inch and/or 1-1/2 inch by 1-1/2 inch solid  
39 wood strips with 1/4 inch veneer on all sides. Tenons shall be 3 to 3-1/2 inches long.  
40 3. Match existing molding profiles.  
41 4. Panels shall be solid lumber construction with two outer panels made of white oak veneer and  
42 milled to match existing and comply with AWI Premium Grade construction for flat panels.  
43 5. Laminate veneers to cores with 100 percent waterproof phenolic resin glue.  
44  
45 D. Bevel lock side of doors at an angle of 1/8 inch per 2 inches thickness. Break or ease all edges.  
46  
47 E. New doors shall be fabricated to fit finished door openings such that a clearance of no less than 1/8" is  
48 provided at the head and jambs.  
49

## 2.3 EXISTING DOORS

- 50  
51  
52  
53 A. Refer to Door Schedule for number of existing doors to be reused and the extent of the specific  
54 refinishing, repair and rehabilitation work required for each door.  
55 B. Repair of existing door panels as noted in Door Schedule shall be as follows.  
56 1. Tag and carefully remove door. Protect and store until ready for repair, refinish and  
57 reinstallation.  
58 2. Clean and completely remove glue from all areas where veneer has lifted from panel core.  
59 3. Inject core at existing gaps and cracks (1/64" min.) with wood and glue and cold press until

- 1 solidified.
- 2 4. Allow to cure.
- 3 5. Inject glue and evenly coat the underside of delaminated areas.
- 4 6. Cover both sides of panel with non-adhering wax-type paper and place in cold press at 60 psi.
- 5 7. Hot presses and increased pressure are not allowed.
- 6 8. Allow to cure.
- 7 9. Where veneer gaps remain, route out veneer only to a 1/8" maximum to patch with veneer strips
- 8 cut with sap wood cutter to allow maximum bonding edge. All veneer patches shall be quarter
- 9 sawn white oak and match abutting components for grain and color.
- 10 10. Strip and refinish as required. Reinstall.

### PART 3 - EXECUTION

#### 3.1 FABRICATION

- A. Manufacture of all new wood doors shall be in accordance with AWI standards for Premium Grade door construction or as amended herein.
- B. All new moldings and profiles, joining, size, graining and appearance shall match existing as approved by the Architect.
- C. All joints shall be coped and/or mitered as required, surfaces shall be sanded smooth and be free from tool and machine marks that might show through transparent finish.
- D. Match abutting components for grain and color.
- E. Door panels:
  1. Standard panels shall have two raised areas on each side and may be fabricated from one layer of veneer on each side of core.
  2. Panels for fire rated doors shall consist of a 1/4 inch medite core with white oak veneer faces.
  3. Exposed panel veneers shall have grain running in vertical direction only.
- F. Leather-covered doors and Judge's Bench desk top:
  1. Carefully lay leather on surfaces of doors and bench desk top to plan for best coverage of each hide. Location of joints, matching of colors and grain shall be approved by Owner and Architect.
  2. Apply full bed of adhesive to doors and desk top and lay out leather carefully stretched over flat surfaces, hand molded around edges and neatly tucked under moldings at glass openings and under trim pieces at back edge of door.
  3. Wrinkles, gouges, scratches, tool marks and glue marks shall not be acceptable. Unacceptable applications shall be re-done with new leather covering at no expense to the Owner.
  4. Clean leather with approved cleaner and leather preservative such as "Lustre Cream".
  5. For doors, install upholstery buttons in pattern to match original door button pattern. Set in straight lines and space evenly.
  6. Cut leather neatly as required for door locks or other hardware.

#### 3.2 INSTALLATION

- A. Install wood doors to comply with referenced AWI standard and as indicated.
- B. Examine installed door frames prior to hanging doors. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with plumb jambs and level heads.
- C. Where existing door casing is to be re-used, all screw holes at hinges shall be drilled out and plugged during installation.

- 1 D. On all existing doors to be re-used, drill and plug screw holes on hinge side.
- 2
- 3 E. Notify Architect if conditions do not allow for work to proceed. Do not proceed with installation until
- 4 unsatisfactory conditions have been corrected.
- 5
- 6 F. Coordinate with Section 087100 - "Door Hardware" section for installation of door hardware.
- 7 G. Install fire-rated doors in corresponding fire-rated frames in accordance with requirements of NFPA No.
- 8 80.
- 9
- 10 H. Install, align and fit doors in frames with uniform clearances as indicated below; do not trim stiles and
- 11 rails in excess of limits permitted with fire-rated doors.
- 12
- 13 1. Fitting Clearances for Non-Rated Doors: Provide 1/8" at jambs and heads; 1/8" per leaf at
- 14 meeting stiles for pairs of doors; and 5/8" from bottom of door to top of decorative floor finish or
- 15 covering. Where threshold is shown or scheduled, provide 1/4" clearance from bottom of door
- 16 to top of threshold.
- 17 2. Fitting Clearances for Fire-Rated Doors: Complying with NFPA 80.
- 18
- 19 I. Coordinate with Section 099300 to remove doors after installation and adjustment for staining and
- 20 varnishing of door tops, bottoms and edges. Reinstall after Section 099300 work is complete.
- 21

22 **3.3 ADJUSTING AND PROTECTION**

- 23
- 24 A. Operation: Re-hang or replace doors that do not swing or operate freely.
- 25
- 26 B. Replace doors damaged during installation.
- 27
- 28 C. Protect doors to ensure that wood doors will be without damage or deterioration at time of Substantial
- 29 Completion.
- 30
- 31
- 32

**END OF SECTION 08 21 10**

SECTION 08 31 13  
ACCESS DOORS AND FRAMES.

1  
2  
3 PART 1 – GENERAL  
4 1.1 [RELATED DOCUMENTS](#)  
5 1.2 [SUMMARY](#)  
6 1.3 [ACTION SUBMITTALS](#)  
7 PART 2 – PRODUCTS  
8 2.1 [PERFORMANCE REQUIREMENTS](#)  
9 2.2 [ACCESS DOORS AND FRAMES](#)  
10 2.3 [FIRE-RATED ACCESS DOORS AND FRAMES](#)  
11 2.4 [MATERIALS](#)  
12 2.5 [FABRICATION](#)  
13 2.6 [FINISHES](#)  
14 PART 3 – EXECUTION  
15 3.1 [INSTALLATION](#)

16 **PART 1 - GENERAL**

17 **1.1 RELATED DOCUMENTS**

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

20 **1.2 SUMMARY**

- 21 A. Section includes access doors and frames for walls and ceilings.

22 **1.3 ACTION SUBMITTALS**

- 23 A. Product Data: For each type of product.  
24 B. Samples: For each type of access door and frame and for each finish specified.  
25 C. Product Schedule: For access doors and frames use same designations indicated on Drawings.

26 **PART 2 - PRODUCTS**

27 **2.1 PERFORMANCE REQUIREMENTS**

- 28 A. Fire-Rated Access Doors and Frames: Assemblies complying with NFPA 80 that are listed and labeled by  
29 a qualified testing agency, for fire-protection ratings indicated, according to NFPA 252 or UL 10B.

30 **2.2 ACCESS DOORS AND FRAMES**

- 31 A. Flush Access Doors with Exposed Flanges (ACCESS-1):  
32 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products  
33 that may be incorporated into the Work include, but are not limited to the following:  
34 a. Acudor Products, Inc.  
35 b. Babcock-Davis.  
36 c. JL Industries, Inc.; a division of the Activar Construction Products Group.  
37 d. Larsens Manufacturing Company.  
38 e. MIFAB, Inc.  
39 f. Milcor; Commercial Products Group of Hart & Cooley, Inc.  
40 g. Nystrom, Inc.  
41 2. Description: Face of door flush with frame, with exposed flange and concealed hinge.  
42 3. Locations: Wall and ceiling.  
43 4. Uncoated Steel Sheet for Door: Nominal 0.060 inch, 16 gage, factory primed.  
44 5. Latch and Lock: Cam latch, screwdriver operated.

45 **2.3 FIRE-RATED ACCESS DOORS AND FRAMES**

- 46 A. Fire-Rated, Flush Access Doors with Exposed Flanges (ACCESS-2):  
47 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products  
48 that may be incorporated into the Work include, but are not limited to the following:  
49 a. Acudor Products, Inc.



- 1 b. Babcock-Davis.
- 2 c. JL Industries, Inc.; a division of the Activar Construction Products Group.
- 3 d. Larsens Manufacturing Company.
- 4 e. MIFAB, Inc.
- 5 f. Milcor; Commercial Products Group of Hart & Cooley, Inc.
- 6 g. Nystrom, Inc.
- 7 2. Description: Door face flush with frame, with a core of mineral-fiber insulation enclosed in sheet
- 8 metal; with exposed flange, self-closing door, and concealed hinge.
- 9 3. Locations: Wall and ceiling.
- 10 4. Fire-Resistance Rating: Not less than that of adjacent construction.
- 11 5. Temperature-Rise Rating: 450 deg F at the end of 30 minutes.
- 12 6. Uncoated Steel Sheet for Door: Nominal 0.036 inch, 20 gage, factory primed.
- 13 7. Latch and Lock: Self-latching door hardware, prepared for mortise cylinder.

14 **2.4 MATERIALS**

- 15 A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- 16 B. Steel Sheet: Uncoated or electrolytic zinc coated, ASTM A 879/A 879M, with cold-rolled steel sheet
- 17 substrate complying with ASTM A 1008/A 1008M, Commercial Steel (CS), exposed.
- 18 C. Frame Anchors: Same material as door face.
- 19 D. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A 153/A 153M or
- 20 ASTM F 2329.

21 **2.5 FABRICATION**

- 22 A. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with
- 23 smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller
- 24 marks, rolled trade names, or roughness.
- 25 B. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish mounting
- 26 holes, attachment devices and fasteners of type required to secure access doors to types of supports
- 27 indicated.
- 28 C. Latch and Lock Hardware:
- 29 1. Quantity: Furnish number of latches and locks required to hold doors tightly closed.
- 30 2. Keys: Furnish two keys per lock and key all locks alike.
- 31 3. Mortise Cylinder Preparation: Where indicated, prepare door panel to accept cylinder specified in
- 32 Section 08 71 00 "Door Hardware."

33 **2.6 FINISHES**

- 34 A. Painted Finishes: Comply with coating manufacturer's written instructions for cleaning, conversion coating,
- 35 and applying and baking finish.
- 36 1. Factory Primed: Apply manufacturer's standard, lead- and chromate-free, universal primer
- 37 immediately after surface preparation and pretreatment.

38 **PART 3 - EXECUTION**

39 **3.1 INSTALLATION**

- 40 A. Comply with manufacturer's written instructions for installing access doors and frames.
- 41 B. Install fire rated access doors to comply with tested assembly installation instructions
- 42 C. Adjust doors and hardware, after installation, for proper operation.

43 **END OF SECTION**

SECTION 08 33 23  
OVERHEAD COILING DOORS

- 1  
2  
3 PART 1 – GENERAL  
4 1.1 [RELATED DOCUMENTS](#)  
5 1.2 [SUMMARY](#)  
6 1.3 [ACTION SUBMITTALS](#)  
7 1.4 [CLOSEOUT SUBMITTALS](#)  
8 1.5 [QUALITY ASSURANCE](#)  
9 PART 2 – PRODUCTS  
10 2.1 [PERFORMANCE REQUIREMENTS](#)  
11 2.2 [OVERHEAD COILING SELF STORAGE SHEET DOORS \(COIL-2\)](#)  
12 2.3 [GENERAL FINISH REQUIREMENTS](#)  
13 2.4 [STEEL AND GALVANIZED-STEEL FINISHES](#)  
14 PART 3 – EXECUTION  
15 3.1 [EXAMINATION](#)  
16 3.2 [INSTALLATION](#)  
17 3.3 [ADJUSTING](#)

18 **PART 1 - GENERAL**

19 **1.1 RELATED DOCUMENTS**

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

22 **1.2 SUMMARY**

- 23 A. Section Includes:  
24 1. Overhead coiling sheet doors.  
25 B. Related Requirements:  
26 1. Section 05 50 00 "Metal Fabrications" for miscellaneous steel supports.

27 **1.3 ACTION SUBMITTALS**

- 28 A. Product Data: For each type and size of overhead coiling door and accessory.  
29 1. Include construction details, material descriptions, dimensions of individual components, profiles for  
30 slats, and finishes.  
31 B. Shop Drawings: For each installation and for special components not dimensioned or detailed in  
32 manufacturer's product data.  
33 1. Include plans, elevations, sections, and mounting details.  
34 2. Include points of attachment and their corresponding static and dynamic loads imposed on  
35 structure.

36 **1.4 CLOSEOUT SUBMITTALS**

- 37 A. Maintenance Data: For overhead coiling doors to include in maintenance manuals.

38 **1.5 QUALITY ASSURANCE**

- 39 A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by  
40 manufacturer for both installation and maintenance of units required for this Project.  
41 B. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation  
42 Barriers Compliance Board's ADA-ABA Accessibility Guidelines,,.  
43

1 **PART 2 - PRODUCTS**

2 **2.1 PERFORMANCE REQUIREMENTS**

- 3 A. Structural Performance, Exterior Doors: Capable of withstanding the design wind loads.
- 4 1. Design Wind Load: As indicated on Drawings.
- 5 2. Testing: According to ASTM E 330 or DASMA 108 for garage doors and meeting the acceptance
- 6 criteria of DASMA 108.
- 7 3. Deflection Limits: Design overhead coiling doors to withstand design wind load without evidencing
- 8 permanent deformation or disengagement of door components.
- 9 4. Operability under Wind Load: Design overhead coiling doors to remain operable under design wind
- 10 load, acting inward and outward.

11 **2.2 OVERHEAD COILING SELF STORAGE SHEET DOORS (COIL-2):**

- 12 A. Basis of Design: Overhead Door Corporation 770 Series.
- 13 1. Comparable products by the following manufacturers:
- 14 a. Raynor Duracoil Basic.
- 15 b. Clopay 150c.
- 16 B. Curtain: Roll formed, galvanized steel, per ASTM A 653 SQ Grade 80, Galvanized G-30. Sections
- 17 interlocked and permanently seamed together to form a continuous curtain. Provided with a PVC edge
- 18 strip stapled on the edge of curtain's exterior side to minimize steel-to-steel contact.
- 19 1. Slats: Partially perforated panels representing roughly 25% free area of exposed door. Bottom 24
- 20 inches shall be unperforated.
- 21 2. Finish:
- 22 a. Curtain slats shall receive rust-inhibitive, roll coating process, including 0.2 mils thick baked-
- 23 on prime paint, and 0.6 mils thick baked-on polyester top coat.
- 24 b. Top Coat Color: As selected by the Architect from the manufacturer's standard colors.
- 25 c. Guides, angles, bottom bar stops, headplates and rings galvanized. Aluminum bottom bar
- 26 clear anodized.
- 27 3. Bottom Bar: Extruded aluminum reinforced with roll formed steel angle and provided with a flexible
- 28 PVC bulb type astragal to ensure a consistent seal along the floor. Extrusion designed to interlock
- 29 with door curtain.
- 30 4. Bottom Bar Stops: Bottom bar stops shall be 14 gauge.
- 31 5. Guides: Guide roll-formed from 18-gauge steel. Guides 1-5/8 inches (41 mm) wide with UHMW
- 32 polypropylene rub strips on each edge of the guide.
- 33 6. Headplates: 14-gauge steel and includes steel roller bearings to prevent steel-to-steel contact.
- 34 7. Counterbalance: Counterbalance assembly with "stepped" designed steel rings to ensure a tight
- 35 and uniform curtain wrap. 3-3/8 inch (86 mm) I.D. springs lubricated at factory to enhance long life
- 36 and door operation. Shaft 1-5/16 inch (35 mm) diameter with .065 inch (1.65 mm) wall thickness to
- 37 minimize door deflection
- 38 8. Operation: Manual push up.
- 39 9. Locking: Dual Exterior curtain locks, slide bolt lock.

40 **2.3 GENERAL FINISH REQUIREMENTS**

- 41 A. Comply with NAAMM/NOMMA's "Metal Finishes Manual for Architectural and Metal Products (AMP 500-
- 42 06)" for recommendations for applying and designating finishes.
- 43 B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in
- 44 appearance of adjoining components are acceptable if they are within the range of approved Samples and
- 45 are assembled or installed to minimize contrast.

46 **2.4 STEEL AND GALVANIZED-STEEL FINISHES**

- 47 A. Baked-Enamel or Powder-Coat Finish: Manufacturer's standard baked-on finish consisting of prime coat
- 48 and thermosetting topcoat. Comply with coating manufacturer's written instructions for cleaning,
- 49 pretreatment, application, and minimum dry film thickness.

50 **PART 3 - EXECUTION**

51 **3.1 EXAMINATION**

- 52 A. Examine substrates areas and conditions, with Installer present, for compliance with requirements for

- 1 substrate construction and other conditions affecting performance of the Work.  
2 B. Proceed with installation only after unsatisfactory conditions have been corrected.

3 **3.2 INSTALLATION**

- 4 A. Install overhead coiling doors and operating equipment complete with necessary hardware, anchors,  
5 inserts, hangers, and equipment supports; according to manufacturer's written instructions and as  
6 specified.

7 **3.3 ADJUSTING**

- 8 A. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or  
9 distortion.  
10 1. Adjust exterior doors and components to be weather-resistant.  
11 B. Lubricate bearings and sliding parts as recommended by manufacturer.  
12 C. Adjust seals to provide tight fit around entire perimeter.

13 **END OF SECTION**

SECTION 08 33 26  
OVERHEAD COILING GRILLES

- 1  
2  
3 PART 1 – GENERAL  
4 1.1 [RELATED DOCUMENTS](#)  
5 1.2 [SUMMARY](#)  
6 1.3 [ACTION SUBMITTALS](#)  
7 1.4 [CLOSEOUT SUBMITTALS](#)  
8 1.5 [QUALITY ASSURANCE](#)  
9 PART 2 – PRODUCTS  
10 2.1 [OPEN-CURTAIN GRILLE ASSEMBLY \(COIL-1\)](#)  
11 2.2 [MATERIALS, GENERAL](#)  
12 2.3 [GRILLE CURTAIN MATERIALS AND CONSTRUCTION](#)  
13 2.4 [HOODS AND ACCESSORIES](#)  
14 2.5 [LOCKING DEVICES](#)  
15 2.6 [COUNTERBALANCING MECHANISM](#)  
16 PART 3 – EXECUTION  
17 3.1 [INSTALLATION](#)  
18 3.2 [DEMONSTRATION](#)

19 **PART 1 - GENERAL**

20 **1.1 RELATED DOCUMENTS**

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

23 **1.2 SUMMARY**

- 24 A. Section includes open-curtain overhead coiling grilles.  
25 B. Related Requirements:  
26 1. Section 05 50 00 "Metal Fabrications" for miscellaneous steel supports, angle-framing of grille  
27 opening.

28 **1.3 ACTION SUBMITTALS**

- 29 A. Product Data: For each type and size of overhead coiling grille and accessory.  
30 B. Shop Drawings: For each installation and for special components not dimensioned or detailed in  
31 manufacturer's product data.  
32 1. Include points of attachment and their corresponding static and dynamic loads imposed on  
33 structure.  
34 2. Show locations of controls, locking devices, and other accessories.  
35 3. Include diagrams for power, signal, and control wiring.  
36 C. Samples: For each exposed product and for each color and texture specified.

37 **1.4 CLOSEOUT SUBMITTALS**

- 38 A. Maintenance data.

39 **1.5 QUALITY ASSURANCE**

- 40 A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by  
41 manufacturer for both installation and maintenance of units required for this Project.  
42

1 **PART 2 - PRODUCTS**

2 **2.1 OPEN-CURTAIN GRILLE ASSEMBLY (COIL-1)**

- 3 A. Open-Curtain Grille (**COIL-1**): Overhead coiling, countertop grille with a curtain having a network of  
4 horizontal rods and tube spacers with vertical links in a brick pattern.  
5 1. Basis of Design: Cornell ESG12 motor operated rolling grille.  
6 2. Manufacturers: Subject to compliance with requirements, available manufacturers offering products  
7 that may be incorporated into the Work include, but are not limited to the following:  
8 a. Clopay Building Products.  
9 b. Cookson.  
10 B. Operation Cycles: Grille components and operators capable of operating for not less than 5 times per day.  
11 C. Grille Curtain Material: Aluminum.  
12 1. Pattern: Brick.  
13 D. Bottom Bar: Continuous aluminum and finished to match grille.  
14 E. Curtain Jamb Guides: Heavy duty extruded aluminum with exposed finish matching grille. Provide  
15 continuous integral wear strips to prevent metal-to-metal contact and to minimize operational noise.  
16 F. Hood: Match curtain material and finish.  
17 1. Mounting Position: As indicated on Drawings.  
18 G. Locking Devices: Equip grille with locking device assembly. Keyed cylinder locking into both jambs  
19 operable from both sides of curtain with motor interlock cutout switches.  
20 H. Electric Grille Operator:  
21 1. Usage Classification: Standard duty, up to 5 cycles per day.  
22 2. Motor Exposure: Interior.  
23 3. Emergency Manual Operation: provide wall manual release system pull handle to disengage motor  
24 operator and automatically open grille for emergency egress without the use of electrical power.  
25 Release of pull handle will reset grille to normal motor operation.  
26 4. Control Station: Interior mounted, where indicated on Drawings.  
27 5. Other Equipment: none.  
28 I. Grille Finish:  
29 1. Aluminum Finish: Clear anodized.  
30 2. PVC Spacers: Color as selected by Architect from manufacturer's full range.

31 **2.2 MATERIALS, GENERAL**

- 32 A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a  
33 qualified testing agency, and marked for intended location and application.

34 **2.3 GRILLE CURTAIN MATERIALS AND CONSTRUCTION**

- 35 A. Open-Curtain Grilles: Fabricate metal grille curtain as an open network of horizontal rods, spaced at  
36 regular intervals, that are interconnected with vertical links, which are formed and spaced as indicated and  
37 are free to rotate on the rods.  
38 B. Bottom Bar: Manufacturer's standard continuous shape unless otherwise indicated, finished to match  
39 grille.  
40 1. Astragal: Equip grille bottom bar with a replaceable, adjustable, continuous, compressible gasket of  
41 flexible vinyl, rubber, or neoprene as a cushion bumper.  
42 C. Grille Curtain Jamb Guides: Manufacturer's standard shape having curtain groove with return lips or bars  
43 to retain curtain. Provide continuous integral wear strips to prevent metal-to-metal contact and to minimize  
44 operational noise; with removable stops on guides to prevent overtravel of curtain.  
45 1. Removable Posts and Jamb Guides: Manufacturer's standard.

46 **2.4 HOODS AND ACCESSORIES**

- 47 A. General: Form sheet metal hood to entirely enclose coiled curtain and operating mechanism at opening  
48 head. Contour to fit end brackets to which hood is attached. Roll and reinforce top and bottom edges for  
49 stiffness. Form closed ends for surface-mounted hoods and fascia for any portion of between-jamb  
50 mounting that projects beyond wall face. Equip hood with intermediate support brackets as required to  
51 prevent sagging.  
52 B. Removable Metal Soffit: Formed or extruded from same metal and with same finish as curtain if hood is  
53 mounted above ceiling, unless otherwise indicated.

1 **2.5 LOCKING DEVICES**

- 2 A. Locking Device Assembly: Fabricate with cylinder lock, spring-loaded dead bolt, operating handle, cam  
3 plate, and adjustable locking bars to engage through slots in tracks.  
4 1. Lock Cylinders: Cylinders specified in Section 08 71 00 "Door Hardware".  
5 2. Keys: Three for each cylinder.  
6 B. Safety Interlock Switch: Equip power-operated grilles with safety interlock switch to disengage power  
7 supply when grille is locked.

8 **2.6 COUNTERBALANCING MECHANISM**

- 9 A. General: Counterbalance grilles by means of manufacturer's standard mechanism with an adjustable-  
10 tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel  
11 connected to top of curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite  
12 bearings for rotating members.  
13 B. Brackets: Manufacturer's standard mounting brackets of either cast iron or cold-rolled steel plate.

14 **2.7 ELECTRIC GRILLE OPERATORS**

- 15 A. General: Electric grille operator assembly of size and capacity recommended and provided by grille  
16 manufacturer for grille and operation cycles requirement specified, with electric motor and factory-rewired  
17 motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, control stations, control  
18 devices, integral gearing for locking grille, and accessories required for proper operation.  
19 1. Comply with NFPA 70.  
20 2. Control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6, with NFPA 70  
21 Class 2 control circuit, maximum 24-V ac or dc.  
22 B. Usage Classification: Electric operator and components capable of operating for not less than number of  
23 cycles per hour indicated for each grille.  
24 C. Motors: Reversible-type motor with controller (disconnect switch) for motor exposure indicated.  
25 1. Electrical Characteristics:  
26 a. Phase: Single phase.  
27 b. Volts: 115 V.  
28 c. Hertz: 60.  
29 2. Motor Size: Minimum size as indicated. If not indicated, large enough to start, accelerate, and  
30 operate grille in either direction from any position, at a speed not less than 8 in./sec. and not more  
31 than 12 in./sec., without exceeding nameplate ratings or service factor.  
32 3. Operating Controls, Controllers (Disconnect Switches), Wiring Devices, and Wiring: Manufacturer's  
33 standard unless otherwise indicated.  
34 D. Control Station: Three-button control station in fixed location with momentary-contact push-button controls  
35 labeled "Open" and "Stop" and sustained- or constant-pressure push-button control labeled "Close."  
36 1. Interior-Mounted Units: Full-guarded, surface-mounted, heavy-duty type, with general-purpose  
37 NEMA ICS 6, Type 1 enclosure.  
38 E. Emergency Manual Operation: Equip electrically powered grille with capability for emergency manual  
39 operation. Design manual mechanism so required force for grille operation does not exceed **25 lbf**  
40 F. Motor Removal: Design operator so motor may be removed without disturbing limit-switch adjustment and  
41 without affecting emergency manual operation.

42 **PART 3 - EXECUTION**

43 **3.1 INSTALLATION**

- 44 A. Install overhead coiling grilles and operating equipment complete with necessary hardware, anchors,  
45 inserts, hangers, and equipment supports, according to manufacturer's written instructions and as  
46 specified.  
47 B. Adjust hardware and moving parts to function smoothly, so that grilles operate easily, free of warp, twist, or  
48 distortion. Lubricate bearings and sliding parts as recommended by manufacturer.

49 **3.2 DEMONSTRATION**

- 50 A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust,  
51 operate, and maintain overhead coiling grilles.

52 **END OF SECTION**

SECTION 08 34 73.13

METAL SOUND CONTROL DOOR ASSEMBLIES

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21 **PART 1 - GENERAL**

22 **1.1 RELATED DOCUMENTS**

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

25 **1.2 SUMMARY**

- 26 A. Section includes metal sound control door assemblies.
- 27 B. Related Requirements:
- 28 1. Section 08 71 00 "Door hardware" for additional hardware not supplied with acoustical door
- 29 assembly.

30 **1.3 COORDINATION**

- 31 A. Coordinate installation of anchorages for sound control door assemblies. Furnish setting drawings,
- 32 templates, and directions for installing anchorages. Deliver sleeves, inserts, anchor bolts, and items with
- 33 integral anchors to Project site in time for installation.

34 **1.4 ACTION SUBMITTALS**

- 35 A. Product Data: For each type of product. Include sound ratings, construction details, material descriptions,
- 36 core descriptions, fire-resistance rating, and finishes.
- 37 B. Shop Drawings: For sound control door assemblies.
- 38 1. Include elevations of each door design.
- 39 2. Include details of sound control seals, door bottoms, and thresholds.
- 40 3. Include details of doors, including vertical- and horizontal-edge details and metal thicknesses.
- 41 4. Include frame details for each frame type, including dimensioned profiles and metal thicknesses.
- 42 5. Include locations of reinforcements and preparations for hardware.
- 43 6. Include details of each different wall opening condition.
- 44 7. Include details of anchorages, joints, field splices, and connections.
- 45 8. Include details of accessories.
- 46



- 1 C. Product Compliance Certificates: ASTM E 90 and ASTM E 413; substitution of test data not in accordance  
2 with ASTM E 90 and ASTM E 413 is not acceptable.  
3 1. Provide certification that the door construction utilized has been tested at an independent laboratory.  
4 2. The laboratory referenced in the certification must be qualified under the National Voluntary  
5 Accreditation Program (NVLAP) of the US Bureau of Standards. Certification must reference  
6 laboratory name, test report number, and date of test.  
7 3. Fire Resistance: Certify that assemblies have been tested in accordance with Standard for Safety  
8 UL 10b for neutral pressure requirements or Standard for Safety UL 10C/UBC 7-2 for positive  
9 pressure requirements of labeled fire doors and frames, and meet the applicable requirements of  
10 NFPA 80.  
11 a. When positive pressure fire ratings are required, Category B frame mounted intumescent  
12 shall be used.

13 **1.5 INFORMATIONAL SUBMITTALS**

- 14 A. Product Certificates: For each type of sound control door assembly.  
15 B. Product Test Reports: For each sound control door assembly, for tests performed by a qualified testing  
16 agency.

17 **1.6 CLOSEOUT SUBMITTALS**

- 18 A. Maintenance Data: For sound control door assemblies to include in maintenance manuals.

19 **1.7 QUALITY ASSURANCE**

- 20 A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by  
21 manufacturer.

22 **1.8 DELIVERY, STORAGE, AND HANDLING**

- 23 A. Deliver doors and frames palletized, wrapped, or crated to provide protection during transit and Project-site  
24 storage. Avoid the use of nonvented plastic.  
25 1. Provide additional protection to prevent damage to factory-finished units.  
26 B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jams  
27 and Mullions.  
28 C. Store doors and frames vertically under cover at Project site with head up. Place on minimum 4-inch-high  
29 wood blocking. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

30 **1.9 WARRANTY**

- 31 A. Special Warranty: Manufacturer agrees to repair or replace components of sound control door assemblies  
32 that fail in materials or workmanship within specified warranty period.  
33 1. Failures include, but are not limited to, the following:  
34 a. Failure to meet sound rating requirements.  
35 b. Faulty operation of sound seals.  
36 c. Deterioration of metals, metal finishes, and other materials beyond normal use or weathering.  
37 2. Warranty Period: One year from date of Substantial Completion.

38 **PART 2 - PRODUCTS**

39 **2.1 PERFORMANCE REQUIREMENTS**

- 40 A. Sound Rating: Provide sound control door assemblies identical to those of assemblies tested as sound-  
41 retardant units by an acoustical testing agency, and have the minimum rating scheduled.  
42 1. STC Rating: As calculated by ASTM E 413 when tested in an operable condition according to ASTM  
43 E 90.  
44 B. Fire-Rated Assemblies: Complying with NFPA 80 and listed and labeled by a qualified testing agency  
45 acceptable to authorities having jurisdiction for fire-protection ratings indicated, based on testing at positive  
46 pressure according to NFPA 252 or UL 10C.  
47 1. Smoke- and Draft Control Assemblies: Provide an assembly with gaskets listed and labeled for  
48 smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction,  
49 based on testing according to UL 1784 and installed in compliance with NFPA 105.  
50

- 1 **2.2 ACOUSTIC DOOR ASSEMBLIES**
- 2 A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated or comparable
- 3 product by one of the following:
- 4 1. Overly Door Company.
- 5 2. Ceco Door/ASSA ABLOY.
- 6 3. Wenger/JR Clancy.
- 7 4. Krieger.
- 8 5. Specialty Products.
- 9 B. Basis of Design: Overly Model 509575; single swinging flush metal doors.
- 10 1. STC Rating (ASTM E 90 and ASTM E 413): 50.
- 11 2. Perimeter Seals: Single "H" Gasket.
- 12 a. Description: Single compression type perimeter seal, with a metal retainer and cover.
- 13 b. Material: Felt/neoprene combination.
- 14 3. Bottom Seals: Super "H" Door Bottom.
- 15 4. Door Thickness: 1-7/8 inches (47 mm).
- 16 5. Minimum Frame Depth: 4-3/4 inches (120 mm).
- 17 6. Fire Resistance Requirements: One hour.
- 18 C. Basis of Design: Overly Model 509391; pair of metal doors with one leaf active.
- 19 1. STC Rating (ASTM E 90 and ASTM E 413): 50.
- 20 2. Perimeter Seals: Single "H" Gasket.
- 21 a. Description: Single compression type perimeter seal, with a metal retainer and cover.
- 22 b. Material: Felt/neoprene combination.
- 23 3. Bottom Seals: Super "H" Door Bottom.
- 24 4. Door Thickness: 1-7/8 inches (47 mm).
- 25 5. Minimum Frame Depth: 4-3/4 inches (120 mm).
- 26 6. Fire Resistance Requirements: One hour.

27 **2.3 FABRICATION**

- 28 A. Steel Sound Control Door Fabrication: Sound control doors to be rigid and free of defects, warp, or buckle.
- 29 Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal.
- 30 1. Comply with requirements in NFPA 80 for fire-rated and smoke control doors.
- 31 2. Components: Assemblies to be complete with metal frame, doors, sealing systems, and hinge
- 32 systems.
- 33 3. Finishes: Zinc-rich primer, as approved by manufacturer.
- 34 B. Materials: Formed sheet steel or structural shapes and bars.
- 35 1. Lead or asbestos in door construction to achieve STC performance is not acceptable.
- 36 2. Sheet Steel: Commercial quality, level, cold rolled steel conforming to ASTM A 366.
- 37 3. Steel Shapes: Complies with ASTM A 36 and steel bars with ASTM A 108, Grade 1018.
- 38 C. Door Design: Face gauges, internal sound retardant core and perimeter door edge construction to be
- 39 manufacturer's standard for the specified model.
- 40 1. Seams: No visible seams shall be permitted on door faces.
- 41 D. Frame Design: With integral trim and shipped with temporary spreader.
- 42 1. Thickness: 14 gauge minimum.
- 43 2. Construction: Welded units.
- 44 3. Knock-down frames are not acceptable.
- 45 E. Cam Lift Hinges: When required to achieve STC, manufacturer to furnish laboratory test data certifying
- 46 hinges have been cycled a minimum of 1,000,000 while supporting a minimum door weight of 350 pounds.
- 47 F. Hardware Reinforcements:
- 48 1. Mortise Hardware: Factory mortise, reinforce, drill and tap components as required by hardware
- 49 manufacturer's template.
- 50 2. Surface Mounted Hardware: Provide reinforcement plates.
- 51 3. Drilling and Tapping: Performed in field by installer.
- 52 4. Frame Mortises: Provide dust cover boxes.
- 53 G. Anchors: Provide anchors to install frames in partition types indicated on approved Drawings.
- 54

1 **PART 3 - EXECUTION**

2 **3.1 EXAMINATION**

- 3 A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and  
4 other conditions affecting performance of the Work.  
5 B. Examine roughing-in for embedded and built-in anchors to verify actual locations of sound control door frame  
6 connections before frame installation.  
7 C. Proceed with installation only after unsatisfactory conditions have been corrected.

8 **3.2 PREPARATION**

- 9 A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and  
10 dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.  
11 B. Prior to installation, adjust and securely brace sound control door frames to the following tolerances:  
12 1. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb  
13 perpendicular to frame head.  
14 2. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.  
15 3. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and  
16 perpendicular to plane of wall.  
17 4. Plumbness: Plus or minus 1/16 inch, measured at jambs on a perpendicular line from head to floor.  
18 C. Drill and tap doors and frames to receive nontemplated mortised and surface-mounted door hardware.

19 **3.3 INSTALLATION**

- 20 A. General: Install sound control door assemblies plumb, rigid, properly aligned, and securely fastened in place;  
21 comply with manufacturer's written instructions.  
22 B. Frames: Install sound control door frames in sizes and profiles indicated.  
23 1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors  
24 are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and  
25 undamaged.  
26 a. At fire-rated openings, install frames according to NFPA 80.  
27 b. At openings requiring smoke and draft control, install frames according to NFPA 105.  
28 c. Remove temporary braces only after frames or bucks have been properly set and secured.  
29 d. Check squareness, twist, and plumbness of frames as walls are constructed. Shim as  
30 necessary to comply with installation tolerances.  
31 2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with  
32 postinstalled expansion anchors.  
33 3. Installation Tolerances: Adjust sound control door frames for squareness, alignment, twist, and  
34 plumbness to the following tolerances:  
35 a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from  
36 jamb perpendicular to frame head.  
37 b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane  
38 of wall.  
39 c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines,  
40 and perpendicular to plane of wall.  
41 d. Plumbness: Plus or minus 1/16 inch, measured at jambs on a perpendicular line from head  
42 to floor.  
43 C. Doors: Fit sound control doors accurately in frames, within clearances indicated below. Shim as necessary.  
44 1. Non-Fire-Rated Doors: Fit non-fire-rated doors accurately in frames with the following clearances:  
45 a. Jambs: 1/8 inch.  
46 b. Head with Cam-Lift Hinges: As required by manufacturer, but not more than 3/8 inch.  
47 c. Sill: Manufacturer's standard.  
48 d. Between Edges of Pairs of Doors: 1/8 inch.  
49 2. Fire-Rated Doors: Install fire-rated doors with clearances according to NFPA 80.  
50 D. Sound Control Seals: Where seals have been factory prefit and preinstalled and subsequently removed for  
51 shipping, reinstall seals and adjust according to manufacturer's written instructions.  
52 E. Cam-Lift Hinges: Install hinges according to manufacturer's written instructions.  
53 F. Thresholds: Set thresholds in full bed of sealant complying with requirements in Section 07 92 00 "Joint  
54 Sealants."  
55

- 1 **3.4 ADJUSTING AND CLEANING**  
2 A. Final Adjustments: Check and adjust seals, door bottoms, and other sound control hardware items right  
3 before final inspection. Leave work in complete and proper operating condition.  
4 B. Remove and replace defective work, including defective or damaged sound seals and doors and frames that  
5 are warped, bowed, or otherwise unacceptable.  
6 1. Adjust gaskets, gasket retainers, and retainer covers to provide contact required to achieve STC  
7 rating.  
8 C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and  
9 apply touchup of compatible, rust-inhibitive, air-drying primer.  
10 D. Metallic-Coated Surfaces: Clean abraded areas of doors and repair with galvanizing repair paint according  
11 to manufacturer's written instructions.

12 **END OF SECTION**

SECTION 08 41 13

ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

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- 20 2.8 [ALUMINUM FINISHES](#)
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23 **PART 1 - GENERAL**

24 **1.1 RELATED DOCUMENTS**

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

27 **1.2 SUMMARY**

- 28 A. Section Includes:  
29 1. Interior storefront framing.  
30 2. Interior manual-swing entrance doors and door-frame units.

31 **1.3 PREINSTALLATION MEETINGS**

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

33 **1.4 ACTION SUBMITTALS**

- 34 A. Product Data: For each type of product.  
35 B. Sustainable Design Submittals:  
36 1. Product Data: For sealants, indicating VOC content.  
37 2. Laboratory Test Reports: For sealants, indicating compliance with requirements for low-emitting  
38 materials.  
39 C. Shop Drawings: Include plans, elevations, sections, full-size details, and attachments to other work.  
40 1. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.  
41 D. Samples: For each exposed finish required.  
42 E. Entrance Door Hardware Schedule: Prepared by or under supervision of supplier, detailing fabrication and  
43 assembly of entrance door hardware, as well as procedures and diagrams.

44 **1.5 INFORMATIONAL SUBMITTALS**

- 45 A. Energy Performance Certificates: NFRC-certified energy performance values from manufacturer.  
46 B. Product test reports.  
47 C. Field quality-control reports.  
48 D. Sample warranties.

49 **1.6 CLOSEOUT SUBMITTALS**

- 50 A. Maintenance data.

- 1 **1.7 QUALITY ASSURANCE**  
2 A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by  
3 manufacturer.  
4 B. Testing Agency Qualifications: Qualified according to ASTM E 699 for testing indicated.  
5 C. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic  
6 effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions,  
7 arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one  
8 another, and to adjoining construction.  
9 1. Do not change intended aesthetic effects, as judged solely by Architect, except with Architect's  
10 approval. If changes are proposed, submit comprehensive explanatory data to Architect for review.

- 11 **1.8 WARRANTY**  
12 A. Special Warranty: Installer agrees to repair or replace components of aluminum-framed entrances and  
13 storefronts that do not comply with requirements or that fail in materials or workmanship within specified  
14 warranty period.  
15 1. Warranty Period: 10 years from date of Substantial Completion.  
16 B. Special Finish Warranty: Standard form in which manufacturer agrees to repair finishes or replace aluminum  
17 that shows evidence of deterioration of factory-applied finishes within specified warranty period.  
18 1. Warranty Period: 10 years from date of Substantial Completion.

19 **PART 2 - PRODUCTS**

- 20 **2.1 PERFORMANCE REQUIREMENTS**  
21 A. General Performance: Comply with performance requirements specified, as determined by testing of  
22 aluminum-framed entrances and storefronts representing those indicated for this Project without failure due  
23 to defective manufacture, fabrication, installation, or other defects in construction.  
24 1. Aluminum-framed entrances and storefronts shall withstand movements of supporting structure  
25 including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from  
26 uniformly distributed and concentrated live loads.  
27 2. Failure also includes the following:  
28 a. Thermal stresses transferring to building structure.  
29 b. Glass breakage.  
30 c. Noise or vibration created by wind and thermal and structural movements.  
31 d. Loosening or weakening of fasteners, attachments, and other components.  
32 e. Failure of operating units.  
33 B. Structural Loads:  
34 1. Other Design Loads: 5psf for interior storefront loads.  
35 C. Performance: Results are based upon 1 inch clear insulating glass (1/4 inch clear with e= 0.035 low e coating  
36 on #2 surface, 1/2 inch as with warm edge spacer and 90% argon gas fill, 1/4 inch clear). Refer to Section  
37 08 80 00 for GL-3 for glass performance.  
38 1. Thermal Transmittance (U-factor): When tested to AAMA Specification 1503, the thermal  
39 transmittance (U-factor) shall not be more than:  
40 a. Glass to Exterior – 0.47 (low-e).  
41 2. Condensation Resistance (CRF): When tested to AAMA Specification 1503, the condensation  
42 resistance factor shall not be less than:  
43 a. Glass to Exterior – 70 frame and 69 glass (low-e).  
44 D. Air Infiltration: Test according to ASTM E 283 for infiltration as follows:  
45 1. Fixed Framing and Glass Area:  
46 a. Maximum air leakage of 0.06 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft..  
47 2. Entrance Doors:  
48 a. Pair of Doors: Maximum air leakage of 1.0 cfm/sq. ft. at a static-air-pressure differential of  
49 1.57 lbf/sq. ft.  
50 b. Single Doors: Maximum air leakage of 0.5 cfm/sq. ft. at a static-air-pressure differential of  
51 1.57 lbf/sq. ft.  
52 3. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.  
53

- 1 **2.2 MANUFACTURERS**
- 2 A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may
- 3 be incorporated into the Work include, but are not limited to the following:
- 4 1. EFCO Corporation.
- 5 2. Kawneer North America.
- 6 3. Tubelite Inc.
- 7 **2.3 INTERIOR STOREFRONT FRAMING (GLWS-1, GLWS-2 - acoustical)**
- 8 A. Basis of Design: Kawneer North America; TriFab 451-Series, front glazed, with SSG in selected locations,
- 9 per the drawings.
- 10 B. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required
- 11 and reinforced as required to support imposed loads.
- 12 1. Construction: Non-thermal.
- 13 2. Glazing System: Retained mechanically with gaskets on four sides.
- 14 3. Glazing Plane: Front.
- 15 4. Finish: Baked-enamel finish.
- 16 5. Fabrication Method: Field-fabricated stick system.
- 17 C. Backer Plates: Manufacturer's standard, continuous backer plates for framing members, if not integral,
- 18 where framing abuts adjacent construction.
- 19 D. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining,
- 20 nonferrous shims for aligning system components.
- 21 E. Materials:
- 22 1. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
- 23 a. Sheet and Plate: ASTM B 209.
- 24 b. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
- 25 c. Extruded Structural Pipe and Tubes: ASTM B 429/B 429M.
- 26 d. Structural Profiles: ASTM B 308/B 308M.
- 27 **2.4 ENTRANCE DOOR SYSTEMS**
- 28 A. Entrance Doors: Manufacturer's standard glazed entrance doors for manual-swing operation.
- 29 1. Door Construction: 1-3/4-inch overall thickness, with minimum 0.125-inch-thick, extruded-aluminum
- 30 tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply
- 31 penetrated and fillet welded or that incorporate concealed tie rods.
- 32 2. Door Design: Wide style. 5 inches wide stile. Coordinate with hardware space requirement.
- 33 3. Glazing Stops and Gaskets: Square, snap-on, extruded-aluminum stops and preformed gaskets.
- 34 a. Provide nonremovable glazing stops on outside of door.
- 35 **2.5 ENTRANCE DOOR HARDWARE**
- 36 A. Entrance Door Hardware: Hardware not specified in this Section is specified in Section 08 71 00 "Door
- 37 Hardware."
- 38 **2.6 GLAZING**
- 39 A. Glazing: Comply with Section 08 80 00 "Glazing."
- 40 B. Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient
- 41 elastomeric glazing gaskets, setting blocks, and shims or spacers.
- 42 C. Glazing Sealants: As recommended by manufacturer.
- 43 1. Sealant shall have a VOC content of 250 g/L or less.~\$-45~S\$
- 44 **2.7 FABRICATION**
- 45 A. Form or extrude aluminum shapes before finishing.
- 46 B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish.
- 47 Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
- 48 C. Fabricate components that, when assembled, have the following characteristics:
- 49 1. Profiles that are sharp, straight, and free of defects or deformations.
- 50 2. Accurately fitted joints with ends coped or mitered.
- 51 3. Physical and thermal isolation of glazing from framing members.
- 52 4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required
- 53 glazing edge clearances.
- 54 5. Provisions for field replacement of glazing from exterior.
- 55 6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
- 56 D. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.

- 1 E. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing
- 2 entrance door hardware.
- 3 F. Entrance Doors: Reinforce doors as required for installing entrance door hardware.
- 4 G. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible.
- 5 Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.
- 6 H. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.
  
- 7 **2.8 ALUMINUM FINISHES**
- 8 A. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils.
- 9 1. Color and Gloss: Match Architect's sample.

10 **PART 3 - EXECUTION**

11 **3.1 INSTALLATION**

- 12 A. General:
- 13 1. Comply with manufacturer's written instructions.
- 14 2. Do not install damaged components.
- 15 3. Fit joints to produce hairline joints free of burrs and distortion.
- 16 4. Rigidly secure nonmovement joints.
- 17 5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration
- 18 and to prevent impeding movement of moving joints.
- 19 6. Seal perimeter and other joints watertight unless otherwise indicated.
- 20 B. Metal Protection:
- 21 1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact
- 22 surfaces with materials recommended by manufacturer for this purpose or by installing nonconductive
- 23 spacers.
- 24 2. Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact
- 25 surfaces with bituminous paint.
- 26 C. Set continuous sill members and flashing in full sealant bed as specified in Section 07 92 00 "Joint Sealants"
- 27 to produce weathertight installation.
- 28 D. Install components plumb and true in alignment with established lines and grades.
- 29 E. Install operable units level and plumb, securely anchored, and without distortion. Adjust weather-stripping
- 30 contact and hardware movement to produce proper operation.
- 31 F. Install glazing as specified in Section 08 80 00 "Glazing."
- 32 G. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points.
- 33 1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.
- 34 2. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according
- 35 to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest
- 36 extent possible.

37 **END OF SECTION**



**SECTION 08 41 14**  
**GLASS PARTITION SYSTEMS**

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13 2.3 [PERFORMANCE / DESIGN CRITERIA](#)  
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15 2.5 [FULL HEIGHT DOUBLE GLAZED PARTITION SYSTEM \(GLWS-5\)](#)  
16 2.6 [FINISHES](#)  
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19 3.2 [INSTALLATION](#)  
20 3.3 [FIELD QUALITY CONTROL](#)  
21 3.4 [ADJUSTING, CLEANING, AND PROTECTION](#)

22 **PART 1 - GENERAL**

23 **1.1 RELATED DOCUMENTS**

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

26 **1.2 SUMMARY**

- 27 A. Section includes, but is not limited to, fabricating, furnishing, delivering, erecting and installing the following  
28 work:  
29 1. Full height double-glazed partition system.  
30 2. Accessories required for a complete working installation.  
31 B. Related Documents and Sections:  
32 1. Glass doors and door hardware: Refer to Section 08 41 13 and 08 71 00.

33 **1.3 SUBMITTALS**

- 34 A. Product Data: Submit manufacturer's printed product literature indicating product characteristics,  
35 performance criteria, product use limitations, requirements and recommendations, and Manufacturers'  
36 Instructions.  
37 B. Shop Drawings: Submit shop drawings indicating plans, elevations, and details showing type and  
38 thickness of metal and glass, glazing, anchoring, and joining, electrical wiring and power requirements,  
39 hardware, trim, and accessories. Provide Field Measurements.  
40 C. Samples:  
41 1. Initial for Selection: Submit two (2) complete full range sets of color chips.  
42 2. Final Selection: Submit two (2) 12 inch (30 cm) square samples for acceptance.  
43 D. Manufacturer's Certificates  
44 E. Sustainable Design (USGBC LEED®) Submittals: Refer to Section 01 81 13.13, LEED Design  
45 Requirements.  
46 1. LEED 2009 (v3) Credits. Complete online LEED forms and submit other required materials as  
47 follows:  
48 a. Materials and Resources (MR) Credits:  
49 1) MR Credit 3: Materials Reuse - 5%.  
50 2) MR Credit 4: Recycled Content - 10% (post-consumer + 1/2 pre-consumer).  
51 3) MR Credit 5: Regional Materials: 10% Extracted, Processed & Manufactured  
52 Regionally.  
53 b. Indoor Environmental Quality (EQ) Credits:  
54 1) EQ Credit 4.2 (EQc4.2): Low-Emitting Materials - Paints & Coatings  
55 2) EQ Credit 8.1 (EQc8.1): Daylight & Views - Daylight 75% of Spaces  
56 3) EQ Credit 8.2 (EQc8.2): Daylight & Views - Views for 90% of Spaces

- 1 F. LEED Closeout Documentation:  
2 1. LEED 2009 (v3). Submit completed LEED™ submittal Worksheet Templates for credits:
- 3 **1.4 QUALITY ASSURANCE**  
4 A. Regulatory Agency Approvals: Comply where required by *authorities having jurisdiction* (AHJ).  
5 1. Glazing: GANA (GM), GANA (LGRM), and CPSC 16 CFR 1201  
6 2. Accessibility: ADAAG (28 CFR Part 32) and ICC / ANSI 117.1  
7 B. Qualifications: Manufacturer to have minimum five (5) years documented experience; Installer to have  
8 minimum two (2) years documented experience.  
9 C. Source Limitations: Obtain Glass Partition System materials from one manufacturer.  
10 D. Mockup: Refer to Section 01 43 39 – Mockups for description of construction required to complete a  
11 mockup submittal for review.  
12 1. Level 1 Public Area partial height conference room: Portion of GLWS-5 feature glass system  
13 assembly and junctions at conference room including perimeter ceiling assembly and conference  
14 room “cap” assembly. Size approx. 4ft x 4ft in plan at corner x full height to ceiling cap assembly.
- 15 **1.5 DELIVERY, STORAGE, AND HANDLING**  
16 A. Comply with manufacturer’s instructions and recommendations, GANA (GM), GANA (LGRM), and Division  
17 01 requirements.
- 18 **1.6 SITE CONDITIONS**  
19 A. Ambient Conditions: Do not deliver or install product until building is enclosed and HVAC system has been  
20 operating at occupancy levels in accordance with ANSI/ASHRAE 55; Acclimate product to installation  
21 location at least 48 hours before installation.
- 22 **PART 2 - PRODUCTS**
- 23 **2.1 MANUFACTURERS**  
24 A. Basis of Design Product by Manufacturer: Solare DG by Avanti Systems USA, 200 William St. Suite 306;  
25 Port Chester, NY 10573.
- 26 **2.2 DESCRIPTION**  
27 A. Regulatory Requirements: Provide tempered or laminated safety glass for locations subject to human  
28 impact as required by *authorities having jurisdiction* (AHJ).  
29 B. Sustainability Characteristics:  
30 1. Fully demountable system for ease of reuse or recycling.  
31 2. Assembly components (glass, aluminum and stainless steel) contain recycled material and are  
32 infinitely recyclable.  
33 3. No adhesives used (no VOC) with dry joint glazing.
- 34 **2.3 PERFORMANCE / DESIGN CRITERIA**  
35 A. Performance Criteria:  
36 1. Acoustical: Sound reduction tested in accordance with BS EN ISO 140-4 or ASTM E90 and ASTM  
37 E336, and rated in accordance with BS EN ISO 717-1 or ASTM E413.  
38 a. Solare DG - System Acoustic Rating: 44 dB (Rw).  
39 b. (US Equivalent) STC: 44.  
40 2. Impact Safety Resistance: CPSC 16 CFR 1201, Cat. I & II.  
41 B. Design Criteria:  
42 1. Structural Live Load - Deflection: Maximum L/120.  
43 2. Structural Stability: BS 5234, BS 6180; or IBC 1621.1.2, ASCE 7 9.6.2.8.
- 44 **2.4 MATERIALS**  
45 A. Aluminum Extrusions: ASTM B221, 6063-T6 alloy and temper.  
46 B. Glass: Refer to spec section 08 80 00 for glass types and schedule.  
47 C. Fasteners: Type best suited to application, and acceptable to glass partition system manufacturer.  
48 D. Door Hardware: Refer to Section 08 71 00.  
49

- 1 **2.5 FULL HEIGHT DOUBLE GLAZED PARTITION SYSTEM (GLWS-5)**  
2 A. Solare DG full height, relocatable, double dry glazed glass partition system as manufactured by Avanti  
3 Systems USA.  
4 1. Configuration: Straight wall as indicated by Drawings.  
5 2. Double Glazed: Where indicated on the drawings.  
6 a. Tempered Clear Glass Thickness: 1/2 inch (13 mm)  
7 b. Laminated Clear Glass Thickness: 7/16 inch (11 mm)  
8 3. Head and Sill Channels and Vertical Wall Trim: 1 x 4 inch (25 mm x 104 mm) extruded aluminum  
9 channels with rubber flap seals.  
10 4. Prefabricated Glass Joints: Vertical, Horizontal, 90 degree Corner H section PVC joint seals by  
11 Crystal Clear  
12 5. Doorframe Type: Extruded aluminum Slimline with rubber flap seals.
- 13 **2.6 FINISHES**  
14 A. Aluminum: AAMA 2604, polyester powder coating; Stock color RAL 9006 Metallic Silver.

15 **PART 3 - EXECUTION**

- 16 **3.1 EXAMINATION AND PREPARATION**  
17 A. Examination, Preparation, and Acceptance of Conditions in accordance with Division 01 requirements,  
18 manufacturer's instructions, approved Shop Drawings, and as follows:  
19 1. Carefully examine installation areas with Installer present, for compliance with requirements  
20 affecting Work performance.  
21 a. Shimming on top of existing, historic clay floor tile and/or concrete will be needed to achieve  
22 level +/- 1/8 inch in 10 feet (3 mm in 3 m) non-cumulative.  
23 b. Verify concealed overhead structural supports meet project requirements.  
24 2. Proceed with installation only after unsatisfactory conditions have been corrected.  
25 3. Broom sweep and vacuum clean surfaces thoroughly prior to installation.
- 26 **3.2 INSTALLATION**  
27 A. Install in accordance with Division 01 requirements, manufacturer's instructions, approved Shop Drawings,  
28 GANA (GM), GANA (LGRM), and as follows:  
29 1. Securely anchor assembly to structure with components installed plumb and level, in proper plane,  
30 free from warp and twist.
- 31 **3.3 FIELD QUALITY CONTROL**  
32 A. Non-Conforming Work: Repair or replace as directed by the Architect; see General and Supplementary  
33 Conditions, and Division 01, General Requirements.  
34 1. Remove and replace glass that is broken, chipped, cracked, abraded, or otherwise damaged,  
35 including natural causes, accidents and vandalism, during construction period.
- 36 **3.4 ADJUSTING, CLEANING, AND PROTECTION**  
37 A. Adjust doors for smooth operation throughout full operating range.  
38 B. Waste Management: Comply with Division 01 requirements; recycle shipping pallets, cardboard protection,  
39 and scrap metal.  
40 C. Cleaning: Clean metal and glass surfaces to remove foreign materials; clean glazing to GANA Bulletin 01-  
41 0300.  
42 D. Touch-up, clean, repair or replace damaged products prior to Substantial Completion.  
43 E. Protect installed work from construction operations until date of Final Completion or Owner occupancy,  
44 whichever occurs first.

45 **END OF SECTION**

**SECTION 08 44 10  
FIRE RATED ALUMINUM CURTAIN WALL**

- 1
- 2
- 3 PART 1 – GENERAL
- 4 1.1 [RELATED DOCUMENTS](#)
- 5 1.2 [SECTION INCLUDES](#)
- 6 1.3 [RELATED SECTIONS](#)
- 7 1.4 [PREINSTALLATION MEETINGS](#)
- 8 1.5 [REFERENCES](#)
- 9 1.6 [SYSTEM DESCRIPTION](#)
- 10 1.7 [SUBMITTALS](#)
- 11 1.8 [QUALITY ASSURANCE](#)
- 12 1.9 [DELIVERY, STORAGE AND HANDLING](#)
- 13 1.10 [PROJECT CONDITIONS](#)
- 14 PART 2 – PRODUCTS
- 15 2.1 [FIRE-RATED ALUMINUM FIXED WINDOWS \(GLWS-3\):](#)
- 16 2.2 [MATERIALS – ALUMINUM FRAMING](#)
- 17 2.4 [MATERIALS – GLAZING AND ASSEMBLY ACCESSORIES](#)
- 18 2.5 [FABRICATION](#)
- 19 2.6 [FINISHES](#)
- 20 2.7 [DOOR HARDWARE](#)
- 21 PART 3 – EXECUTION
- 22 3.1 [EXAMINATION](#)
- 23 3.2 [INSTALLATION](#)
- 24 3.3 [CLEANING](#)

25 **PART 1 - GENERAL**

26 **1.1 RELATED DOCUMENTS**

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

29 **1.2 SECTION INCLUDES**

- 30 A. Fire-rated aluminum curtain wall including frame and glazing.  
31 B. Fire-rated aluminum full vision door system including pre-finished door, frame, glazing, and hardware.

32 **1.3 RELATED SECTIONS**

- 33 A. Section 08 88 13: Fire-Resistant Glazing.

34 **1.4 PREINSTALLATION MEETINGS**

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

36 **1.5 REFERENCES**

- 37 A. American Society for Testing and Materials (ASTM):  
38 1. ASTM E119 Standard Test Methods for Fire Tests of Building Construction and Materials.  
39 2. ASTM E2010 Standard Test Method for Positive Pressure Fire Tests of Window Assemblies.  
40 B. National Fire Protection Association (NFPA):  
41 1. NFPA 80: Standard for Fire Doors and Fire Windows.  
42 2. NFPA 251: Standard Methods of Tests of Fire Endurance of Building Construction and Materials.  
43 3. NFPA 252: Standard Methods of Fire Tests of Door Assemblies.  
44 4. NFPA 257: Standard on Fire Test for Window and Glass Block Assemblies.  
45 C. Uniform Building Code (UBC):  
46 1. UBC-7-4: Methods for Fire Tests of Window Assemblies.  
47 2. UBC-7-2: Methods for Fire Tests of Door Assemblies.  
48 3. UL 10C: Positive Pressure Fire Tests of Door Assemblies.  
49 D. Underwriters Laboratories, Inc. (UL):  
50 1. UL 9: Fire Tests of Window Assemblies.  
51 2. UL 263: Fire Tests of Building Construction and Materials  
52

- 1 E. American National Standards Institute (ANSI):
- 2 1. ANSI Z97.1 Safety Glazing Materials Used in Buildings – Safety Performance Specifications and
- 3 Methods of Test.
- 4 F. Consumer Product Safety Commission (CPSC):
- 5 1. CPSC 16 CFR 1201 Categories I and II: Safety Standard for Glazing Materials.

6 **1.6 SYSTEM DESCRIPTION**

- 7 A. Performance Requirements – Curtain Wall:
- 8 1. Fire Rating: 120 minutes.
- 9 2. Certification: Windows shall be tested in accordance with ASTM E 2010, NFPA 252, UBC 7-4,
- 10 UL263.
- 11 3. Testing Laboratory: Fire tests shall have been conducted by an approved independent testing
- 12 laboratory, similar to Underwriter's Laboratories, Inc.
- 13 B. Performance Requirements – Doors:
- 14 1. Fire Rating: 90 minutes.
- 15 2. Certification: Doors and frames shall be tested in accordance with ASTM E 2074, NFPA 252, UBC
- 16 7-2, UL 10C.
- 17 3. Testing Laboratory: Fire tests shall have been conducted by an approved independent testing
- 18 laboratory, similar to Underwriter's Laboratories, Inc.

19 **1.7 SUBMITTALS**

- 20 A. Submit listed submittals in accordance with Conditions of the Contract and Division 1 Submittal Procedure
- 21 Section.
- 22 1. Shop Drawings: Submit shop drawings showing layouts, profiles and product components.
- 23 2. Samples: Submit samples for finishes, colors and textures.
- 24 3. Technical Information: Submit latest edition of manufacturer's product data providing product
- 25 description, technical data and installation instructions.

26 **1.8 QUALITY ASSURANCE**

- 27 A. Listings and Labels:
- 28 1. Fire rated framing and glazing shall be under current follow-up services by an approved
- 29 independent agency and maintain a current listing or certification. Assemblies shall be labeled in
- 30 accordance with limits of listings.
- 31 B. Mockup: Refer to Section 01 43 39 – Mockups for description of construction required to complete a
- 32 mockup submittal for review.
- 33 1. Rated glass wall GLWS-3 and associated egress door at Level 3, east stair side. Include glass
- 34 panel above door, glass panel at one side of door, door hardware, and fire stopping sealant all
- 35 around frame.

36 **1.9 DELIVERY, STORAGE AND HANDLING**

- 37 A. Ordering: Comply with manufacturer's ordering instructions and lead-time requirements to avoid
- 38 construction delays.
- 39 B. Delivery: Deliver materials to specified destination in manufacturer's packaging undamaged, complete with
- 40 installation instructions.
- 41 C. Storage and Protection: Store off ground, under cover, protected from weather, direct sunlight,
- 42 construction activities and at temperature conditions recommended by manufacturer, +10°F to +110°F.
- 43 D. Handling: Protect materials and finish during handling and installation to prevent damage.

44 **1.10 PROJECT CONDITIONS**

- 45 A. Field Measurements: Verify actual measurements for openings by field measurements before fabrication.
- 46 Show recorded measurements on shop drawings. Coordinate field measurements and fabrication
- 47 schedule with construction progress to avoid construction delays.
- 48

1 **PART 2 - PRODUCTS**

2 **2.1 FIRE-RATED ALUMINUM FIXED WINDOWS, DOORS AND FRAMES (GLWS-3):**

- 3 A. Basis of Design: SaftiFirst  
4 1. GPX Wall with 120 Min fire resistive rating.  
5 2. GPX door pair with 90 Min fire resistive rating. Builder Series Steel Door Leafs.  
6 3. Glass: Basis-of-Design Product: Subject to compliance with requirements, provide SAFTI FIRST  
7 Fire Rated Glazing Solutions; SuperLite II-XL.

8 **2.2 MATERIALS – ALUMINUM FRAMING**

- 9 A. Frame construction: Integral structure, pressure plate, and cap from extruded aluminum profiles. Filled  
10 internally with cement composite material.  
11 B. Dimensions (Basis of design dimensions only: other system dimensions may vary within 1/4 inch of the  
12 sightline width/framing face dimension indicated):  
13 1. Curtain Wall:  
14 a. Perimeter framing face dimension: 3 inch  
15 b. Depth of vertical framing: 7-5/8 inch  
16 c. Depth of horizontal framing: 7-5/8 inch.  
17 2. Door and Frame:  
18 a. Door framing face dimension: 2-1/2 inches  
19 b. Depth of door framing: 4-1/2 for 90 Min Door  
20 c. Door stile face dimension: 5 inches for 90 Min Door  
21 d. Door cross rail: N/A for 90 Min Door.  
22 C. Assembly:  
23 1. Window frame corners assembled with mechanical fasteners – in factory or in the field.  
24 2. Door frame corners assembled by means of crimped and bonded miter joints.  
25 D. Sealing: Framing system shall insulate against effects of fire, smoke, and heat transfer from either side.  
26 Perimeter of the framing system to the rough opening shall be firmly packed with mineral wool insulation.  
27 E. Wall assemblies shall be glazed with 120 minute rated 1-1/2 inches inch thick SuperLite II-XL fire resistant  
28 glazing material as manufactured by Saftifirst  
29 F. Door assemblies shall be glazed with 90 minute rated 1-1/2 inches thick SuperLite II-XL fire resistant  
30 glazing material as manufactured by SaftiFirst  
31 G. Individual lites shall be permanently identified with a listing mark.  
32 H. Glazing material installed in "Hazardous Locations" (subject to human impact) shall be certified to meet the  
33 applicable requirements for fire rated assemblies referenced in ANSI Z97.1 Standard for Safety Glazing  
34 Materials Used In Buildings and/or CPSC 16 CFR 1201 Safety Standard for Architectural Glazing  
35 Materials.  
36 I. Visible daylight transmission shall be a minimum of 70% for window glazing and 81 % for door glazing.  
37 Glazing material shall be optically clear, colorless and free from unusual distortion.  
38 J. All framing, doors and glazing materials must be fabricated by the manufacture NOT a third party or  
39 distributor.  
40 K. All framing, doors and glazing materials must be fabricated in the U.S.A.

41 **2.3 MATERIALS – GLAZING AND ASSEMBLY ACCESSORIES**

- 42 A. Fasteners: All fasteners, setting pads, and glazing clips, shall be stainless or zinc-plated steel.  
43 B. Glazing Accessories: The glazing material perimeter shall be separated from the perimeter framing system  
44 with approved flame retardant intumescent glazing tape. Ceramic setting blocks shall be placed between  
45 the metal setting pads and the glazing material. Setting pads and blocks provided by manufacturer.

46 **2.4 FABRICATION**

- 47 A. Curtainwall frames shall be furnished pre-assembled or K-D. Curtainwall assemblies shall be field glazed.  
48 B. Door frames and door leaves shall be furnished pre-assembled. Door assemblies shall be field glazed.  
49 C. Fabrication Dimensions: Fabricate to approved dimensions. The general contractor shall guarantee  
50 dimensions within required tolerance (+ - 1/8"). Obtain approved shop drawings prior to fabrication.

51 **2.5 FINISHES**

- 52 A. Framing shall be chemically cleaned and pretreated, then shop finished on all exposed areas with:  
53 1. PPG paint finish "light silver ref: AD3Y1346N to match clear anodized aluminum.  
54 B. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering  
55 before shipping.  
56

1 C. Slight variations in appearance of abutting or adjacent pieces are acceptable. Noticeable variations in the  
2 same piece are not acceptable.

3 **2.6 DOOR HARDWARE**

4 A. Hardware shall be supplied from door manufacturer's standard recommended hardware groups as  
5 specified.

6 **HW SET: 74A**

2	EA	CONTINUOUS HINGES	OKC	PEM
2	EA	POWER TRANSFER	EPT10	VON
1	EA	MULLION	KR-9954	VON
1	EA	ELEC FIRE EXIT HARDWARE	RX-33A-EO-F	VON
1	EA	ELEC FIRE EXIT HARDWARE	RX-QEL+-33A-NL-OP-F-388	VON
2	EA	TRIM	996L	VON
2	EA	INTERCHANGEABLE CORE	CYLINDER AS REQUIRED	SCH
1	EA	SURFACE CLOSER	4011 / 4111 EDA	LCN
1	EA	SURF. AUTO OPERATOR	BY 08 7100 MINIMUM DOOR WEIGHT 400LBS	
2	EA	ACTUATOR, WALL MOUNT	8310-813 (Touch less) (Touch less)	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B4E CS	IVE
2	EA	WALL STOP	WS406/407CVX	IVE
1	EA	SMOKE SEALS	S44D	PEM
2	EA	DOOR BOTTOM	420APKL	PEM
1	EA	MEETING EDGE SEALS (NEOPRENE)	328 (EACH LEAF)	ZER
1	EA	WIRING DIAGRAMS	RISER & POINT-TO-POINT (BY HARDWARE SUPPLIER)	
1	EA	POWER SUPPLY	PS902 900-4R FA900	SCE

7

8 **HW SET: 74B**

1	EA	CONTINUOUS HINGES	OKC	PEM
1	EA	POWER TRANSFER	EPT10	VON
1	EA	ELEC FIRE EXIT HARDWARE	RX-QEL-33A-NL-OP	VON
1	EA	TRIM	996-L	VON
1	EA	INTERCHANGEABLE CORE	CYLINDER AS REQUIRED	SCH
1	EA	OH STOP	100S	GLY
1	EA	SURFACE CLOSER	4021	LCN
		CREDENTIAL READER	(BY TECHNOLOGY CONTRACTOR)	
1	EA	DOOR CONTACT	7764	SCE
1	EA	POWER SUPPLY	PS902 900-4R	SCE
1	EA	WIRING DIAGRAMS	RISER & POINT-TO-POINT (BY HARDWARE SUPPLIER).	

9 FUNCTION: Latchbolt retracted inside by exit device push pad and outside by key in cylinder. Door locks when key is  
10 removed and door is closed. A valid credential will unlock the door.  
11

1 **HW SET: 74C**

2

1	EA	CONTINUOUS HINGES	OKC	PEM
1	EA	POWER TRANSFER	EPT10	VON
1	EA	ELEC FIRE EXIT HARDWARE	RX-QEL-33A-NL-OP	VON
1	EA	TRIM	996-L	VON
1	EA	INTERCHANGEABLE CORE	CYLINDER AS REQUIRED	SCH
1	EA	OH STOP	100S	GLY
1	EA	SURF. AUTO OPERATOR	BY 08 7100 MINIMUM DOOR WEIGHT 400LBS	
2	EA	ACTUATOR, WALL MOUNT	8310-813 (Touch less)	LCN
		CREDENTIAL READER	(BY TECHNOLOGY CONTRACTOR)	
1	EA	DOOR CONTACT	7764	SCE
1	EA	POWER SUPPLY	PS902 900-4R	SCE
1	EA	JUNCTION BOX	JB7 R2	VON
1	EA	WIRING DIAGRAMS	RISER & POINT-TO-POINT (BY HARDWARE SUPPLIER)	

3

4 FUNCTION: Latchbolt retracted inside by exit device push pad and outside by key in cylinder. Door locks when key is  
5 removed and door is closed. This door has a power operator. Interior actuator always active to unlock and open the  
6 door. A valid credential will unlock the door and make the exterior actuator active.

7

8

9 **HW SET: DOOR 300A/B (PAIR) 74D**

10

2	EA	CONTINUOUS HINGES	OKC	PEM
2	EA	POWER TRANSFER	EPT10	VON
1	EA	MULLION	KR-9954	VON
2	EA	ELEC FIRE EXIT HARDWARE	Von Duprin EL 98/99 US26D	VON
2	EA	TRIM	996-L	VON
2	EA	INTERCHANGEABLE CORE	CYLINDER AS REQUIRED	SCH
2	EA	OH STOP	100S	GLY
2	EA	SURF. AUTO OPERATOR	BY 08 7100 MINIMUM DOOR WEIGHT 400LBS	
4	EA	ACTUATOR, WALL MOUNT	8310-813 (Touch less)	LCN
		CREDENTIAL READER	(BY TECHNOLOGY CONTRACTOR)	
1	EA	DOOR CONTACT	7764	SCE
1	EA	POWER SUPPLY	PS902 900-4R	SCE
1	EA	JUNCTION BOX	JB7 R2	VON
1	EA	WIRING DIAGRAMS	RISER & POINT-TO-POINT (BY HARDWARE SUPPLIER)	

11

12 FUNCTION: Latchbolt retracted inside by exit device push pad and outside by key in cylinder. Door locks when key is  
13 removed and door is closed. This door has a power operator. Interior actuator always active to unlock and open the  
14 door. A valid credential will unlock the door and make the exterior actuator active.

15

16

17



1 **HW SET: 74E**

2

2	EA	CONTINUOUS HINGES	OKC	PEM
2	EA	POWER TRANSFER	EPT10	VON
1	EA	MULLION	KR-9954	VON
2	EA	ELEC FIRE EXIT HARDWARE	RX-CD-33A-EO-299	VON
2	EA	TRIM	996L	VON
3	EA	INTERCHANGEABLE CORE	CYLINDER AS REQUIRED	SCH
2	EA	OH STOP	100S	GLY
2	EA	SURFACE CLOSER	4021	LCN
1	EA	MULLION SEAL CREDENTIAL READER	8780 (BY TECHNOLOGY CONTRACTOR)	ZER
2	EA	DOOR CONTACT	7764	SCE
1	EA	POWER SUPPLY	PS902 900-4R	SCE
1	EA	WIRING DIAGRAMS	RISER & POINT-TO-POINT (BY HARDWARE SUPPLIER)	

3

4 FUNCTION: (NL) Latchbolt retracted inside by exit device push pad and outside by key in cylinder. Door locks when  
5 key is removed and door is closed. Access from exterior when exit device push pad is dogged down. A valid  
6 credential retracts latch bolt and push pad on active door.

7

8 **HW SET: 74F**

9

2	EA	CONTINUOUS HINGES	OKC	PEM
2	EA	POWER TRANSFER	EPT10	VON
1	EA	MULLION	KR-9954	VON
2	EA	ELEC FIRE EXIT HARDWARE	RX-CD-33A-EO-299	VON
2	EA	ELEC FIRE EXIT HARDWARE	RX-QEL-33A-NL-OP	VON
2	EA	TRIM	996L	VON
3	EA	INTERCHANGEABLE CORE	CYLINDER AS REQUIRED	SCH
2	EA	OH STOP	100S	GLY
1	EA	SURF. AUTO OPERATOR	BY 08 7100 MINIMUM DOOR WEIGHT 400LBS	
2	EA	ACTUATOR, WALL MOUNT CREDENTIAL READER	8310-813 (Touch less) (BY TECHNOLOGY CONTRACTOR)	LCN
2	EA	DOOR CONTACT	7764	SCE
1	EA	POWER SUPPLY	PS902 900-4R	SCE
1	EA	WIRING DIAGRAMS	RISER & POINT-TO-POINT (BY HARDWARE SUPPLIER)	

10

11 FUNCTION: (NL) Latchbolt retracted inside by exit device push pad and outside by key in cylinder. Door locks when  
12 key is removed and door is closed. Access from exterior when exit device push pad is dogged down. This door has  
13 a power operator. Interior actuator always active to unlock and open the door. A valid credential will unlock the active  
14 door and make the exterior actuator active. Loss of power or activation of fire alarm will disable power operator and  
15 insure fire door remains latched.

16

1 **PART 3 - EXECUTION**

2 **3.1 EXAMINATION**

- 3 A. Examine area to receive curtainwall. Openings shall be plumb, square and within allowable tolerances.  
4 Notify Architect of conditions that would adversely affect installation or subsequent use. Do not proceed  
5 with installation until unsatisfactory conditions are corrected.

6 **3.2 INSTALLATION**

- 7 A. Curtainwall installation shall be by a specialty contractor with appropriate experience qualifications; and in  
8 strict accordance with the approved shop drawings.

9 **3.3 CLEANING**

- 10 A. Cleaning: Remove temporary coverings and protection of adjacent work areas. Glass and frame should be  
11 cleaned using soft clean cloth, chamois leathers, sponges or soft paper. Use clean warm water with a mild  
12 detergent. Do not use detergent that contains either alkaline, acids or fluoride! Abrasive cleaning methods  
13 can damage surfaces! Clean prior to owner's acceptance. Remove construction debris from project site  
14 and legally dispose of debris.

15 **END OF SECTION**

SECTION 08 44 13  
GLAZED ALUMINUM CURTAIN WALLS

- 1
- 2
- 3 PART 1 – GENERAL
- 4 1.1 [RELATED DOCUMENTS](#)
- 5 1.2 [SUMMARY](#)
- 6 1.3 [PREINSTALLATION MEETINGS](#)
- 7 1.4 [INFORMATIONAL SUBMITTALS](#)
- 8 1.5 [CLOSEOUT SUBMITTALS](#)
- 9 1.6 [QUALITY ASSURANCE](#)
- 10 1.7 [WARRANTY](#)
- 11 PART 2 – PRODUCTS
- 12 2.1 [PERFORMANCE REQUIREMENTS](#)
- 13 2.2 [MANUFACTURERS](#)
- 14 2.3 [FRAMING](#)
- 15 2.4 [GLAZING](#)
- 16 2.5 [FABRICATION](#)
- 17 2.6 [ALUMINUM FINISHES](#)
- 18 PART 3 – EXECUTION
- 19 3.1 [INSTALLATION](#)
- 20 3.2 [FIELD QUALITY CONTROL](#)

21 **PART 1 - GENERAL**

22 **1.1 RELATED DOCUMENTS**

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

25 **1.2 SUMMARY**

- 26 A. Section includes glazed aluminum curtain walls.
- 27 B. Related Work:
- 28 1. Section 08 80 00 – Glazing: for IG units required for curtainwalls.

29 **1.3 PREINSTALLATION MEETINGS**

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

31 **1.4 ACTION SUBMITTALS**

- 32 A. Product Data: For each type of product.
- 33 B. Sustainable Design Submittals:
  - 34 1. Product Data: For sealants, indicating VOC content.
  - 35 2. Laboratory Test Reports: For sealants, indicating compliance with requirements for low-emitting
  - 36 materials.
- 37 C. Shop Drawings: Include plans, elevations, sections, full-size details, and attachments to other work.
  - 38 1. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.
- 39 D. Samples: For each exposed finish required.
- 40 E. Delegated-Design Submittal: For glazed aluminum curtain walls indicated to comply with performance
- 41 requirements and design criteria, including analysis data signed and sealed by the qualified professional
- 42 engineer licensed in the State of Wisconsin responsible for their preparation.

43 **1.5 INFORMATIONAL SUBMITTALS**

- 44 A. Energy Performance Certificates: NFRC-certified energy performance values from manufacturer.
- 45 B. Product test reports.
- 46 C. Field quality-control reports.
- 47 D. Sample warranties.

48 **1.6 CLOSEOUT SUBMITTALS**

- 49 A. Maintenance data.

1.7 **QUALITY ASSURANCE**

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- B. Testing Agency Qualifications: Qualified according to ASTM E 699 for testing indicated.
- C. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.
  - 1. Do not change intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If changes are proposed, submit comprehensive explanatory data to Architect for review.
- D. Mockup: Refer to Section 01 43 39 – Mockups for description of construction required to complete a mockup submittal for review.
  - 1. Junction of new curtain wall system GLWS-4 with existing clay brick masonry wall at the north elevation. Size to be based on either Level 0 or Level 1 entry door framing height and width at the north elevation, and to include the special shape movement joint at the intersection between framing system and masonry wall.

1.8 **WARRANTY**

- A. Special Assembly Warranty: Installer agrees to repair or replace components of glazed aluminum curtain wall that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: 2 years from date of Substantial Completion.
- B. Special Finish Warranty: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of factory-applied finishes within specified warranty period.
  - 1. Warranty Period: 20 years from date of Substantial Completion.

**PART 2 - PRODUCTS**

2.1 **PERFORMANCE REQUIREMENTS**

- A. Delegated Design: Engage a qualified professional engineer licensed in the State of Wisconsin, as defined in Section 01 40 00 "Quality Requirements," to design glazed aluminum curtain walls.
- B. General Performance: Comply with performance requirements specified, as determined by testing of glazed aluminum curtain walls representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.
  - 1. Glazed aluminum curtain walls shall withstand movements of supporting structure including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
  - 2. Failure also includes the following:
    - a. Thermal stresses transferring to building structure.
    - b. Glass breakage.
    - c. Noise or vibration created by wind and thermal and structural movements.
    - d. Loosening or weakening of fasteners, attachments, and other components.
    - e. Failure of operating units.
- C. Structural Loads:
  - 1. Wind Loads: As indicated on Drawings.
  - 2. Other Design Loads: As indicated on Drawings.
- D. Deflection of Framing Members: At design wind pressure, as follows:
  - 1. Deflection Normal to Wall Plane: Limited to edge of glass in a direction perpendicular to glass plane not exceeding 1/175 of the glass edge length for each individual glazing lite or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.
  - 2. Deflection Parallel to Glazing Plane: Limited to amount not exceeding that which reduces glazing bite to less than 75 percent of design dimension and that which reduces edge clearance between framing members and glazing or other fixed components to less than 1/8 inch.
    - a. Operable Units: Provide a minimum 1/16-inch clearance between framing members and operable units.
  - 3. Cantilever Deflection: Where framing members overhang an anchor point, as follows:
    - a. Perpendicular to Plane of Wall: No greater than 1/240 of clear span plus 1/4-inch for spans greater than 11 feet 8-1/4 inches or 1/175 times span, for spans less than 11 feet 8-1/4 inches.

- 1 E. Structural: Test according to ASTM E 330 as follows:  
2 1. When tested at positive and negative wind-load design pressures, assemblies do not evidence  
3 deflection exceeding specified limits.  
4 2. Uniform Load: A static air design load of 150 percent of positive and negative wind-load design  
5 pressures shall be applied in the positive and negative direction in accordance with ASTM E 330.  
6 There shall be no deflection in excess of L/175 of the span of any framing member at design load. At  
7 structural test load equal to 1.5 times the specified design load, no glass breakage or permanent set  
8 in the framing members in excess of 0.2% of their clear spans shall occur.  
9 3. Test Durations: As required by design wind velocity, but not less than 10 seconds.
- 10 F. Air Infiltration: Test according to ASTM E 283 for infiltration as follows:  
11 1. Fixed Framing and Glass Area:  
12 a. Maximum air leakage of 0.06 cfm/sq. ft. at a static-air-pressure differential of 6.24 lbf/sq. ft..
- 13 G. Water Penetration under Static Pressure: Test according to ASTM E 331 as follows:  
14 1. No evidence of water penetration through fixed glazing and framing areas when tested according to  
15 a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not  
16 less than 12 psf (575 Pa).  
17 2. Water Resistance, (dynamic): The test specimen shall be tested in accordance with AAMA 501.1.  
18 There shall be no leakage at an air pressure differential of 12 psf (575 Pa) as defined in AAMA 501.
- 19 H. Energy Performance: Certify and label energy performance according to NFRC as follows: Glazing for test  
20 standard shall be 1 inch IG clear (U value 0.48 and SHGC 0.70). Refer to Section 08 80 00 GL-3 for glass  
21 performance.  
22 1. Thermal Transmittance (U-factor): Fixed glazing and framing areas shall have U-factor in the range  
23 of 0.34 to 0.37 Btu/sq. ft. x h x deg F as determined according to NFRC 100.  
24 2. Condensation Resistance: Fixed glazing and framing areas shall have an NFRC-certified  
25 condensation resistance rating of no less than 63 as determined according to AAMA Specification  
26 1503.
- 27 I. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature  
28 changes:  
29 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

## 30 2.2 MANUFACTURERS

- 31 A. Basis of Design: Kawneer 1600 Wall System 1 and 2 with 4 Sided Captured and SSG curtain wall system.  
32 1. 2-1/2" x 6" (63.5 x 152.4) outside glazed captured and SSG format.  
33 2. 2-1/2" x 10-1/2" (63.5 x 267) outside glazed captured format.
- 34 B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may  
35 be incorporated into the Work include, but are not limited to the following:  
36 1. EFCO Corporation.  
37 2. Kawneer North America; an Alcoa company.  
38 3. Oldcastle, Inc.  
39 4. Tubelite Inc.  
40 5. Wausau Window and Wall Systems; Apogee Wausau Group.

## 41 2.3 FRAMING

- 42 A. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required  
43 and reinforced as required to support imposed loads.  
44 1. Construction: Thermally broken.  
45 2. Glazing System: Retained mechanically with gaskets at perimeter and at horizontal transoms, with  
46 SSG butt joints, silicon sealed, at intermediate verticals.  
47 3. Glazing Plane: Front.  
48 4. Finish: High-performance organic finish.  
49 5. Fabrication Method: Field-fabricated stick system.
- 50 B. Pressure Caps: Manufacturer's standard aluminum components that mechanically retain glazing at  
51 perimeter and at transomes.  
52 1. Include snap-on aluminum trim that conceals fasteners.
- 53 C. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining,  
54 nonferrous shims for aligning system components.
- 55 D. Canopy Framing: Versoleil SunShade - Outrigger System (without blades)  
56 1. 36 inches square outrigger, (omit blades), rectangular fascia, and shallow cover.  
57 2. Finish: Organic finish as specified. Color to affect zinc appearance.  
58

- 1 E. Materials:
- 2 1. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
- 3 a. Sheet and Plate: ASTM B 209.
- 4 b. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
- 5 c. Extruded Structural Pipe and Tubes: ASTM B 429/B 429M.
- 6 d. Structural Profiles: ASTM B 308/B 308M.
- 7 2. Steel Reinforcement: Manufacturer's standard zinc-rich, corrosion-resistant primer complying with
- 8 SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select
- 9 surface preparation methods according to recommendations in SSPC-SP COM, and prepare
- 10 surfaces according to applicable SSPC standard.
- 11 a. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
- 12 b. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
- 13 c. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.

14 **2.4 GLAZING**

- 15 A. Glazing: Comply with Section 08 80 00 "Glazing."
- 16 B. Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient
- 17 elastomeric glazing gaskets, setting blocks, and shims or spacers.
- 18 C. 3M VHB tape for mounting butt-jointed glass to a back-box.
- 19 D. Glazing Sealants: As recommended by manufacturer.
- 20 1. Sealant shall have a VOC content of 250 g/L or less.

21 **2.5 FABRICATION**

- 22 A. Form or extrude aluminum shapes before finishing.
- 23 B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish.
- 24 Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
- 25 C. Fabricate components that, when assembled, have the following characteristics:
- 26 1. Profiles that are sharp, straight, and free of defects or deformations.
- 27 2. Accurately fitted joints with ends coped or mitered.
- 28 3. Physical and thermal isolation of glazing from framing members.
- 29 4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required
- 30 glazing edge clearances.
- 31 5. Provisions for field replacement of glazing from exterior.
- 32 6. Provisions for safety railings mounted on interior face of mullions or between mullions at interior.
- 33 7. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
- 34 D. Fabricate components to resist water penetration as follows:
- 35 1. Pressure-equalized system or double barrier design with primary air and vapor barrier at interior side
- 36 of glazed aluminum curtain wall and secondary seal weeped and vented to exterior.
- 37 E. Factory-Assembled Frame Units:
- 38 1. Rigidly secure nonmovement joints.
- 39 2. Prepare surfaces that are in contact structural sealant according to sealant manufacturer's written
- 40 instructions to ensure compatibility and adhesion.
- 41 3. Preparation includes, but is not limited to, cleaning and priming surfaces.
- 42 4. Seal joints watertight unless otherwise indicated.
- 43 5. Install glazing to comply with requirements in Section 08 80 00 "Glazing."
- 44 F. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

45 **2.6 ALUMINUM FINISHES**

- 46 A. High-Performance Organic Finish: Three-coat fluoropolymer finish complying with AAMA 2605 and
- 47 containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare,
- 48 pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers'
- 49 written instructions.
- 50 1. Color and Gloss: As selected by Architect from manufacturer's full range.
- 51

1 **PART 3 - EXECUTION**

2 **3.1 INSTALLATION**

- 3 A. General:
- 4 1. Comply with manufacturer's written instructions.
  - 5 2. Do not install damaged components.
  - 6 3. Fit joints to produce hairline joints free of burrs and distortion.
  - 7 4. Rigidly secure nonmovement joints.
  - 8 5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration
  - 9 and to prevent impeding movement of moving joints.
  - 10 6. Where welding is required, weld components in concealed locations to minimize distortion or
  - 11 discoloration of finish. Protect glazing surfaces from welding.
  - 12 7. Seal joints watertight unless otherwise indicated.
- 13 B. Metal Protection:
- 14 1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting
  - 15 contact surfaces with primer, applying sealant or tape, or installing nonconductive spacers as
  - 16 recommended by manufacturer for this purpose.
  - 17 2. Where aluminum is in contact concrete or masonry, protect against corrosion by painting contact
  - 18 surfaces with bituminous paint.
- 19 C. Install components to drain water passing joints, condensation occurring within framing members, and
- 20 moisture migrating within glazed aluminum curtain wall to exterior.
- 21 D. Install components plumb and true in alignment with established lines and grades.
- 22 E. Install glazing as specified in Section 08 80 00 "Glazing."

23 **3.2 FIELD QUALITY CONTROL**

- 24 A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- 25 B. Test Area: Perform tests on representative areas of glazed aluminum curtain walls.
- 26 C. Field Quality-Control Testing: Perform the following test on representative areas of glazed aluminum curtain
- 27 walls.
- 28 1. Water-Spray Test: Before installation of interior finishes has begun, areas designated by Architect
  - 29 shall be tested according to AAMA 501.2 and shall not evidence water penetration.
  - 30 a. Perform a minimum of two tests in areas as directed by Architect.
- 31 D. Glazed aluminum curtain walls will be considered defective if they do not pass tests and inspections.
- 32 E. Prepare test and inspection reports.

33 **END OF SECTION**

SECTION 08 51 13  
ALUMINUM WINDOWS

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- 2
- 3 PART 1 – GENERAL
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- 20 PART 3 – EXECUTION
- 21 3.1 [INSTALLATION](#)
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23 **PART 1 - GENERAL**

24 **1.1 RELATED DOCUMENTS**

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

27 **1.2 SUMMARY**

- 28 A. Section includes:
  - 29 1. All exterior Architectural Performance Class (AW) historical windows furnished and installed as
  - 30 shown on drawings, specified in this section and designated in AAMA/WDMA/CSA 101/I.S.2/A440-
  - 31 11 North American Fenestration Standard (NAFS-2011).
  - 32 2. All labor, materials, tools, equipment and services needed to furnish and install AW Class windows.
  - 33 3. Components furnished with installed windows.
  - 34 4. Installation accessories furnished and installed.

35 **1.3 ACTION SUBMITTALS**

- 36 A. Product Data: For each type of product.
- 37 B. Shop Drawings: Include plans, elevations, sections, hardware, accessories, operational clearances, and
- 38 half-size details of installation, including anchor, flashing, and sealant installation.
- 39 C. Samples: For each exposed product and for each color specified, 2 by 4 inches in size.
- 40 D. Product Schedule: For aluminum windows. Use same designations indicated on Drawings.

41 **1.4 INFORMATIONAL SUBMITTALS**

- 42 A. Test Reports and Calculations:
  - 43 1. Submit certified independent laboratory test reports verifying compliance with all performance
  - 44 requirements.
  - 45 2. Submit structural calculations indicating adequacy of all materials furnished under this section, to
  - 46 meet the uniform and structural load requirements as specified.
- 47 B. Provide copies of original manifests verifying window production is within 500 miles of the Project location.
- 48 C. Sample warranties.
- 49



1 **1.5 QUALITY ASSURANCE**

- 2 A. Qualifications: Upon request, the window manufacturer shall provide written consent for the installation  
3 subcontractor to install window products to be used on this project.
- 4 B. In-Plant Testing: Conduct detailed quality audits and ASTM E331 static water infiltration testing on a  
5 minimum of 4% of factory-glazed windows prior to shipping, subject to reasonable unit size restrictions.
- 6 1. Each tested unit shall be identified with a removable sticker on the inside glass face.  
7 2. Provide detailed documentation of in-plant testing upon request.
- 8 C. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic  
9 effects and set quality standards for materials and execution.
- 10 D. Mockup: Refer to Section 01 43 39 – Mockups for description of construction required to complete a  
11 mockup submittal for review.
- 12 1. New replacement window WIN-1 at level 2 Storage Room 221. One complete window type W12  
13 including window sill and jamb and head finishes.
- 14 2. New factory-style replacement window WIN-2 in place of demo'd brick infill panel at north elevation.  
15 One entire window type W4 including jamb and head finishes and new window sill.

16 **1.6 WARRANTY**

- 17 A. Manufacturer's Warranty: Manufacturer agrees to repair or replace aluminum windows that fail in materials  
18 or workmanship within specified warranty period.
- 19 1. Warranty Period:  
20 a. Window: 10 years from date of Substantial Completion.  
21 b. Glazing Units: 10 years from date of Substantial Completion.  
22 c. Aluminum Finish: 20 years from date of Substantial Completion.

23 **PART 2 - PRODUCTS**

24 **2.1 MANUFACTURERS**

- 25 A. Drawings and specification are based on:  
26 1. Wausau Window and Wall Systems 4250i-XLT INvent Retro Beveled Profile Historical Fixed  
27 Windows.
- 28 B. Subject to compliance with requirements, manufacturers offering comparable products that may be  
29 incorporated into the Work include, but are not limited to, the following:  
30 1. Graham Architectural Products.  
31 2. St Cloud Window.

32 **2.2 WINDOW PERFORMANCE REQUIREMENTS**

- 33 A. Design Wind Loads - Allowable Stress Design (ASD)  
34 1. The design wind pressure for the project will be:  
35 a. Per local building codes  
36 2. All structural components, including meeting rails, mullions and anchors shall be designed  
37 accordingly, complying with deflection and stress requirements.
- 38 B. Air, Water and Structural Performance Requirements  
39 1. When tested in accordance with cited test procedures, windows shall meet or exceed the following  
40 performance criteria, as well as those indicated in NAFS-2011 for Architectural AW Performance  
41 Class windows, Performance Grade 100 (AW100) unless otherwise noted herein.  
42 a. Test units shall not be smaller in either width or height than the "Gateway Test Size" specified  
43 in NAFS-2011 for AW Performance Class.  
44 b. "Downsize" testing to meet Optional Performance Class requirements specified herein shall  
45 not be permitted.  
46 c. Test units shall employ manufacturer's standard sealing, lock spacing and anchorage.
- 47 2. Air Test Performance Requirements  
48 a. Air infiltration maximum 0.1 cfm per square foot at 6.24 psf pressure differential when tested  
49 in accord with ASTM E283.
- 50 3. Water Test Performance Requirements  
51 a. No uncontrolled water leakage at 15.00 psf static pressure differential, with water application  
52 rate of 5 gallons/hr/sq ft when tested in accord with both ASTM E331 and ASTM E547.  
53

- 1           4.     Structural Test Performance Requirements  
2           a.     Uniform Load Deflection Test  
3           1)     No deflection of any unsupported span L of test unit (framing rails, muntins, mullions,  
4                     etc.) in excess of L/175 at both a positive and negative load of 100 psf (design test  
5                     pressure) when tested in accord with ASTM E330.  
6           b.     Uniform Load Structural Test  
7           1)     Unit to be tested at 1.5 x design test pressure, both positive and negative, acting  
8                     normal to plane of wall in accord with ASTM E330.  
9           2)     No glass breakage; permanent damage to fasteners, hardware parts, or anchors;  
10                    damage to make windows inoperable; or permanent deformation of any main frame  
11                    or ventilator member in excess of 0.2% of its clear span.  
12     C.     Life Cycle Testing  
13     1.     When tested in accordance with AAMA 910-10, there is to be no damage to fasteners, hardware  
14             parts, support arms, activating mechanisms or any other damage that would cause the window to be  
15             inoperable at the conclusion of testing.  
16             a.     Air infiltration and water resistance tests shall meet the primary performance requirements  
17                     specified after completion of 4,000 operational cycles and misuse testing.  
18     D.     Condensation Resistance and Thermal Transmittance Performance Requirements  
19     1.     Perform thermal tests in accordance with NFRC 102 and AAMA 1503, or provide finite element  
20             computer thermal modeling and calculations per NFRC 100, NFRC 705 or AAMA 507, using  
21             DOE/LBL THERM, WINDOW, and/or CMAST software.  
22             a.     Thermal Transmittance (U-Factor) for the overall window area shall be less than or equal to  
23                     0.31 BTU/hr-ft<sup>2</sup>-°F.  
24             b.     Solar Heat Gain Coefficient (SHGC) for the overall window area shall not exceed 0.33.  
25             c.     Condensation Resistance Factor (CRF) requirements: CRF minimum 61 (Frame) and CRF  
26                     minimum 65 (Glass).  
27     E.     Acoustic Performance Requirements  
28     1.     Perform acoustical tests in accordance with ASTM E90 and ASTM E1425 on the glass type(s)  
29             specified in 08 80 00, rigidly supported in aluminum framing of the same product type.  
30     2.     “Glass-only” test results shall not be acceptable.  
31     3.     Sound Transmission Class (STC) shall not be less than 31.  
32     4.     Outdoor-Indoor Transmission Class (OITC) shall not be less than 25.  
33     F.     Sustainable Design Requirements  
34     1.     The products provided under this section may affect LEED® certification for the project. Provide  
35             documentation in accordance with the applicable version of USGBC’s “LEED® for New Construction  
36             and Major Renovation Version,” verifying that the components, processes and/or assemblies  
37             specified herein conform to the following requirements.  
38             a.     Regional Materials: The specified products shall be manufactured within 500 miles of Project  
39                     site.  
40             b.     MR Credit 4.1 and 4.2: Recycled Content  
41                 1)     Provide window assemblies (aluminum framing, glass and other components)  
42                     containing no less than 15% combined recycled content by assembly weight.  
43                 2)     Combined content to be calculated as post-consumer plus one-half pre-consumer  
44                     recycled content by weight.  
45                 3)     Report pre- and post-consumer recycled content separately.  
46                 4)     All recycled secondary aluminum billet must meet Aluminum Association content  
47                     requirements for the alloy used.  
48             c.     EQ Credit 4.1: Low-Emitting Materials – Adhesives and Sealants  
49                 1)     All interior primers, structural glazing adhesives and metal-to-metal sealants used on  
50                     site must meet applicable South Coast Air Quality Management District (SCAQMD)  
51                     Rule #1168 VOC limits.

52     **2.3     ALUMINUM WINDOWS (WIN-1)**

- 53     A.     Drawings and specification are based on Wausau Window and Wall Systems :  
54     1.     Wausau Window and Wall Systems 4250i-XLT INvent Retro Beveled Profile Historical Fixed  
55             Windows.  
56     2.     Windows to be Simulated Double Hung with a 2 inches offset glass plane from upper to lower lites,  
57             where indicated on the architectural drawings.  
58     B.     Substitute products not pre-approved by the Architect via addenda will not be considered. Clear preference  
59             will be given to products produced in LEED®-certified manufacturing facilities. Operating Types: As indicated  
60             on Drawings.  
61

- 1     **2.4     ALUMINUM WINDOWS (WIN-2)**
- 2     A.     Drawings and specification are based on Wausau Window and Wall Systems 4250i-XLT INvent Retro
- 3     Beveled Profile Historical Fixed Windows..
- 4     1.     Windows to be flush glazed (non-Simulated Double Hung) with simulated floating vent operables.
- 5     a.     Simulated divided lites at WIN-2 shall be in accordance with the architectural drawings to
- 6     mimic the operable vents, no exceptions.
- 7     B.     Substitute products not pre-approved by the Architect via addenda will not be considered. Clear preference
- 8     will be given to products produced in LEED®-certified manufacturing facilities. Operating Types: As indicated
- 9     on Drawings.
- 10    **2.5     HEAT RESISTANT PANEL**
- 11    A.     Where indicated at WIN-1 window type for application at MEP pipe penetration.
- 12    **2.6     MATERIALS**
- 13    A.     Aluminum Framing Members
- 14    1.     Extruded aluminum billet, 6063-T5 or T6 alloy for primary non-radius components; 6063-T5 or T6,
- 15    6005-T5, 6105-T5 or 6061-T6 for anchor components; all meeting the requirements of ASTM B221.
- 16    2.     Aluminum sheet alloy 5005-H32 (for anodic finishing), or alloy 3003-H14 (for painted or unfinished
- 17    sheet) meeting the requirements of ASTM B209.
- 18    3.     Principal window frame members will be a minimum 0.125 inch in thickness at glazing legs and
- 19    section flanges.
- 20    4.     Extruded or formed trim components will be a minimum 0.060 inch in thickness.
- 21    5.     Frame depth 4-7/8 inches minimum.
- 22    6.     Glass plane shall be recessed 1" from exterior plane of window members. Framing members shall
- 23    have a beveled profile at glazing rebates as shown on architectural details.
- 24    **2.7     COMPONENTS**
- 25    A.     Hardware
- 26    1.     All steel components including attachment fasteners to be 300 Series stainless steel except as noted.
- 27    2.     Extruded aluminum components 6063-T5 or -T6.
- 28    B.     Sealants
- 29    1.     All sealants shall comply with applicable provisions of AAMA 800 and/or Federal Specifications FS-
- 30    TT-001 and 002 Series.
- 31    2.     Frame joinery sealants shall be suitable for application specified and as tested and approved by
- 32    window manufacturer.
- 33    C.     Glass
- 34    1.     Provide in accordance with Section 08 80 00.
- 35    2.     Sealed insulated glass shall be tested and certified in accord with ASTM E2190.
- 36    D.     Glazing
- 37    1.     Provide in general accordance with Section 08 80 00.
- 38    2.     Glazing method shall be as approved by the glass fabricator, and warrantable.
- 39    E.     Glazing Materials
- 40    1.     Setting Blocks/Edge Blocking: Provide in sizes and locations recommended by GANA Glazing
- 41    Manual. Setting blocks used in conjunction with soft-coat low-e glass shall be silicone.
- 42    2.     Back-bedding tapes, expanded cellular glazing tapes, toe beads, heel beads and cap beads shall
- 43    meet the requirements of applicable specifications cited in AAMA 800.
- 44    3.     Glazing gaskets shall be non-shrinking, weather-resistant, and compatible with all materials in
- 45    contact.
- 46    4.     Structural silicone sealant where used shall meet the requirements of ASTM C1184.
- 47    5.     Spacer tape in continuous contact with structural silicone shall be tested for compatibility and
- 48    approved by the sealant manufacturer for the intended application.
- 49    6.     Gaskets in continuous contact with structural silicone shall be extruded silicone or compatible
- 50    material.
- 51    F.     Steel Components
- 52    1.     Provide steel reinforcements as necessary to meet the performance requirements.
- 53    2.     Concealed steel anchors and reinforcing shall be factory painted after fabrication with TGIC powder
- 54    coating, or rust-inhibitive primer complying with Federal Specification TT-P-645B.
- 55

- 1 G. Simulated Divided Lite (SDL) Muntins:  
2 1. Provide beveled profile muntins on the exterior of the glass as shown on the architectural drawings.  
3 Dimensions to be minimum 3/4 inch, match the bevel angle of the perimeter frame, and bevel cut at  
4 overlapping joints.  
5 2. Provide between glass muntin grid with dimensions of 3/8" x 3/4", colored to match the insulated  
6 glass mill finish spacer.  
7 3. Provide tape applied aluminum flat bar muntin on the interior of the glass with dimensions as shown  
8 on the architectural drawings, no exceptions.
- 9 H. Historic Horizontal Accent (at WIN-1):  
10 1. A thermally broken "H-mullion" shall separate the upper and the lower windows in this location, per  
11 the architectural drawings.  
12 2. Utilize a pressure plate and custom snap cover applied and sealed to the "H-mullion" to give the  
13 exterior the historic aesthetic per the architectural drawings, no exceptions.  
14 3. From the exterior, the horizontal historic band must remain uninterrupted across multiple units, no  
15 exceptions.  
16 4. All maximum dimensions of this horizontal must be per the architectural drawings, no exceptions.
- 17 I. Anchorage:  
18 1. All windows must be adequately anchored into surrounding conditions for imposed loads per  
19 structural calculations.  
20 2. Anchorage devices, accessories and means must not add to aesthetic sightlines shown in the  
21 architectural drawings.  
22

23 **2.8 FABRICATION**

- 24 A. General:  
25 1. Finish, fabricate and shop assemble frame members into complete windows under the responsibility  
26 of one manufacturer.  
27 2. No bolts, screws or fastenings shall impair independent frame movement, or bridge the thermal  
28 barrier, unless such bridging was also present in thermal test units and thermal models.  
29 3. Fabricate to allow for thermal movement of materials when subjected to a temperature differential  
30 from -30 °F exterior ambient temperature to +180 °F exterior surface temperature.
- 31 B. Frames:  
32 1. Cope or miter and weld or mechanically fasten each corner; then seal weather tight.  
33 2. Make provisions for continuity of frame joinery seals at extrusion webs.
- 34 C. Simulated Divided Lite (SDL) Muntins:  
35 1. Exterior muntin-to-muntin joints shall be partially coped to create an interlock cross and epoxy  
36 bonded together.  
37 2. Exterior muntin-to-frame joints shall be mitered to overlap and connected via concealed spring pin  
38 plunger.
- 39 D. Glass Drainage: (field glazed units only)  
40 1. Provision shall be made to insure that water will not accumulate and remain in contact with the  
41 perimeter area of sealed insulated glass.
- 42 E. Thermal Break Construction:  
43 1. Continuous extruded polyamide with 25% glass fiber reinforcing, mechanically crimped into cross-  
44 knurled cavities.  
45 2. Minimum thermal barrier width 24 mm.  
46 3. Quality assurance records must be maintained and available as requested.

47 **2.9 ALUMINUM FINISHES**

- 48 A. High-Performance Organic Finish (Two-Coat Fluoropolymer): Thermocured system consisting of inhibitive  
49 primer and fluoropolymer color coat with color coat containing not less than 70 percent polyvinylidene  
50 fluoride resin by weight complying with AAMA 2605.  
51 1. Color and Gloss:  
52 a. For WIN-1, WIN-2: AL-A: Benjamin Moore # HC-131 (Lehigh Green), 30% gloss.

1 **PART 3 - EXECUTION**

2 **3.1 INSTALLATION**

- 3 A. Comply with manufacturer's written instructions for installing windows, hardware, accessories, and other  
4 components. For installation procedures and requirements not addressed in manufacturer's written  
5 instructions, comply with installation requirements in ASTM E 2112.  
6 B. Install windows level, plumb, square, true to line, without distortion or impeding thermal movement, anchored  
7 securely in place to structural support, and in proper relation to wall flashing and other adjacent construction  
8 to produce weathertight construction.  
9 C. Install windows and components to drain condensation, water penetrating joints, and moisture migrating  
10 within windows to the exterior.  
11 D. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points  
12 of contact with other materials.  
13 E. Clean exposed surfaces immediately after installing windows. Avoid damaging protective coatings and  
14 finishes. Remove excess sealants, glazing materials, dirt, and other substances.  
15 F. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during  
16 construction period.

17 **3.2 ADJUSTING, CLEANING, AND PROTECTION**

- 18 A. Clean exposed surfaces immediately after installing windows. Avoid damaging protective coatings and  
19 finishes. Remove excess sealants, glazing materials, dirt, and other substances.  
20 1. Keep protective films and coverings in place until final cleaning.  
21 B. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during  
22 construction period.  
23 C. Protect window surfaces from contact with contaminating substances resulting from construction operations.  
24 If contaminating substances do contact window surfaces, remove contaminants immediately according to  
25 manufacturer's written instructions.

26 **END OF SECTION**

SECTION 08 51 13.23  
ALUMINUM ACCESSORY WINDOWS

1  
2  
3 PART 1 – GENERAL  
4 1.1 [RELATED DOCUMENTS](#)  
5 1.2 [SUMMARY](#)  
6 1.3 [ACTION SUBMITTALS](#)  
7 1.4 [INFORMATIONAL SUBMITTALS](#)  
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10 PART 2 – PRODUCTS  
11 2.1 [MANUFACTURERS](#)  
12 2.2 [WINDOW PERFORMANCE REQUIREMENTS](#)  
13 2.6 [INTERIOR ACCESSORY WINDOWS \(IAW-1\)](#)  
14 2.7 [FABRICATION](#)  
15 2.8 [ALUMINUM FINISHES](#)  
16 PART 3 – EXECUTION  
17 3.1 [INSTALLATION](#)  
18 3.2 [ADJUSTING, CLEANING, AND PROTECTION](#)

19 **PART 1 - GENERAL**

20 **1.1 RELATED DOCUMENTS**

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

23 **1.2 SUMMARY**

- 24 A. Section includes:  
25 1. All interior accessory windows furnished and installed as shown on drawings, specified in this section  
26 and designated in AAMA/WDMA/CSA 101/I.S.2/A440.  
27 2. All labor, materials, tools, equipment and services needed to furnish and install interior accessory  
28 windows for sound, energy, air and/or light control enhancement of existing weather tight windows.  
29 3. Components furnished with installed interior windows.  
30 4. Installation accessories furnished and installed.

31 **1.3 ACTION SUBMITTALS**

- 32 A. Product Data: For each type of product.  
33 B. Shop Drawings: Include plans, elevations, sections, hardware, accessories, insect screens, operational  
34 clearances, and half-size details of installation, including anchor, flashing, and sealant installation.  
35 C. Samples: For each exposed product and for each color specified, 2 by 4 inches in size.  
36 D. Product Schedule: For aluminum windows. Use same designations indicated on Drawings.

37 **1.4 INFORMATIONAL SUBMITTALS**

- 38 A. Product test reports.  
39 B. Provide copies of original manifests verifying window production is within 500 miles of the Project location.  
40 C. Sample warranties.

41 **1.5 QUALITY ASSURANCE**

- 42 A. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic  
43 effects and set quality standards for materials and execution.  
44 B. Mockup: Refer to Section 01 43 39 – Mockups for description of construction required to complete a  
45 mockup submittal for review.  
46 1. One large interior accessory window IAW-1 on the inside of historic window type W11 at level 2  
47 mockup, including support steel for IAW, jamb and head conditions, and new window sill.  
48

1 **1.6 WARRANTY**

- 2 A. Manufacturer's Warranty: Manufacturer agrees to repair or replace aluminum windows that fail in materials  
3 or workmanship within specified warranty period.  
4 1. Warranty Period:  
5 a. Window: 10 years from date of Substantial Completion.  
6 b. Glazing Units: 10 years from date of Substantial Completion.  
7 c. Aluminum Finish: 20 years from date of Substantial Completion.

8 **PART 2 - PRODUCTS**

9 **2.1 MANUFACTURERS**

- 10 A. Drawings and specification are based on:  
11 1. Wausau Window and Wall Systems - 1297 S.E.A.L.™ Series Interior Accessory Windows.  
12 B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may  
13 be incorporated into the Work include, but are not limited to, the following:  
14 1. Graham Architectural Products.  
15 2. Wausau Window and Wall Systems; Apogee Wausau Group.

16 **2.2 WINDOW PERFORMANCE REQUIREMENTS**

- 17 A. Air Infiltration/Exfiltration Performance Requirements:  
18 1. When tested in accordance with cited test procedures, and with all purposeful vent holes plugged,  
19 windows shall meet or exceed the following performance criteria.  
20 2. Air infiltration and exfiltration maximum 0.3 cfm per square foot at 6.24 psf pressure differential when  
21 tested in accord with ASTM E283.  
22 B. Sustainable Design Requirements  
23 1. The products provided under this section may affect LEED® certification for the project. Provide  
24 documentation in accordance with USGBC's "LEED® for New Construction and Major Renovation  
25 Version 2.2", verifying that the components, processes and/or assemblies specified herein conform  
26 to the following requirements.  
27 a. Regional Materials: The specified products shall be manufactured within 500 miles of Project  
28 site.  
29 b. MR Credit 4.1 and 4.2: Recycled Content  
30 1) Provide window assemblies (aluminum framing, glass and other components)  
31 containing no less than 15% combined recycled content by assembly weight.  
32 2) Combined content to be calculated as post-consumer plus one-half pre-consumer  
33 recycled content by weight.  
34 3) Report pre- and post-consumer recycled content separately.  
35 4) All recycled secondary aluminum billet must meet Aluminum Association content  
36 requirements for the alloy used.  
37 c. EQ Credit 4.1: Low-Emitting Materials – Adhesives and Sealants  
38 1) All interior primers, structural glazing adhesives and metal-to-metal sealants used on  
39 site must meet applicable South Coast Air Quality Management District (SCAQMD)  
40 Rule #1168 VOC limits.

41 **2.3 INTERIOR ACCESSORY WINDOWS (IAW-1)**

- 42 A. Drawings and specification are based on Wausau Window and Wall Systems - 1297 S.E.A.L.™ Series  
43 Interior Prime Windows. Substitute products not pre-approved by the Architect via addenda will not be  
44 considered. Clear preference will be given to products produced in LEED®-certified manufacturing facilities.  
45 B. Operating Types: As indicated on Drawings.  
46 C. Insulating-Glass Units: ASTM E 2190.  
47 1. Refer to Section 08 80 00: Glass Designation GL-4.  
48 D. Glazing System: Manufacturer's standard factory-glazing system that produces weathertight seal.  
49

- 1 E. Aluminum Framing Members  
2 1. Extruded aluminum billet, 6063-T5 or T6 alloy for primary components; 6063-T5 or T6, 6005-T5,  
3 6105-T5 or 6061-T6 for structural components; all meeting the requirements of ASTM B221.  
4 2. Aluminum sheet alloy 5005-H32 (for anodic finishing), or alloy 3003-H14 (for painted or unfinished  
5 sheet) meeting the requirements of ASTM B209.  
6 3. Principal window frame and access panel members will be a minimum 0.093" in thickness at glazing  
7 legs, hardware mounting webs and section flanges.  
8 4. Extruded or formed trim components will be a minimum 0.125" in thickness.  
9 5. Frame depth 1-1/2 inches minimum.  
10 6. "Stacking" sightlines must be within 1/4" of the existing cast iron window sections.  
11 7. Access panel sections must close flush with adjoining frame surfaces at interior and exterior.  
12 a. Overlap access panels will not be accepted.
- 13 F. Hardware  
14 1. All steel components including attachment fasteners to be 300 Series stainless steel except as noted.  
15 2. Extruded aluminum components 6063-T5 or -T6.  
16 3. Locking handles, bases and strikes to be die cast, white bronze or stainless steel.  
17 4. Thermo-plastic or thermo-set plastic caps, housings and other components to be injection-molded  
18 nylon, extruded PVC, or other suitable compound.  
19 5. Hardware to be custodial-operated.
- 20 G. Sealants  
21 1. All sealants shall comply with applicable provisions of AAMA 800 and/or Federal Specifications FS-  
22 TT-001 and 002 Series.  
23 2. Frame joinery sealants shall be suitable for application specified and as tested and approved by  
24 window manufacturer.
- 25 H. Glazing Materials  
26 1. Setting Blocks/Edge Blocking: Provide in sizes and locations recommended by GANA Glazing  
27 Manual. Setting blocks used in conjunction with soft-coat low-e glass shall be silicone.  
28 2. Back-bedding tapes, expanded cellular glazing tapes, toe beads, heel beads and cap beads shall  
29 meet the requirements of applicable specifications cited in AAMA 800.  
30 3. Glazing gaskets shall be non-shrinking, weather-resistant, and compatible with all materials in  
31 contact.  
32 4. Structural silicone sealant where used shall meet the requirements of ASTM C1184.  
33 5. Spacer tape in continuous contact with structural silicone shall be tested for compatibility and  
34 approved by the sealant manufacturer for the intended application.  
35 6. Gaskets in continuous contact with structural silicone shall be extruded silicone or compatible  
36 material.
- 37 I. Glazed Access Panel:  
38 1. Hinged and Lift-Off access panels shall be provided with Allen locks for custodial operation.
- 39 **2.4 FABRICATION**  
40 A. General:  
41 1. Finish, fabricate and shop assemble frame and access panel members into complete windows under  
42 the responsibility of one manufacturer.
- 43 B. Frames:  
44 1. Miter all corners and mechanically stake over a solid extruded aluminum corner block, set and sealed  
45 in epoxy; or miter and weld each corner.
- 46 C. Interior Operable Panel  
47 1. Miter all corners and mechanically stake over a solid extruded aluminum corner block, set and sealed  
48 in epoxy, leaving hairline joinery.
- 49 D. Hardware:  
50 1. Concealed Hinges at Sash Ventilator and Fixed Lite Access Panels  
51 a. Provide two concealed extruded aluminum "walk-around" butt hinges with stainless steel pins.  
52 Provide three-four hinges on in-swing casement units over 4'-0" in height.  
53 2. Locks  
54 a. Die cast or stainless steel Allen-keyed locks for custodial operation shall secure panel in  
55 closed position.  
56 b. Provide locks at maximum 40" spacing.
- 57 E. Weather-stripping:  
58 1. Bulb- or fin-type neoprene, EPDM, dual-durometer PVC, polypropylene, TPE, or other suitable  
59 material as approved by the window manufacturer.  
60 2. Miter, crowd, stake or join at corners.



- 1 **2.5 ALUMINUM FINISHES**  
2 A. High-Performance Organic Finish (Two-Coat Fluoropolymer): Thermocured system consisting of inhibitive  
3 primer, fluoropolymer color coa with not less than 50 percent polyvinylidene fluoride resin by weight  
4 complying with AAMA 2603.  
5 1. Color and Gloss:  
6 a. For IAW-1: Factory painted to match paint color PT-\_A Benjamin Moore Lehigh Green HC-  
7 131.

8 **PART 3 - EXECUTION**

- 9 **3.1 INSTALLATION**  
10 A. Comply with manufacturer's written instructions for installing windows, hardware, accessories, and other  
11 components. For installation procedures and requirements not addressed in manufacturer's written  
12 instructions, comply with installation requirements in ASTM E 2112.  
13 B. Install windows level, plumb, square, true to line, without distortion or impeding thermal movement, anchored  
14 securely in place to structural support, and in proper relation to wall flashing and other adjacent construction  
15 to produce weathertight construction.  
16 C. Clean exposed surfaces immediately after installing windows. Avoid damaging protective coatings and  
17 finishes. Remove excess sealants, glazing materials, dirt, and other substances.

- 18 **3.2 ADJUSTING, CLEANING, AND PROTECTION**  
19 A. Adjust operating sashes and hardware for a tight fit at contact points and weather stripping for smooth  
20 operation and weathertight closure.  
21 B. Clean exposed surfaces immediately after installing windows. Avoid damaging protective coatings and  
22 finishes. Remove excess sealants, glazing materials, dirt, and other substances.  
23 1. Keep protective films and coverings in place until final cleaning.  
24 C. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during  
25 construction period.  
26 D. Protect window surfaces from contact with contaminating substances resulting from construction operations.  
27 If contaminating substances do contact window surfaces, remove contaminants immediately according to  
28 manufacturer's written instructions.

29 **END OF SECTION**

1 SECTION 08 6200

2 UNIT SKYLIGHTS

3 PART 1 – GENERAL

- 4 1.1 [RELATED DOCUMENTS](#)
- 5 1.2 [SUMMARY](#)
- 6 1.3 [PREINSTALLATION MEETINGS](#)
- 7 1.4 [ACTION SUBMITTALS](#)
- 8 1.5 [INFORMATIONAL SUBMITTALS](#)
- 9 1.6 [QUALITY ASSURANCE](#)
- 10 1.7 [WARRANTY](#)

11 PART 2 – PRODUCTS

- 12 1.1 [MANUFACTURERS](#)
- 13 1.2 [UNIT SKYLIGHTS](#)
- 14 1.3 [FRAMING MATERIALS](#)
- 15 1.4 [ACCESSORY MATERIALS](#)
- 16 1.5 [ALUMINUM FINISHES](#)

17 PART 3 – EXECUTION

- 18 1.1 [EXAMINATION](#)
- 19 1.2 [INSTALLATION](#)
- 20 1.3 [CLEANING](#)

21 PART 1 - **GENERAL**

22 1.1 **RELATED DOCUMENTS**

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

25 1.2 **SUMMARY**

- 26 A. Section Includes:
  - 27 1. Unit skylights mounted on site-erected curbs.
- 28 B. Related Requirements:
  - 29 1. Section 06 10 00 "Rough Carpentry" for site built curbs.

30 1.3 **PREINSTALLATION MEETINGS**

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

32 1.4 **ACTION SUBMITTALS**

- 33 A. Shop Drawings: For unit skylight work.
  - 34 1. Include plans, elevations, sections, details, and connections to supporting structure and other  
35 adjoining work.

36 1.5 **INFORMATIONAL SUBMITTALS**

- 37 A. Sample Warranty: For special warranty.

38 1.6 **QUALITY ASSURANCE**

- 39 A. Manufacturer Qualifications: A manufacturer capable of fabricating unit skylights that meet or exceed  
40 performance requirements indicated and of documenting this performance by inclusion in lists and by  
41 labels, test reports, and calculations.
- 42 B. Installer Qualifications: An installer acceptable to unit skylight manufacturer for installation of units required  
43 for this Project.

44 1.7 **WARRANTY**

- 45 A. Special Warranty: Manufacturer agrees to repair or replace components of unit skylights that fail in  
46 materials or workmanship within specified warranty period.
  - 47 1. Failures include, but are not limited to, the following:
    - 48 a. Uncontrolled water leakage.
    - 49 b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
    - 50 c. Deterioration of insulating-glass hermetic seal.
  - 51 2. Warranty Period: Five years from date of Substantial Completion.

1 **PART 2 - PRODUCTS**

2 **2.1 MANUFACTURERS**

- 3 A. Manufacturers: Subject to compliance with requirements, provide Pinnacle 350 system by Wasco  
4 Products, Inc., Commercial Division, Wells, ME.  
5 1. Wasco 'G' Series.  
6 B. Acceptable Alternate: Comparable skylight as manufactured by Velux.

7 **2.2 UNIT SKYLIGHTS (SKYLIGHT-1)**

- 8 A. General: Provide factory-assembled unit skylights that include glazing, extruded-aluminum glazing  
9 retainers, gaskets, and inner frames and that are capable of withstanding performance requirements  
10 indicated.  
11 B. Insulating Glass: Clear, sealed units that comply with Section 08 8000 "Glazing,"(GL-7).  
12 C. Glazing Gaskets: Manufacturer's standard.  
13 D. Condensation Control: Fabricate unit skylights with integral internal gutters and nonclogging weeps to  
14 collect and drain condensation to the exterior.  
15 E. Thermal Break: Fabricate unit skylights with thermal barrier separating exterior and interior metal framing.

16 **2.3 FRAMING MATERIALS**

- 17 A. Framing Members: Extruded aluminum alloy 6063-T5 or T6, ASTM B 221 with minimum effective  
18 thickness of 0.109 inches.  
19 B. Exterior Pressure Caps: Extruded aluminum alloy 6063-T5 or T6, ASTM B 221 with minimum effective  
20 thickness of 0.090 inches.  
21 C. Concealed Flashing: Manufacturer's standard corrosion-resistant, non-staining, non-bleeding flashing;  
22 compatible with adjacent materials.  
23 D. Exposed Flashing and Closures: Aluminum sheet alloy and temper of 1100-H14, thickness as require for  
24 proper performance.  
25 1. Minimum Thickness: 0.032 inch Apron Flashing.  
26 2. Minimum Thickness: 0.062 inch Closures.  
27 E. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, non-staining, non-bleeding  
28 fasteners and accessories; compatible with adjacent materials.  
29 1. Aluminum Retaining Cap Fasteners and Framing Members Fasteners: ASTM A 193/A 193M,  
30 Series 300 stainless-steel screws; type as recommended by manufacturer.  
31 2. Connections to Supporting Structure: Series 300 Stainless Steel or ASTM A 307, hot dipped  
32 galvanized steel fasteners by installer.  
33 F. Framing-System Sealants: Single-component, non-sag, high performance, non-priming, gun-grade  
34 elastomeric polyurethane sealant furnished by skylight manufacturer.  
35 1. Sealant complies with ASTM C920, Type S, Grade NS, Class 25, Use T, NT, M, A, G, and O.  
36 G. Bituminous Paint: Cold-applied asphalt mastic paint complying with SSPC-Paint 12, except containing no  
37 asbestos, and formulated for 30-mil thickness per coat.

38 **2.4 ACCESSORY MATERIALS**

- 39 A. Fasteners: Same metal as metal being fastened, nonmagnetic stainless steel, or other noncorrosive metal  
40 as recommended by manufacturer. Finish exposed fasteners to match material being fastened.  
41 1. Where removal of exterior exposed fasteners might allow access to building, provide nonremovable  
42 fastener heads.  
43 B. Bituminous Coating: Cold-applied asphalt mastic, compounded for 15-mildry film thickness per coat.

44 **2.5 ALUMINUM FINISHES**

- 45 A. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

46 **PART 3 - EXECUTION**

47 **3.1 EXAMINATION**

- 48 A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for  
49 compliance with requirements for installation tolerances and other conditions affecting performance of the  
50 Work.  
51 B. Proceed with installation only after unsatisfactory conditions have been corrected.



SECTION 086210

STEEL DOOR REHABILITATION

PART 1 – GENERAL

- 1.1 [SUMMARY](#)
- 1.2 [UNIT PRICES](#)
- 1.3 [DEFINITIONS](#)
- 1.4 [PREINSTALLATION MEETING](#)
- 1.5 [ACTION SUBMITTALS](#)
- 1.6 [QUALITY ASSURANCE](#)

PART 2 – PRODUCTS

- 2.1 [GLASS](#)
- 2.2 [HARDWARE](#)
- 2.3 [CLEANERS](#)
- 2.4 [DOOR FRAME AND SUBFRAME PAINT](#)
- 2.5 [WEATHERSTRIPPING](#)
- 2.6 [MISCELLANEOUS MATERIALS](#)

PART 3 – EXECUTION

- 3.1 [PROTECTION](#)
- 3.2 [REHABILITATION SEQUENCE](#)
- 3.3 [INTERIOR FRAME](#)
- 3.4 [REPLACEMENT OF MISSING SECTIONS](#)
- 3.5 [REPAIRS TO STEEL SECTIONS](#)
- 3.6 [REPAIRS TO CAST IRON](#)
- 3.7 [FINAL CLEANING](#)
- 3.8 [WARRANTY](#)

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes complete rehabilitation of existing, exterior steel doors, frames and decorative grilles. All work will match existing historic details and finishes.
- B. The goal of the rehabilitation work on the exterior steel doors, frames, and decorative grilles is to retain and improve to contemporary standards through repair and alterations while retaining and preserving the original elements, portions and features.
- C. Work shall follow the recommendations of The Secretary of the Interior's Standards for Historic Preservation: Preservation Briefs and Preservation Tech Notes as noted below.
- D. Steel doors, frames and grilles have historically been coated with lead based paint. The removal and proper disposal of such materials shall be the responsibility of the contractor.
- E. All damaged steel will be repaired with new or with rehabilitated salvaged materials to match existing.
- F. Contractor shall provide all required access.
- G. Special Notes:
  - 1. **Preservation Brief 27**, *The Maintenance and Repair of Architectural Cast Iron* provide an overview of methods and materials associated with rehabilitation of cast iron components.

1 1.2

2 1.3 DEFINITIONS

3 A. Rehabilitation: The process of making possible a compatible use through repair and alterations while retaining and  
4 preserving the original elements, portions and features.

5 B. Hand Tool Cleaning: Removes all loose mill scale, loose rust, and other detrimental foreign matter. It is not  
6 intended that adherent mill scale, rust and paint be removed by this process. Mill scale, rust and paint are  
7 considered adherent if they cannot be lifted with a dull putty knife. Before hand tool cleaning, remove visible oil,  
8 grease, soluble residues and salts by the methods outlined in SSPC-SP1. For complete instructions refer to Steel  
9 Structures Paint Council Surface Preparation Specification No. 2 (SSPC-SP2).

10 C. Power Tool Cleaning: Removes all loose mill scale, loose rust, and other detrimental foreign matter. It is not  
11 intended that adherent mill scale, rust and paint be removed by this process. Mill scale, rust and paint are  
12 considered adherent if they cannot be lifted with a dull putty knife. Before power tool cleaning, remove visible oil,  
13 grease, soluble residues and salts by the methods outlined in SSPC-SP1. For complete instructions refer to Steel  
14 Structures Paint Council Surface Preparation Specification No. 3 (SSPC-PC3).

15 1.4 PREINSTALLATION MEETING

16 A. Preinstallation Conference: Conduct conference at Project a minimum of one week in advance of starting mockup.

17 1.5 ACTION SUBMITTALS

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

19 B. Shop Drawings:

- 20 1. Include plans, elevations, sections, and detail drawings describing damage and missing sections,  
21 deterioration and deficiencies doors and grilles and proposed repairs and treatment methods.  
22 2. Include drawings and description of protection.

23 C. Samples:

- 24 1. 6" x12" Paint samples on metal (for both interior metal paint and exterior metal paint)  
25 2. 12" x12" Glass type **GL-1**.  
26 3. Weatherstripping (sealant)  
27  
28

29 1.6 QUALITY ASSURANCE

30 A. Door Rehabilitation Specialist Qualifications: Engage an experienced metals repair firm to perform work of this  
31 Section. Firm shall have completed work similar in material, design, and extent to that indicated for this Project with  
32 a record of successful in-service performance. Firm must have successfully completed three similar projects in the  
33 last five years.

34 B. Rehabilitation Worker Qualifications: Persons who are experienced and specialize in rehabilitation work of types  
35 they will be performing. Workers shall have minimum of three years of documented experience. Key staff shall be  
36 of sufficient number to accomplish the required work with the required project schedule.

37 C. Submit documentation of firm experience, qualifications and worker resumes. Submittals shall include:

- 38 1. Name of firm and location of office.  
39 2. Description and location of a minimum of three required projects.  
40 3. References for five required projects including contact information.

- 1 4. Name of individuals that worked on the five required projects that will work on this project.  
2 5. Brief resumes of individual Rehabilitation workers, including supervisors, proposed for this project.
- 3 D. The owner and the architect will review submittals, check references and project information submitted by the  
4 contractor and determine if the specialist firm and individuals identified meet the qualification requirements as  
5 outlined above. Firms and individuals not meeting the qualifications, as assessed by the owner and architect, will  
6 not be permitted to engage in work of this Section.
- 7 E. Mockups: Refer to Section 014339. Prepare one complete mockup of steel rehabilitation to demonstrate aesthetic  
8 effects and to set quality standards for materials and execution and for repair and rehabilitation. Mock-up shall  
9 include and document every process of the repair, including: steel and cast iron repair, primer, base coat, filler, top  
10 coat, final top coat and sealants.
- 11 1. Construct mockup in location in where directed by Owner and Architect.
- 12 2. Prepare mockup for review and approval by Owner. Correct all conditions noted during review process. Re-  
13 check until approved by Owner, at no additional cost to Owner.
- 14 3. Approved mockup shall become part of the completed Work if undisturbed at time of Substantial  
15 Completion.

16 **PART 2 - PRODUCTS**

17 2.1 GLASS [GL-1]

- 18 A. Provide new glass where existing glass is damaged or missing.
- 19 1. 1/8" clear annealed float glass. Safety glazing shall be used as required by code and correctly labeled on  
20 glass.

21 2.2 DOOR, GRILLE AND RELATED FRAMES AND SUBFRAMES PAINT:

22 A. INTERIOR: **PT-12A**

- 23 a. Interior Primer: Sherwin Williams oil based alkyd slow drying primer, tinted 50% of finish coat.
- 24 b. Interior Finish Coat: Sherwin Williams oil based alkyd, satin finish

25 B. EXTERIOR: **PT-6A**

- 26 a. Exterior Primer: Sherwin Williams, 646-100 HS Epoxy Primer B58-600 Series, tint to 50% final finish, per MPI#  
27 108.
- 28 b. Exterior Finish Coats: First coat, Sherwin Williams Corothane 1 HS Aliphatic Urethane, tint to 75 final finish. 2.0-3.0  
29 DFT. Second coat, Sherwin Williams Corothane 1 HS Aliphatic Urethane, per MPI# 203.

- 30 C. Single-Source Responsibility: Provide primers and undercoat paint produced by the same manufacturer as the finish  
31 coats.

- 32 D. Paint applicators must be manufacturer certified to apply products. Provide documentation of certification.

1 E. MISCELLANEOUS MATERIALS

2 a. Primers, sealers, filling compounds and fasteners. Provide materials required to complete the Work.

3 **PART 3 - EXECUTION**

4 3.1 PROTECTION Provide durable temporary interior and exterior protection for adjacent finishes, surfaces and  
5 materials.

6 A. Provide temporary closure panels for window / door opening to maintain weather tight building.

7 B. If interior and/or exterior finishes, surfaces or materials are damaged by the door rehabilitation process, repair  
8 will be done by the selected subcontractor responsible for damaged areas and paid for by the window  
9 rehabilitation subcontractor by way of credit or subsequent payment applications.

10 3.2 REHABILITATION SEQUENCE

11 A. Determination was made that recognizes that the existing doors are in generally sound condition. The  
12 rehabilitation work of this project includes, but is not limited to, the following:

13 **In Field Work for Interior**

- 14 i. Protect all adjacent finishes, materials and surfaces.  
15 ii. Carefully lightly sand steel and cast iron components to provide a key for new coatings. Remove and loose or  
16 scaling paint.  
17 iii. Coordinate with window exterior contractor relative to repairs to window frames and sash.  
18 iv. Apply tinted primer coat.  
19 v. Apply finish coats.  
20 vi. Discard temporary enclosure and protection.

21 **In Field Work for Exterior**

- 22 i. Protect all adjacent finishes, materials and surfaces.  
23 ii. Provide for collection of chemical strippers and rinse agents.  
24 iii. Carefully strip steel and cast iron components down to either a stable base layer or the original primer coat, not  
25 beyond the original primer coat.  
26 iv. Prepare surfaces by hand tool cleaning.  
27 v. Rinse and neutralize stripper per manufacturers recommendations.  
28 vi. Prepare all new metal surfaces and repairs.  
29 vii. Apply tinted primer coat.  
30 viii. Apply finish coats (2).  
31 ix. Discard temporary enclosure and protection.

32 3.3 INTERIOR FRAME

33 3.4 REPAIRS TO STEEL SECTIONS

- 34 Repairs include:  
35 1. Straightening of warped or bent sections for proper alignment.  
36 2. Polyester based automotive putty for small holes or imperfections  
37 3. Removal and replacement of structurally weakened sections, welding and grinding smooth.  
38 4. Utilize salvaged sections where possible.



1 3.5 REPAIRS TO CAST IRON

2 Non-structural repairs.

3 1. Polyester based automotive putty for small holes or imperfections

4 2. Filler compound containing iron particles in an epoxy resin binder for non-structural cracks.

5 3. Brazing of major cracks with special nickel-alloy welding rods.

6 4. Grind repairs smooth to adjacent surfaces.

7 3.6 FINAL CLEANING

8 A. After rehabilitation the Contractor shall remove all paint spatter, sealants, caulking and other misplaced materials  
9 from all surfaces including adjacent work. The door frame and glass shall be cleaned thoroughly with materials  
10 and methods recommended by the door and glass manufacturers and shall not cause any defacement of the  
11 work.

12 3.7 WARRANTY

13 A. Doors and frames shall be free of rehabilitation and/or material defects for a period of 5 years from date of substantial  
14 completion under normal use and service conditions.  
15  
16

17 **END OF SECTION 08 62 10**

SECTION 087100.00

DOOR HARDWARE

PART 1 – GENERAL

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- 2.11 [LOW ENERGY ELECTRO-HYDRAULIC AUTOMATIC OPERATORS](#)
- 2.12 [KICK PLATES AND MOP PLATE](#)
- 2.13 [OVERHEAD STOPS](#)
- 2.14 [WALL STOPS AND HOLDERS](#)
- 2.15 [WEATHERSTRIP, GASKETING](#)
- 2.16 [THRESHOLDS](#)
- 2.17 [ELECTRIC STRIKES](#)
- 2.18 [POWER SUPPLIES](#)
- 2.19 [DOOR POSITION SWITCHES](#)
- 2.20 [FINISHES AND BASE MATERIALS](#)
- 2.21 [KEYING](#)
- 2.22 [KEY CABINETS](#)

PART 3 – EXECUTION

- 3.1 [EXAMINATION](#)
- 3.2 [INSTALLATION](#)
- 3.3 [FIELD QUALITY CONTROL](#)
- 3.4 [ADJUSTMENT AND CLEANING](#)
- 3.5 [HARDWARE SCHEDULE](#)

1. GENERAL

1.1 CONDITIONS

- A. Conditions of the contract (General and Supplementary Conditions) and Division One General Requirements, govern the work of this section.
- B. This section includes all material, and related service necessary to furnish all finish hardware indicated on the drawings, or specified herein.
- C. Furnish UL listed hardware for all labeled and 20 min. openings in conformance with the requirements for the class of opening scheduled. Underwriters' requirements shall have precedence over specification where conflicts exist.
- D. All work shall be in accordance with all applicable state and local building codes. Code requirements shall have precedence over this specification where conflicts exist.

1 1.2 WORK INCLUDED

- 2 A. This section includes the following:
- 3 1. Furnish door hardware (for hollow metal, wood and aluminum doors) specified herein, listed in the
  - 4 hardware schedule, and/or required by the drawings.
  - 5 2. Cylinders for Aluminum Doors
  - 6 3. Thresholds and Weather-stripping (Aluminum frame seals to be provided by aluminum door supplier)
  - 7 4. Electro-Mechanical Devices
  - 8 5. Access Control components and or systems specified within this section.
- 9 B. Where items of hardware are not definitely or correctly specified and is required for the intended service,
- 10 such omission, error or other discrepancy should be directed to the Architect prior to the bid date for
- 11 clarification by addendum. Otherwise furnish such items in the type and quantity established by this
- 12 specification for the appropriate service intended.

13 1.3 RELATED WORK IN OTHER SECTIONS

- 14 A. This section includes coordination with related work in the following sections:
- 15 1. Division 6 Section "Finish Carpentry".
  - 16 2. Division 6 Section "Cabinet Hardware"
  - 17 3. Division 8 Section "Hollow Metal Doors and Frames".
  - 18 4. Division 8 Section "Wood Doors"
  - 19 5. Division 8 Section "Aluminum Entrances and Storefronts"
  - 20 6. Division 28 Sections "Electrical".

21 1.4 REFERENCES

- 22 A. Publications of agencies and organizations listed below form a part of this specification section to the extent
- 23 referenced.
- 24 1. DHI - Recommended Locations for Builders' Hardware.
  - 25 2. NFPA 80 - Standards for Fire Doors and Windows.
  - 26 3. NFPA 101 - Code for Safety to Life from Fire in Buildings and Structures.
  - 27 4. UL - Building Material Directory.
  - 28 5. DHI - Door and Hardware Institute
  - 29 6. WHI - Warnock Hersey
  - 30 7. BHMA - Builders Hardware Manufacturers Association
  - 31 8. ANSI - American National Standards Institute
  - 32 9. IBC 2009 - International Building Code 2009 Edition (as amended by local building code)

33 1.5 SUBMITTALS

- 34 A. Within ten days after award of contract, submit detailed hardware schedule in quantities as required by
- 35 Division 1 - General Conditions.
- 36 B. Schedule format shall be consistent with recommendations for a vertical format as set forth in the Door &
- 37 Hardware Institute's (DHI) publication "Sequence and Format for the Hardware Schedule". Hardware sets
- 38 shall be consolidated to group multiple door openings which share similar hardware requirements.
- 39 Schedule shall include the following information:
- 40 1. Door number, location, size, handing, and rating.
  - 41 2. Door and frame material, handing.
  - 42 3. Degree of swing.
  - 43 4. Manufacturer
  - 44 5. Product name and catalog number
  - 45 6. Function, type and style
  - 46 7. Size and finish of each item
  - 47 8. Mounting heights
  - 48 9. Explanation of abbreviations, symbols, etc.
  - 49 10. Numerical door index, indicating the hardware set/ group number for each door.

- 1 C. When universal type door closers are to be provided, the schedule shall indicate the application method to  
2 be used for installation at each door: (regular arm, parallel arm, or top jamb).
- 3 D. The schedule will be prepared under the direct supervision of a certified Architectural Hardware Consultant  
4 (AHC) employed by the hardware distributor. The hardware schedule shall be signed and embossed with  
5 the DHI certification seal of the supervising AHC. The supervising AHC shall attend any meetings related to  
6 the project when requested by the architect.
- 7 E. Hardware supplier shall field verify with the Owner all existing doors and frames to remain (including those  
8 to be relocated) for existing hardware suitability to remain I.L.O. specified hardware prior to ordering new  
9 hardware, and check the specified hardware for suitability and adaptability to the details and surrounding  
10 conditions.
- 11 F. Review drawings from related trades as required to verify compatibility with specified hardware. Indicate  
12 unsuitable or in compatible items, and proposed substitutions in the hardware schedule.
- 13 G. Provide documentation for all hardware to be furnished on labeled fire doors indicating compliance with  
14 positive pressure fire testing UL 10C.
- 15 H. Furnish manufacturers' catalog data for each item of hardware in quantities as required by Division 1 -  
16 General Conditions.
- 17 I. Submit a sample of each type of hardware requested by the architect. Samples shall be of the same finish,  
18 style, and function as specified herein. Tag each sample with its permanent location so that it may be used  
19 in the final work.
- 20 J. Furnish with first submittal, a list of required lead times for all hardware items.
- 21 K. After final approved schedule is returned, transmit corrected copies for distribution and field use in  
22 quantities as required by Division 1 - General Conditions.
- 23 L. Furnish approved hardware schedules, template lists, and pertinent templates as requested by related  
24 trades.
- 25 M. Furnish necessary diagrams, schematics, voltage and amperage requirements for all electro-mechanical  
26 devices or systems as required by related trades. Wiring diagrams shall be opening specific and include  
27 both a riser diagram and point to point diagram showing all wiring terminations.
- 28 N. After receipt of approved hardware schedule, Hardware supplier shall initiate a meeting including the  
29 owner's representative to determine keying requirements. Upon completion of the initial key meeting,  
30 hardware supplier shall prepare a proposed key schedule with symbols and abbreviations as set forth in the  
31 door and hardware institute's publication "Keying Procedures, Systems, and Nomenclature". Submit copies  
32 of owner approved key schedule for review and field use in quantities as required by Division 1 - General  
33 Conditions. Wiring diagrams shall be included in final submittals transmitted for distribution and field use.
- 34 1.6 QUALITY ASSURANCE
- 35 A. Manufacturers and model numbers listed are to establish a standard of function and quality. Similar items  
36 by approved manufacturers that are equal in design, function, and quality, may be considered for prior  
37 approval of the architect, provided the required data and physical samples are submitted for approval as set  
38 forth in Division One General Requirements.
- 39 B. Where indicated in this specification, products shall be independently certified by ANSI for compliance with  
40 relevant ANSI/BHMA standards A156.1 - A156.36 – Standards for Hardware and Specialties. All products  
41 shall meet or exceed certification requirements for the respective grade indicated within this specification.  
42 Supplier shall provide evidence of certification when requested by the architect.
- 43 C. Obtain each type of hardware (hinges, latch & locksets, exit devices, closers, etc.) from a single  
44 manufacturer, although several may be indicated as offering products complying with requirements.

- 1 D. Electrical drawings and electrical specifications are based on the specific electrified hardware components  
2 specified in hardware sets. When electronic hardware components other than those indicated in hardware  
3 sets are provided, the supplier shall be responsible for all costs incurred by the design team and their  
4 consultants to review, and revise electrical drawings and electrical specifications. Supplier shall also be  
5 responsible for any additional costs associated with required changes in related equipment, materials,  
6 installation, or final hook up to insure the system will operate and function as indicated in the construction  
7 documents, including hardware set operational / functional descriptions.
- 8 E. All hardware items shall be manufactured no earlier than 6 months prior to delivery to site.
- 9 F. Hardware supplier shall be factory trained and certified by the manufacture to provide and support all  
10 computer managed locks and system components.
- 11 G. Installation of hardware shall be installed or directly supervised and inspected by a skilled installer certified  
12 by the manufacturer of locksets, door closers, and exit devices used on the project, or with not less than 3  
13 years' experience in successful completion of projects similar in size and scope.
- 14 H. Provide hardware for all labeled fire doors, which complies with positive pressure fire testing UL 10C.
- 15 I. Comply with all applicable provisions of the standards referenced within section 1.4 of this specification.
- 16 J. Hardware supplier shall participate when reasonably requested to meet with the contractor and or architect  
17 to inspect any claim for incorrect or non-functioning materials; following such inspection, the hardware  
18 supplier shall provide a written statement documenting the cause and proposed remedy of any unresolved  
19 items.

20 1.7 DELIVERY, STORAGE AND HANDLING

- 21 A. Hardware supplier shall deliver hardware to the job site unless otherwise specified.
- 22 B. All hardware shall be delivered in manufacturers' original cartons and shall be clearly marked with set and  
23 door number.
- 24 C. Coordinate with contractor prior to hardware delivery and recommend secure storage and protection  
25 against loss and damage at job site.
- 26 D. Contractor shall receive all hardware and provide secure and proper protection of all hardware items to  
27 avoid delays caused by lost or damaged hardware. Contractor shall report shortages to the Architect and  
28 hardware supplier immediately after receipt of material at the job site.
- 29 E. Coordinate with related trades under the direction of the contractor for delivery of hardware items  
30 necessary for factory installation.

31 1.8 PRE-INSTALLATION MEETING

- 32 A. Schedule a hardware pre-installation meeting on site to review and discuss the installation of continuous  
33 hinges, locksets, door closers, exit devices, overhead stops, and electromechanical door hardware.
- 34 B. Meeting attendees shall be notified 7 days in advance and shall include: Architect, Contractor, Door  
35 Hardware Installers (including low voltage hardware), Manufacturers representatives for above hardware  
36 items, and any other effected subcontractors or suppliers.
- 37 C. All attendees shall be prepared to distribute installation manuals, hardware schedules, templates, and  
38 physical hardware samples.

39 1.9 WARRANTY

- 40 A. All hardware items shall be warranted against defects in material and workmanship as set forth in Division  
41 One General Requirements.

1 B. Repair, replace, or otherwise correct deficient materials and workmanship without additional cost to owner.

2 PART 2 - PRODUCTS

3 2.1 FASTENERS

4 A. All exposed fasteners shall be Phillips head or as otherwise specified, and shall match the finish of the  
5 adjacent hardware. All fasteners ex-posed to the weather shall be non-ferrous or stainless steel. Furnish  
6 correct fasteners to accommodate surrounding conditions.

7 B. Coordinate required reinforcements for doors and frames. Seek approval of the architect prior to furnishing  
8 through-bolts. Furnish through-bolts as required for materials not readily reinforced.

9 2.2 BUTT HINGES

10 A. Acceptable manufacturers and respective catalog numbers:

	<u>Ives</u>	<u>Stanley</u>	<u>Hager</u>	<u>McKinney</u>
1. Standard Weight, Plain Bearing	5PB1	F179	1279	T2714
2. Standard Weight, Ball Bearing	5BB1	BB179	BB1279	TB2714
3. Standard Weight, Ball Bearing, Non-Ferrous	5BB1	FBB191	BB1191	TB2314
4. Heavy Weight, Ball Bearing	5BB1HW	FBB168	BB1168	T4B3786
5. Heavy Weight, Ball Bearing, Non-Ferrous	5BB1HW	FBB199	BB1199	T4B3386

11 B. Hinges shall be independently certified by ANSI for compliance with ANSI A156.1 (2006). Hinges shall  
12 meet or exceed the following ANSI grade requirements as indicated below:

- 13 1. Standard Weight, Plain Bearing Hinges: Grade 3  
14 2. Standard Weight, 2 Ball Bearing Hinges: Grade 2  
15 3. Heavy Weight, 4 Ball Bearing Hinges: Grade 1

16 C. Unless otherwise specified, furnish the following hinge quantities for each door leaf.

- 17 1. 3 hinges for doors up to 90 inches.  
18 2. 1 additional hinge for every 30 inch on doors over 90 inches.  
19 3. 4 hinges for Dutch door applications.

20 D. Unless otherwise specified, top and bottom hinges shall be located as specified in division 8 Section  
21 "Hollow Metal Doors and Frames". Intermediate hinges shall be located equidistant from others.

22 E. Unless otherwise specified, furnish hinge weight and type as follows:

- 23 1. Standard weight: plain bearing hinge 5PB1 for interior openings through 36 inches wide without a door  
24 closer.  
25 2. Standard weight: ball bearing hinge 5BB1 for interior opening over 36 through 40 inches wide without a  
26 door closer, and for interior openings through 40 inches wide with a door closer.  
27 3. Heavyweight: 4 ball bearing hinge 5BB1HW for interior openings over 40 inches wide, and for all  
28 vestibule doors.  
29 4. Heavyweight: 4 ball bearing hinge 5BB1HWss for exterior openings unless otherwise listed in groups.

30 F. Unless otherwise specified, furnish hinges for exterior doors, fabricated from brass, bronze, or stainless  
31 steel. Unless otherwise specified, hinges for interior doors may be fabricated from steel.

32 G. Unless otherwise specified, furnish hinges in the following sizes:

1. 5" x 5" 2-1/4" thick doors  
2. 4-1/2" x 4-1/2" 1-3/4" thick doors  
3. 3-1/2" x 3-1/2" 1-3/8" thick doors

33 H. Furnish hinges with sufficient width to accommodate trim and allow for 180-degree swing.

1 I. Unless otherwise specified, furnish hinges with flat button tips with non-rising pins at interior doors, non-  
2 removable loose pins (NRP) at exterior and out-swinging interior doors.

3 J. Unless otherwise specified, furnish all hinges to template standards.

4 2.3 CONTINUOUS GEARED HINGES

5 A. Acceptable manufacturers and respective catalog numbers:

	<u>Ives</u>	<u>HAGER</u>	<u>STANLEY</u>
Full Mortise	112HD	780-112HD	661HD

6 B. Hinges shall be independently certified by ANSI for compliance with ANSI A156.26, Grade 1 (2012).

7 C. Continuous hinges shall be geared type hinge providing full height door support up to 600 lbs.

8 D. Hinge shall be non-handed with symmetrical template hole pattern and factory drilled.

9 E. Hinge to be able to carry Warnock Hersey Int. or UL for fire rated doors and frames up to 90 minutes.

10 F. Provide machine screws for doors which have been reinforced to accept machine screws.

11 G. Note: Fire label for doors and frames should be placed on the header and top rail of fire rated doors and  
12 frames.

13 2.4 POWER TRANSFERS

14 A. Acceptable manufacturers and respective catalog numbers:

Von Duprin

1. Concealed Two Wire	EPT-2
2. Concealed Ten Wire	EPT-10
3. Armored Door Cord Four Wire	788C-12
4. Armored Door Cord Four Wire	788C-18

15 B. Door cords shall be armored cable with screw on caps.

16 C. Concealed power transfers shall be concealed in the door and frame when the door is closed.

17 D. Concealed power transfers shall have a steel tube to protect wires from being cut.

18 E. Concealed power transfers with spring tubes shall be rejected.

19 F. Concealed power transfers shall be supplied with a mud box to house all terminations.

20 2.5 FLUSH BOLTS AND DUST PROOF STRIKES

21 A. Acceptable manufacturers and respective catalog numbers:

	<u>Ives</u>	<u>Door Controls</u>	<u>Hager</u>
1. Dust Proof Strike	DP2	80	280X
2. Auto Flush Bolt (Metal Door)	FB31P	842	292D
3. Auto Flush Bolt (Wood Door)	FB41P	942	291D
4. Manual Flush Bolt	FB458	780	282D

22 B. Unless otherwise specified, provide 12" rods for manual flush bolts for door 7'6" or less, 24" top rods for  
23 doors over 7'6" to 8'6".

- 1 C. Unless otherwise specified, provide doors over 8'6" with automatic top bolts.
- 2 D. Provide automatic flush bolts where required to maintain fire door listing and or egress requirements on
- 3 pairs of doors.
- 4 E. All flush-bolt applications shall be UL listed to be installed with top flush-bolt only. Provide auxiliary fire bolt
- 5 as required for fire rated openings where less bottom bolt has been specified.
- 6 F. Provide all bottom flush bolts with non-locking dust proof strikes.

7 2.6 EXIT DEVICES

- 8 A. Acceptable manufacturers and respective catalog numbers:

	<u>Von Duprin</u>	<u>No Substitution</u>
1. Wide Stile, Push Pad	98 / 99 Series	
2. Wide Stile, Electric Latch Retraction (motor driven)	QEL 98 / 99 Series	
3. Lever Trim	996 Series	
4. Pull Trim	990 Series	
5. Pull Trim	550 Series	

- 9 A. Exit devices shall be independently certified by ANSI for compliance with ANSI A156.3, Grade 1 (2008).
- 10 B. Obtain exit devices from a single manufacturer, although several may be indicated as offering products
- 11 complying with requirements.
- 12 C. All exit devices shall be equipped with a sound-dampening feature to reduce touch pad return noise.
- 13 D. Quiet Electric Latch Retraction shall be accomplished using a motor driven assembly, and shall incorporate
- 14 the following features:
  - 15 1. Motor shall retract both the push pad assembly and latchbolt.
  - 16 2. Automatic calibration of latch throw and pull.
  - 17 3. Built-in time delay.
  - 18 4. On-board installation and troubleshooting diagnostics built into power supply and device.
  - 19 5. Retry mode if device does not pull on the first try.
- 20 E. On full glass doors there shall be no exposed fasteners on the back of the mechanism visible through the
- 21 glass.
- 22 F. All exit devices shall be provided with flush end caps to reduce potential damage from impact.
- 23 G. All exit devices shall be provided with dead-locking latch bolts to insure security.
- 24 H. All exit devices shall be U.L. listed for accident hazard. Exit device for use on fire doors shall also be U.L.
- 25 listed for fire exit hardware.
- 26 I. Provide optional strikes, special length rods, and adapter plates to accommodate door and frame
- 27 conditions. Provide narrow style series devices in lieu of wide stile series devices where optional strikes
- 28 will not accommodate door and frame conditions.
- 29 J. Coordinate with related trades to insure adequate clearance and reinforcement is provided in doors and
- 30 frames. Provide thru bolts as required.



- 1 K. Refer to hardware groups for exit device applications utilizing the option of: "less bottom rod and floor  
2 strike" (LBR)
- 3 L. All exit devices shall be provided with optional trim designs to match other lever and pull designs used on  
4 the project.
- 5 M. Unless specific exit device dogging options are noted within hardware sets, provide dogging options as  
6 follows:
- 7 N. Fire Rated devices: Dogging not permitted.
- 8 O. Non-Rated Exit Only functions not equipped with outside trim or pull: Less Dogging.
- 9 P. Non-Rated Classroom functions: Less Dogging.
- 10 Q. Non-Rated devices utilizing electric latch retraction or electrified outside trim: Less Dogging.
- 11 R. All Other Non-Rated devices: Cylinder Dogging utilizing interchangeable core cylinders. Cylinder keyway  
12 shall match locksets furnished on this project.
- 13 S. Provide glass bead kits as required to accommodate door conditions. Screws shall not be visible through  
14 full glass doors.
- 15 T. Where specified, provide compatible keyed mullions with cylinder for pairs of doors.
- 16 U. Provide reinforced crossbars for all traditional style exit devices applied to doors over 36" wide.
- 17 2.7 LOCKS AND LATCHES
- 18 A. Acceptable manufacturers and respective catalog numbers:
- |    | <u>Schlage</u>     | <u>No Substitution</u>           |
|----|--------------------|----------------------------------|
| 19 | 1. Grade 1 Mortise | L Series Latitude x N Escutcheon |
- 20 B. Bored locks shall be independently certified by ANSI for compliance with ANSI A156.2 (2011).  
21 Interconnected locks shall be independently certified by ANSI for compliance with ANSI A156.12 (2013).  
22 Mortise locks shall be independently certified by ANSI for compliance with ANSI A156.13 (2012).
- 23 C. Minimize transmission of heat to lock trim. Provide temperature control modules (TCM) on all electrified  
24 locks when cataloged by the lock manufacturer.
- 25 D. Unless otherwise specified, all locks and latches to have:
- 26 1. 2-3/4" Backset  
27 2. 1/2" minimum throw latchbolt  
28 3. 1" throw deadbolt  
29 4. 6 pin cylinders  
30 5. ANSI A115.2 strikes
- 31 E. Provide guarded latch bolts for all locksets, and latch bolts with sufficient throw to maintain fire rating of  
32 both single and paired door assemblies.
- 33 F. Length of strike lip shall be sufficient to clear surrounding trim.
- 34 G. Provide wrought boxes for strikes at inactive doors, wood frames, and metal frames without integral mortar  
covers.

1 2.8 PULLS, PUSH BARS, PUSH/PULL PLATES

2 A. Acceptable manufacturers and respective catalog numbers:

	<u>Burns</u>	<u>Hager</u>	<u>Ives</u>
1. Straight Pull (1" dia., 10" ctc)	26C	4J	8103-0
2. Straight Pull (3/4" dia., 8" ctc)	25B	3G	8102-8
3. Offset Door Pull (1" dia., 10" ctc)	39C	12J	8190-0
4. Pull / Push-Bar (1" dia., 10" ctc Pull)	422 x 26C	153	9103-0
5. Offset Pull / Push-Bar (1" dia., 10" ctc Pull)	422 x 39C	159	9190-0
6. Push Plate (.050 4" X 16")	54	30S 4 x 16	8200 4 x 16
7. Push Plate (.050 6" X 16")	56	30S 6 x 16	8200 6" X 16"
8. Pull Plate (1" dia., 10" ctc - .050" X 4" X 16")	5426C	34J 4 x 16	8303-0 4" X 16"

3 B. Adjust dimensions of push plates to accommodate stile and rail dimensions, lite and louver cutouts, and  
4 adjacent hardware. Where required by adjacent hardware, push plates shall be factory drilled for cylinders  
5 or other mortised hardware. All push plates shall be beveled 4 sides and counter sunk.

6 C. Where possible, provide back-to-back, and concealed mounting for pulls and push bars. Push bar length  
7 shall be 3" less door width, or center of stile to center of stile for stile & rail or full glass doors.

8 2.9 COORDINATORS

9 A. Acceptable manufacturers and respective catalog numbers:

	<u>Ives</u>	<u>Door Controls</u>	<u>Hager</u>
1. Bar Coordinator	COR x FL	600 x Filler	297D x 297F
2. Mounting Bracket	MB Series	AB, C Series	297 Series

10 B. Provide coordinators at all pairs of doors having automatic flush bolts and closers on the inactive leaf, and  
11 for pairs of doors having vertical rod/mortise exit device combinations with overlapping astragals.

12 C. Provide appropriate filler bars, closer mounting brackets, carry bars, and special top latch preparations as  
13 required by adjacent hardware.

14 2.10 CLOSERS

15 A. Acceptable manufacturers and respective catalog numbers:

<u>LCN</u>	<u>Sargent</u>	<u>No Substitution</u>
1. 4011 /4111 EDA	281 / 281P10 (less PRV valve)	

16 B. Door closers shall be independently certified by ANSI for compliance with ANSI A156.4, Grade 1 (2013).

17 C. Obtain door closers from a single manufacturer, although several may be indicated as offering products  
18 complying with requirements.

19 D. Provide extra heavy duty arm (EDA / HD) when closer is to be installed using parallel arm mounting.

20 E. Hardware supplier shall coordinate with related trades to insure aluminum frame profiles will accommodate  
21 specified door closers.

22 F. Provide "SPECIAL TEMPLATE - #1728 / #0723" closer arms as required to accommodate aluminum frame  
23 head details with "non-structural stops" when closers will be required to utilize parallel arm mounting  
24 positions. Frame mounting shoe shall be shortened, and pivot hub height shall be increased to permit  
25 frame mounted shoe to be positioned on frame rabbit (rather than the frame stop), and behind the frame

- 1 stop rather than on top of the frame stop. Contact LCN Door Closers at: 877-671-7011 for pricing and  
2 design assistance.
- 3 G. Closers shall use high strength cast iron cylinders, forged main arms, and 1 piece forged steel pistons.
- 4 H. Closers shall utilize a stable fluid withstanding temperature range of +120deg F to -30deg F without  
5 seasonal adjustment of closer speed to properly close the door. Closers for fire-rated doors shall be  
6 provided with temperature stabilizing fluid that complies with standards UL10C.
- 7 I. Unless otherwise specified, all door closers shall have full covers and separate adjusting valves for sweeps,  
8 latch, and backcheck.
- 9 J. Provide closers for all labeled doors. Provide closer series and type consistent with other closers for similar  
10 doors specified elsewhere on the project.
- 11 K. Provide closers with adjustable spring power. Size closers to insure exterior and fire rated doors will  
12 consistently close and latch doors under existing conditions. Size all other door closers to allow for reduced  
13 opening force not to exceed 5 lbs.
- 14 L. Install closers on the room side of corridor doors, stair side of stairways and interior side of exterior doors.
- 15 M. Closers shall be furnished complete with all mounting brackets and cover plates as required by door and  
16 frame conditions, and by adjacent hardware.
- 17 N. Door closers shall be provided with a powder coat finish to provide superior protection against the effects of  
18 weathering. Powder coat finish shall successfully pass a 100 hour salt spray test.
- 19 O. Pressure Relief Valve, PRV, shall not be acceptable.

20 2.11 LOW ENERGY ELECTRO-HYDRAULIC AUTOMATIC OPERATORS

- 21 A. Acceptable manufacturers and respective catalog numbers:

	<u>LCN</u>	<u>No Substitution</u>
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1. Electro-Hydraulic Operator	4640	
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- 22 B. Low energy operators shall be independently certified by ANSI for compliance with ANSI A156.19 (2002).
- 23 C. Where low kinetic energy, as defined by ANSI/BHMA Standard A156.19, power operators are indicated for  
24 doors required to be accessible to the disabled, provide electrically powered operators complying with the  
25 ADA for opening force and time to close standards.
- 26 D. The closing action shall be controlled by modern type cast iron door closer cylinder filled with a flat viscosity  
27 fluid, stable from +120F to -30F that would require no seasonal adjustments. The closer shall have field  
28 adjustable spring power; have two independent closing speed adjustment valves, and hydraulic back-  
29 check.
- 30 E. Full closing force shall be provided when the power or assist cycle ends.
- 31 F. All power operator systems shall include the following features and functions:
- 32 1. Provisions for separate conduits to carry high and low voltage wiring in compliance with the National  
33 Electrical Code, section 725-31.
- 34 2. The operator will be designed with an electronically controlled mechanical clutching mechanism to  
35 prevent damage to the operator if the system is actuated while the door is latched or if the door is  
36 forced closed during the opening cycle.

- 1 3. All covers, mounting plates and arm systems shall be powder coated and successfully pass a minimum  
2 of 100 hours testing as outlined in ANSI/BHMA Standard A156.18.
- 3 4. UL listed for use on labeled doors.
- 4 5. All operators shall be non-handed with spring power over a range of at least four sizes; either 1 through  
5 4 or 2 through 5.
- 6 6. The power operator shall incorporate microprocessor controlled digital controls including: factory default  
7 memory settings, on-board diagnostics, non-volatile memory, and integrated delay and relay for  
8 controlling door release devices.
- 9 7. Provisions in the control box or module shall provide control (inputs and outputs) for; electric strike  
10 delay, auxiliary contacts, sequential operation, fire alarms systems, actuators, swing side sensors, and  
11 stop side sensors.
- 12 8. Wall mounted actuators shall consist of a 4-1/2 inch diameter stainless steel touch plate with a blue  
13 filled handicapped symbol. Switches shall be weather resistant and mount on a single gang electrical  
14 box furnished by Division 16.
- 15 G. All electrically powered operators shall include the following features or functions:
- 16 1. When an obstruction or resistance to the opening swing is encountered, the operator will pause at that  
17 point, then attempt to continue opening the door. If the obstruction or resistance remains, the operator  
18 will again pause the door.
- 19 2. Easily accessible main power and maintain hold open switches will be provided on the operator.
- 20 3. An electronically controlled clutch to provide adjustable opening force.
- 21 4. A microprocessor to control all motor and clutch functions.
- 22 5. An on-board power supply capable of delivering both 12V and 24V outputs up to a maximum of 1.0  
23 ampere combined load.
- 24 6. All input and output power wiring shall be protected by slow blow fuses. These fuses shall be easily  
25 replaceable without special tools or component replacement.
- 26 7. If electrical failure occurs, the unit shall operate as a standard door closer.
- 27 H. Power Operators shall be warranted by the manufacturer to be free from defects in material and  
28 workmanship for a period of two years.
- 29 2.12 KICK PLATES AND MOP PLATES
- 30 A. Furnish protective plates as specified in hardware groups.
- 31 B. Where specified, provide 10" kick plates, 34" armor plates, and 4" mop plates. Unless otherwise specified,  
32 metal protective plates shall be .050" thick; plastic plates shall be 1/8" thick.
- 33 C. Protective plates shall be 2" less door width, or 1" less door width at pairs. All protective plates shall be  
34 beveled 4 sides and counter sunk. Protection plates over 16" shall not be provided for labeled doors unless  
35 specifically approved by door manufacturers listing.
- 36 D. Where specified, provide surface mounted door edges. Edges shall butt to protective plates. Provide  
37 edges with cutouts as required adjacent hardware.

1 E. Adjust dimensions of protection plates to accommodate stile and rail dimensions, lite and louver cutouts,  
2 and adjacent hardware. Where required by adjacent hardware, protection plates shall be factory drilled for  
3 cylinders or other mortised hardware.

4 2.13 OVERHEAD STOPS

5 A. Acceptable manufacturers and respective catalog numbers:

	<u>Glynn-Johnson</u>	<u>Rixson</u>	<u>Sargent</u>
1. Heavy Duty Surface Mount	GJ900 Series	9 Series	590
2. Heavy Duty Concealed Mount	GJ100 Series	1 Series	690
3. Medium Duty Surface Mount	GJ450 Series	10 Series	1540
4. Medium Duty Concealed Mount	GJ410	2 Series	1530

6 B. Unless otherwise specified, furnish GJ900 series overhead stop for hollow metal or 1-3/4" solid core doors  
7 equipped with regular arm surface type closers that swing more than 140 degrees before striking a wall, for  
8 hollow metal or 1-3/4" solid core doors that open against equipment, casework, sidelights, or other objects  
9 that would make wall bumpers inappropriate, and as specified in hardware groups.

10 C. Furnish sex bolt attachments for wood and mineral core doors unless doors are supplied with proper  
11 reinforcing blocks.

12 D. Provide special stop only ("SE" suffix) overhead stops when used in conjunction with electronic hold open  
13 closers.

14 E. Do not provide holder function for labeled doors.

15 2.14 WALL STOPS AND HOLDERS

16 A. Acceptable manufacturers and respective catalog numbers:

	<u>Ives</u>	<u>Hager</u>	<u>Burns</u>
1. Wrought Convex Wall Bumper	WS406CVX	232W	570
2. Wrought Concave Wall Bumper	WS406CCV	236W	575
3. Extended Wall Stop	WS11/WS11X	255W	530
4. Extended Wall Stop	WS33/WS33X	****	****
5. Automatic Wall Holder	WS40	326W	533
6. Hinge Pin Stop	70	****	****

17 B. Furnish a stop or holder for all doors. Furnish floor stops or hinge pin stops only where specifically  
18 specified.

19 C. Where wall stops are not applicable, furnish overhead stops.

20 D. Do not provide holder function for labeled doors.

21 2.15 MAGNETIC HOLD OPENS

22 A. Acceptable manufacturers and respective catalog numbers:

	<u>LCN</u>	<u>ABH</u>	<u>Edwards</u>
1. Wall Holder	SEM 7800	2000	1500

23 B. Magnetic hold opens shall be independently certified by ANSI for compliance with ANSI A156.15, Grade 1  
24 (2006).

25 C. Magnetic holder's housing and armature shall be constructed of a die cast zinc material.

- 1 D. Provide types as listed in groups.
- 2 E. Where wall conditions do not permit the armature to reach the magnet, provide extensions.
- 3 F. Provide proper voltage and power consumption as required by Division 16.
- 4 G. Coordinate electrical requirements and mounting locations with other trades.

5 **2.16 WEATHERSTRIP, GASKETING**

- 6 A. Acceptable manufacturers and respective catalog numbers:

	<u>Zero</u>	<u>Pemko</u>	<u>NGP</u>	<u>Reese</u>
1. Weatherstrip	429	2891_PK	700NA	755
2. Adhesive Gasket	188	S88	5050	797
3. Mullion Seal/Silencer	8780	5110	5100N	
4. Meeting Edge Seals	8193	18041	9605	959
5. Adhesive Edge Seal	****	S77	5060	****
6. Automatic Door Bottom (Surface Mtd.)	321	4131	222	320
7. Automatic Door Bottom (HD Concealed) (When Sealing Against A Solid Surface)	360	434_RL	423N	430
8. Automatic Door Bottom (HD Concealed) (When Sealing Against Carpet)	360	434_NBL	683	943
9. Automatic Door Bottom	355	420APKL	320N	372A
10. Sweeps	8192	18061_NB	B606	964
11. Sweep w/ drip	8198	345_N	C627	354
12. Drip Cap	142	346	16	R201

- 7 B. Weatherstrip and gasketing shall be independently certified by ANSI for compliance with ANSI A156.22
- 8 (2005).
- 9 C. Where specified in the hardware groups, furnish the above products unless otherwise detailed in groups.
- 10 D. Provide weatherstripping all exterior doors and where specified.
- 11 E. Provide intumescent and other required edge sealing systems as required by individual fire door listings to
- 12 comply with positive pressure standards UL 10C.
- 13 F. Provide Zero 188 smoke gaskets at all fire rated doors and smoke and draft control assemblies.
- 14 G. Provide gasketing for all meeting edges on pairs of fire doors. Gasketing shall be compatible with astragal
- 15 design provided by door supplier as required for specific fire door listings.

16 **2.17 THRESHOLDS**

- 17 A. Acceptable manufacturers and respective catalog numbers:

	<u>Zero</u>	<u>Pemko</u>	<u>NGP</u>	<u>Reese</u>
1. Saddle Thresholds	8655	171	425	S205
2. Half Saddle Thresholds	1674	227	324	S239
3. Interlocking Threshold	74A	114	442-5	T550

- 18 B. Thresholds shall be independently certified by ANSI for compliance with ANSI A156.21 (2001).
- 19 C. Hardware supplier shall verify all finish floor conditions and coordinate proper threshold as required to
- 20 insure a smooth transition between threshold and interior floor finish.
- 21 D. Threshold Types:

- 1 1. Unless otherwise specified, provide saddle threshold similar to Zero 8655 for all exterior openings with  
2 an interior floor finish less than or equal to 1/4" in height.
- 3 2. Unless otherwise specified, provide half saddle threshold similar to Zero 1674 for all exterior openings  
4 with an interior floor finish greater than 1/4" in height. Threshold height shall match thickness of interior  
5 floor finish.

6 2.18 ELECTRIC STRIKES

- 7 A. Acceptable manufacturers and respective catalog numbers:

Von Duprin      Folger Adams

1. Type 1      6000 Series      300 Series

- 8 B. Provide electric strikes designed for use with the type of locks shown at each opening where specified.

- 9 C. Electric strikes shall be UL listed as Burglary-Resistant Electric Door Strikes and where required shall be  
10 UL listed as Electric Strike for Fire Doors.

- 11 D. Provide transformers and rectifiers for each strike as required. Verify voltage with electrical contractor.

12 2.19 POWER SUPPLIES

- 13 A. Provide quantities and types as specified in hardware sets. Shared power supplies will not be accepted  
14 without prior approval from the owner.

- 15 B. All power supplies shall have the following features:

- 16 1. 12/24 VDC Output, field selectable.  
17 2. Class 2 Rated power limited output.  
18 3. Universal 120-240 VAC input.  
19 4. Low voltage DC, regulated and filtered.  
20 5. Polarized connector for distribution boards.  
21 6. Fused primary input.  
22 7. AC input and DC output monitoring circuit w/LED indicators.  
23 8. Cover mounted AC Input indication.  
24 9. Tested and certified to meet UL294.  
25 10. NEMA 1 enclosure.  
26 11. Hinged cover w/lock down screws.  
27 12. High voltage protective cover.

- 28 C. All power supplies shall incorporate fused distribution boards.

- 29 D. All electro-mechanical systems requiring fail safe circuits shall be capable of interfacing with the fire alarm  
30 system to cut power to appropriate system components. Unless already provided in another system  
31 component, all power supplies utilized in fail safe circuits shall include an integral relay which when  
32 connected to the N/C fire alarm contact will cut power to all openings connected to the individual power  
33 supply. Power supply, unless otherwise specified, will automatically reset itself when fire alarm relay returns  
34 to normal state following a fire alarm.

35 2.20 DOOR POSITION SWITCHES

- 36 A. Acceptable manufacturers and respective catalog numbers:

Schlage Electronics      Sentrol      Sargent

1. Concealed (wood & hollow metal doors)      679 Series      1076W      3287

2. Concealed (aluminum doors) 7764 \*\*\*\*\* \*\*\*\*

1 2.21 FINISHES AND BASE MATERIALS

2 A. All hollow metal doors and aluminum doors shall be provided with satin chrome hardware with the  
3 exception of the front metal door areas at Doty, MLK, and Wilson which shall be provided with bronze  
4 hardware. All wood doors shall be provided with bronze hardware.

5 B. Unless otherwise indicated in the hardware groups or herein, hardware finishes shall be applied over base  
6 metals as specified in the following finish schedule:

HARDWARE ITEM	<u>SATIN CHROME</u>	<u>SATIN BRASS</u>
	<u>BHMA FINISH AND BASE MATERIAL</u>	<u>BHMA FINISH AND BASE MATERIAL</u>
1. Butt Hinges: Exterior, or Non-Ferrous	630 (US32D - Satin Stainless Steel)	606 (US4 - Satin Brass)
2. Butt Hinges: Interior	652 (US26D - Satin Chromium)	633 (US4 - Satin Brass)
3. Continuous Hinges	628 (US28 – Anodized Clear Aluminum)	688 (US4 Gold Anodized)
4. Flush Bolts	626 (US26D - Satin Chromium)	606 (US4 - Satin Brass)
5. Exit Devices and Exit Device Trim	626 (US26D - Satin Chromium)	606 (US4 - Satin Brass)
6. Locks and Latches	626 (US26D - Satin Chromium)	606 (US4 - Satin Brass)
7. Pulls and Push Plates/Bars	630 (US32D - Satin Stainless Steel)	606 (US4 - Satin Brass)
8. Coordinators	600 (Prime painted or mill alum.)	600 (Prime painted)
9. Closers	689 (Powder Coat Aluminum)	696 (Powder Coat Brass)
10. Protective Plates	630 (US32D - Satin Stainless Steel)	606 (US4 - Satin Brass)
11. Overhead Stops	630 (US32D - Satin Stainless Steel)	606 (US4 - Satin Brass)
12. Wall Stops and Holders	630 (US32D - Satin Stainless Steel)	606 (US4 - Satin Brass)
13. Thresholds	628 (Mill Aluminum)	628 (Mill Aluminum)
14. Weather-strip, Sweeps Drip Caps (wood and hollow metal doors)	Aluminum Anodized	Gold Anodized
15. Weather-strip, Sweeps Drip Caps (aluminum doors)	Match finish of aluminum doors.	Match finish of aluminum doors.
16. Magnetic Holders	Sprayed Aluminum	Sprayed Aluminum
17. Magnetic Locks	628 (US28)	606 (US4 - Satin Brass)
18. Miscellaneous	626 (US26D - Satin Chromium)	606 (US4 - Satin Brass)

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8

9 2.22 KEYING

- 10 A. Provide all cylinders in keyways as required to accommodate owners existing key system.
- 11 B. All locks under this section shall be keyed as directed by the owner to an existing Master Key System.
- 12 C. Furnish a total of 2 keys per cylinder. Actual cut keys to be determined by owner.
- 13 D. Master keys, control keys, and change keys shall be delivered by registered mail to the owner.  
14 Construction keys shall be delivered to the contractor.

15 2.23 KEY CABINETS

16 A. Acceptable manufacturers and respective catalog numbers:

<u>Lund</u>	<u>Key Control</u>	<u>Telkee</u>
1. 1200-1205 AA	M228-2480	RWC-AWC



- 1 B. Furnish 1 each model 1200 or 1205 AA key cabinet with a capacity 1.5 times the number of key sets.
- 2 C. Provide one key cabinet with at least one hook for each key set, plus additional hooks for 50% expansion.
- 3 D. Furnish key cabinet complete with cam lock, permanent key tags, and change key cards.
- 4 E. Hardware supplier shall prepare all key change index records, tag all keys and place permanent file keys in  
5 cabinet.

6 **PART 3 - EXECUTION**

7 **3.1 EXAMINATION**

- 8 A. Prior to installation of hardware, installer shall examine door frame installation to insure frames have been  
9 set square and plumb. Installer shall examine doors, door frames, and adjacent wall, floor, and ceiling for  
10 conditions, which would adversely affect proper operation and function of door assemblies. Do not proceed  
11 with hardware installation until such deficiencies have been corrected.

12 **3.2 INSTALLATION**

- 13 A. Before hardware installation, general contractor/construction manager shall coordinate a hardware  
14 installation seminar with a 1 week notice to all parties involved. The seminar is to be conducted on the  
15 installation of hardware, specifically of locksets, closers, exit devices, continuous hinges and overhead  
16 stops. Manufacturer's representative of the above products to present seminar. Seminar to be held at the  
17 job site and attended by installers of hardware (including low voltage hardware) for aluminum, hollow metal  
18 and wood doors. Training to include use of installation manuals, hardware schedule, templates and  
19 physical products samples.
- 20 B. Install all hardware in accordance with the approved hardware schedule and manufacturers instructions for  
21 installation and adjustment.
- 22 C. Set units level, plumb and true to the line and location. Adjust and reinforce the attachment substrate as  
23 necessary for proper installation and operation.
- 24 D. Drill and countersink units which are not factory-prepared for anchorage fasteners. Space fasteners and  
25 anchors in accord with industry standards.
- 26 E. Drill appropriate size pilot holes for all hardware attached to wood doors and frames.
- 27 F. Shim doors as required to maintain proper operating clearance between door and frame.
- 28 G. Unless otherwise specified, locate all hardware in accordance with the recommended locations for builders  
29 hardware for standard doors and frames as published by the Door and Hardware Institute.
- 30 H. Use only fasteners supplied by or approved by the manufacturer for each respective item of hardware.
- 31 I. Mortise and cut to close tolerance and conceal evidence of cutting in the finished work.
- 32 J. Conceal push and pull bar fasteners where possible. Do not install through bolts through push plates.
- 33 K. Install hardware on UL labeled openings in accordance with manufacturer's requirements to maintain the  
34 label.
- 35 L. Apply self-adhesive gasketing on frame stop at head & latch side and on rabbet of frame at hinge side.
- 36 M. Install hardware in accordance with supplemental "S" label instructions on all fire rated openings.
- 37 N. Install wall stops to contact lever handles or pulls. Do not mount wall stops on casework, or equipment.

- 1 O. Where necessary, adjust doors and hardware as required to eliminate binding between strike and latchbolt.  
2 Doors should not rattle.
- 3 P. Overhead stops used in conjunction with electrified hold open closers shall be templated and installed to  
4 coincide with engagement of closer hold open position.
- 5 Q. Install door closers on corridor side of lobby doors, room side of corridor doors, and stair side of stairways.
- 6 R. Adjust spring power of door closers to the minimum force required to insure exterior and fire rated doors will  
7 consistently close and latch doors under existing conditions. Adjust all other door closers to insure opening  
8 force does not to exceed 5 lbs.
- 9 S. Adjust "sweep", "latch", & "back check" valves on all door closers to properly control door throughout the  
10 opening and closing cycle. Adjust total closing speed as required to comply with all applicable state and  
11 local building codes.
- 12 T. Install "hardware compatible" (bar stock) type weatherstripping continuously for an uninterrupted  
13 seal. Adjust templating for parallel arm door closers, exit devices, etc., as required to accommodate  
14 weatherstripping.
- 15 U. Unless otherwise specified or detailed, install thresholds with the bevel in vertical alignment with the outside  
16 door face. Notch and closely fit thresholds to frame profile. Set thresholds in full bed of sealant.
- 17 V. Compress sweep during installation as recommended by sweep manufacturer to facilitate a water resistant  
18 seal.
- 19 W. Deliver to the owner 1 complete set of installation and adjustment instructions, and tools as furnished with  
20 the hardware.

21 3.3 FIELD QUALITY CONTROL

- 22 A. After installation has been completed, the hardware supplier and manufacturers representative for locksets,  
23 door closers, exit devices, and overhead stops shall check the project and verify compliance with  
24 installation instructions, adjustment of all hardware items, and proper application according to the approved  
25 hardware schedule. Hardware supplier shall submit a list of all hardware that has not been installed  
26 correctly.
- 27 B. After installation has been completed, the hardware supplier and manufacturers representative shall meet  
28 with the owner to explain the functions, uses, adjustment, and maintenance of each item of hardware.  
29 Hardware supplier shall provide the owner with a copy of all wiring diagrams. Wiring diagrams shall be  
30 opening specific and include both a riser diagram and point to point diagram showing all wiring  
31 terminations.

32 3.4 ADJUSTMENT AND CLEANING

- 33 A. At final completion, and when H.V.A.C. equipment is in operation, installer shall make final adjustments to  
34 and verify proper operation of all door closers and other items of hardware. . Lubricate moving parts with  
35 type lubrication recommended by the manufacturer.
- 36 B. All hardware shall be left clean and in good operation. Hardware found to be disfigured, defective, or  
37 inoperative shall be repaired or replaced.

38 3.5 HARDWARE SCHEDULE

- 39 A. The following schedule of hardware groups are intended to describe opening function. The hardware  
40 supplier is cautioned to refer to the preamble of this specification for a complete description of all materials  
41 and services to be furnished under this section.

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**HW SET: 01**

1	EA	CONT. HINGE	112HD	IVE
1	EA	CLASSROOM LOCK	L9070	SCH
1	EA	WALL STOP	WS406/407CVX	IVE

FUNCTION: L9070 (F05) Classroom Lock  
Latchbolt retracted by lever from either side unless outside is locked by key. Unlocked from outside by key. Inside lever always free for immediate exit. Auxiliary latch deadlocks latchbolt when door is closed.

**HW SET: 01A**

1	EA	CONT. HINGE	112HD	IVE
1	EA	PASSAGE SET	L9010	SCH
1	EA	WALL STOP	WS406/407CVX	IVE

FUNCTION: L9010 (F01) Passage Latch  
Latchbolt retracted by lever from either side at all times.

**HW SET: 01B**

1	EA	CONT. HINGE	112HD	IVE
1	EA	PASSAGE SET	L9010	SCH
1	EA	OH STOP	90S	GLY

FUNCTION: L9010 (F01) Passage Latch  
Latchbolt retracted by lever from either side at all times.

**HW SET: 06**

1	EA	CONT. HINGE	112HD	IVE
1	EA	INSTITUTION LOCK	L9082	SCH
1	EA	WALL STOP	WS406/407CVX	IVE

FUNCTION: L9082 Institution Lock  
Latchbolt retracted by key from either side. Lever on both sides always inoperative. Auxiliary latch deadlocks latchbolt when door is closed.

Hardware supplier shall field verify existing door and frame will accommodate specified hardware.

**HW SET: 07**

**MSR, LTD  
24 MARCH 2017**

1

1	EA	CONT. HINGE	112HD	IVE
1	EA	STOREROOM LOCK	L9080	SCH
1	EA	OH STOP	90S	GLY

2

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FUNCTION: L9080 (F07) Storeroom Lock

4

Latchbolt retracted by key outside or by lever inside. Outside lever always inoperative. Auxiliary latch deadlocks latchbolt when door is closed.

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**HW SET: 09**

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2	EA	CONT. HINGE	112HD	IVE
2	EA	MANUAL FLUSH BOLT	FB458	IVE
1	EA	DUST PROOF STRIKE	DP2	IVE
1	EA	STOREROOM LOCK	L9080	SCH
2	EA	OH STOP	90S	GLY
1	EA	OVERLAP ASTRAGAL	(BY DOOR SUPPLIER)	

11

12

FUNCTION: L9080 (F07) Storeroom Lock

13

Latchbolt retracted by key outside or by lever inside. Outside lever always inoperative. Auxiliary latch deadlocks latchbolt when door is closed.

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**HW SET: 10**

19

1	EA	CONT. HINGE	112HD	IVE
1	EA	PASSAGE SET	L9010	SCH
1	EA	SURFACE CLOSER	4011 / 4111 EDA	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B4E CS	IVE
1	EA	WALL STOP	WS406/407CVX	IVE
1	EA	SMOKE SEAL	188S (AT RATED OR SMOKE & DRAFT CONTROL DRS ONLY)	ZER

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FUNCTION: L9010 (F01) Passage Latch

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Latchbolt retracted by lever from either side at all times.

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26

**HW SET: 11A**

27

1	EA	CONT. HINGE	112HD	IVE
1	EA	PASSAGE SET	L9010	SCH
1	EA	SURFACE CLOSER	4111 SCUSH	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B4E CS	IVE
1	EA	SMOKE SEAL	188S (AT RATED OR SMOKE & DRAFT CONTROL DRS ONLY)	ZER

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FUNCTION: L9010 (F01) Passage Latch

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Latchbolt retracted by lever from either side at all times.

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**HW SET: 11B**

1	EA	OH STOP	90S	GLY
1	EA	SURFACE CLOSER	4011	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B4E CS	IVE

Balance of hardware by acoustical assembly provider.

**HW SET: 11C**

1	EA	SURFACE CLOSER	4111 SCUSH	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B4E CS	IVE
1	EA	SMOKE SEAL	188S (AT RATED OR SMOKE & DRAFT CONTROL DRS ONLY)	ZER

Balance of hardware by acoustical assembly provider.

**HW SET: 13**

1	EA	CONT. HINGE	112HD	IVE
1	EA	CLASSROOM LOCK	L9070	SCH
1	EA	SURFACE CLOSER	4011 / 4111 EDA	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B4E CS	IVE
1	EA	WALL STOP	WS406/407CVX	IVE
1	EA	SMOKE SEAL	188S (AT RATED OR SMOKE & DRAFT CONTROL DRS ONLY)	ZER

FUNCTION: L9070 (F05) Classroom Lock  
Latchbolt retracted by lever from either side unless outside is locked by key. Unlocked from outside by key. Inside lever always free for immediate exit. Auxiliary latch deadlocks latchbolt when door is closed.

**HW SET: 17**

1	EA	CONT. HINGE	112HD	IVE
1	EA	CLASSROOM LOCK	L9070	SCH
1	EA	OH STOP	90S	GLY
1	EA	SURFACE CLOSER	4011 / 4111 EDA	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B4E CS	IVE
1	EA	SMOKE SEAL	188S (AT RATED OR SMOKE & DRAFT CONTROL DRS ONLY)	ZER

FUNCTION: L9070 (F05) Classroom Lock  
Latchbolt retracted by lever from either side unless outside is locked by key. Unlocked from outside by key. Inside lever always free for immediate exit. Auxiliary latch deadlocks latchbolt when door is closed.

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Hardware supplier shall field verify existing door and frame will accommodate specified hardware.

**HW SET: 18**

1	EA	CONT. HINGE	112HD	IVE
1	EA	CLASSROOM LOCK	L9070	SCH
1	EA	SURFACE CLOSER	4011 / 4111 EDA	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B4E CS	IVE
1	EA	WALL STOP	WS406/407CVX	IVE
1	EA	SMOKE SEAL	188S (AT RATED OR SMOKE & DRAFT CONTROL DRS ONLY)	ZER

FUNCTION: L9070 (F05) Classroom Lock  
Latchbolt retracted by lever from either side unless outside is locked by key. Unlocked from outside by key. Inside lever always free for immediate exit. Auxiliary latch deadlocks latchbolt when door is closed.

Hardware supplier shall field verify existing door and frame will accommodate specified hardware.

**HW SET: 19**

1	EA	CONT. HINGE	112HD	IVE
1	EA	STOREROOM LOCK	L9080	SCH
1	EA	SURFACE CLOSER	4011 / 4111 EDA	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B4E CS	IVE
1	EA	WALL STOP	WS406/407CVX	IVE
1	EA	SMOKE SEAL	188S (AT RATED OR SMOKE & DRAFT CONTROL DRS ONLY)	ZER

FUNCTION: L9080 (F07) Storeroom Lock  
Latchbolt retracted by key outside or by lever inside. Outside lever always inoperative. Auxiliary latch deadlocks latchbolt when door is closed.

**HW SET: 20**

1	EA	CONT. HINGE	112HD	IVE
1	EA	STOREROOM LOCK	L9080	SCH
1	EA	OH STOP	90S	GLY
1	EA	SURFACE CLOSER	4011 / 4111 EDA	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B4E CS	IVE
1	EA	SMOKE SEAL	188S (AT RATED OR SMOKE & DRAFT CONTROL DRS ONLY)	ZER

FUNCTION: L9080 (F07) Storeroom Lock  
Latchbolt retracted by key outside or by lever inside. Outside lever always inoperative. Auxiliary latch deadlocks latchbolt when door is closed.

1 **HW SET: 20A**

2

1	EA	CONT. HINGE	112HD	IVE
1	EA	STOREROOM LOCK	L9080	SCH
1	EA	OH STOP	90S	GLY
1	EA	SURFACE CLOSER	4011 / 4111 EDA	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B4E CS	IVE
1	EA	SMOKE SEAL	188S (AT RATED OR SMOKE & DRAFT CONTROL DRS ONLY)	ZER
1	EA	DOOR CONTACT	679 SERIES	SCE

3

4 FUNCTION: L9080 (F07) Storeroom Lock

5 Latchbolt retracted by key outside or by lever inside. Outside lever always inoperative. Auxiliary latch deadlocks latchbolt when door is closed.

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10 **HW SET: 21A**

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1	EA	CONT. HINGE	112HD	IVE
1	EA	STOREROOM LOCK	L9080	SCH
1	EA	OH STOP	90S	GLY
1	EA	SURFACE CLOSER	4011 / 4111 EDA	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B4E CS	IVE
1	EA	SMOKE SEALS	188S (AT RATED OR SMOKE & DRAFT CONTROL DRS ONLY)	ZER

12

13 FUNCTION: L9080 (F07) Storeroom Lock

14 Latchbolt retracted by key outside or by lever inside. Outside lever always inoperative. Auxiliary latch deadlocks latchbolt when door is closed.

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17 Hardware supplier shall field verify existing door and frame will accommodate specified hardware.

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21 **HW SET: 23**

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1	EA	CONT. HINGE	112HD	IVE
1	EA	PRIVACY W/DB & IND	L9496 L583-363	SCH
1	EA	SURFACE CLOSER	4011 / 4111 EDA	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B4E CS	IVE
1	EA	WALL STOP	WS406/407CVX	IVE
1	EA	SEALS	188S	ZER

23

24 FUNCTION: L9496 Privacy With "OCCUPIED" Indicator

25 Lever retracts latchbolt from either side. Deadbolt thrown or retracted by key outside (retraction by key required in the event of an emergency) or inside thumbturn. Throwing deadbolt locks outside lever and displays "OCCUPIED" plate.

26 Rotating inside lever simultaneously retracts both deadbolt and latchbolt and unlocks outside lever.

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31 **HW SET: 24**

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**24 MARCH 2017**

1	EA	CONT. HINGE	112HD	IVE
1	EA	PRIVACY W/DB & IND	L9496 L583-363	SCH
1	EA	SURFACE CLOSER	4011 / 4111 EDA	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B4E CS	IVE
1	EA	WALL STOP	WS406/407CVX	IVE
1	EA	SEALS	188S	ZER

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FUNCTION: L9496 Privacy With "OCCUPIED" Indicator  
 Lever retracts latchbolt from either side. Deadbolt thrown or retracted by key outside (retraction by key required in the event of an emergency) or inside thumbturn. Throwing deadbolt locks outside lever and displays "OCCUPIED" plate. Rotating inside lever simultaneously retracts both deadbolt and latchbolt and unlocks outside lever.  
 Hardware supplier shall field verify existing door and frame will accommodate specified hardware.

**HW SET: 25A**

12

1	EA	CONT. HINGE	112HD	IVE
1	EA	PRIVACY W/DB & IND	L9496 L583-363	SCH
1	EA	SURFACE CLOSER	4111 SCUSH	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B4E CS	IVE
1	EA	SEALS	188S	ZER

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FUNCTION: L9496 Privacy With "OCCUPIED" Indicator  
 Lever retracts latchbolt from either side. Deadbolt thrown or retracted by key outside (retraction by key required in the event of an emergency) or inside thumbturn. Throwing deadbolt locks outside lever and displays "OCCUPIED" plate. Rotating inside lever simultaneously retracts both deadbolt and latchbolt and unlocks outside lever.

**HW SET: 26B**

22

2	EA	SURFACE CLOSER	4011 / 4111 EDA	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B4E CS	IVE
2	EA	WALL STOP	WS406/407CCV	IVE

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Balance of hardware by acoustical assembly provider.

**HW SET: 28**

29

2	EA	CONT. HINGE	112HD	IVE
1	SET	AUTO FLUSH BOLT	FB31P / FB41P	IVE
1	EA	DUST PROOF STRIKE	DP2	IVE
1	EA	STOREROOM LOCK	L9080	SCH
1	EA	COORDINATOR	COR X FL	IVE
1	EA	SURFACE CLOSER	4011 / 4111 EDA	LCN
1	EA	SURFACE CLOSER	4111 SCUSH	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B4E CS	IVE
1	EA	WALL STOP	WS406/407CCV	IVE
1	EA	SMOKE SEAL	188S (AT RATED OR SMOKE & DRAFT CONTROL DRS ONLY)	ZER
1	EA	OVERLAP ASTRAGAL	(BY DOOR SUPPLIER)	



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1 EA MEETING EDGE SEALS 188S (AT RATED OR SMOKE & DRAFT CONTROL DRS ONLY) ZER

1  
2 FUNCTION: L9080 (F07) Storeroom Lock  
3 Latchbolt retracted by key outside or by lever inside. Outside lever always inoperative. Auxiliary latch deadlocks  
4 latchbolt when door is closed.  
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8 **HW SET: 28B**

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1 EA INTERCHANGEABLE CORE CYLINDER AS REQUIRED SCH  
2 EA SURFACE CLOSER 4021 LCN  
2 EA KICK PLATE 8400 10" X 1" LDW B4E CS IVE  
1 EA WALL STOP WS406/407CCV IVE

Balance of hardware by acoustical assembly provider.

15 **HW SET: 29**

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25  
2 EA CONT. HINGE 112HD IVE  
1 SET AUTO FLUSH BOLT FB31P / FB41P IVE  
1 EA DUST PROOF STRIKE DP2 IVE  
1 EA STOREROOM LOCK L9080 SCH  
1 EA COORDINATOR COR X FL IVE  
2 EA SURFACE CLOSER 4111 SCUSH LCN  
2 EA KICK PLATE 8400 10" X 1" LDW B4E CS IVE  
1 EA SMOKE SEAL 188S (AT RATED OR SMOKE & DRAFT CONTROL DRS ONLY) ZER  
1 EA OVERLAP ASTRAGAL (BY DOOR SUPPLIER)  
1 EA MEETING EDGE SEALS 188S (AT RATED OR SMOKE & DRAFT CONTROL DRS ONLY) ZER

17  
18 FUNCTION: L9080 (F07) Storeroom Lock  
19 Latchbolt retracted by key outside or by lever inside. Outside lever always inoperative. Auxiliary latch deadlocks  
20 latchbolt when door is closed.  
21  
22  
23

24 **HW SET: 30**

25  
1 EA CONT. HINGE 112HD IVE  
1 EA CONT. HINGE 112HD EPT IVE  
1 SET AUTO FLUSH BOLT FB31P / FB41P IVE  
1 EA DUST PROOF STRIKE DP2 IVE  
1 EA EU MORTISE LOCK L9092EU SCH  
1 EA COORDINATOR COR X FL IVE  
2 EA SURFACE CLOSER 4111 SCUSH LCN  
2 EA KICK PLATE 8400 10" X 1" LDW B4E CS IVE  
1 EA SMOKE SEAL 188S (AT RATED OR SMOKE & DRAFT CONTROL DRS ONLY) ZER  
1 EA OVERLAP ASTRAGAL (BY DOOR SUPPLIER)

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1	EA	MEETING EDGE SEALS	188S (AT RATED OR SMOKE & DRAFT CONTROL DRS ONLY)	ZER
		CREDENTIAL READER	(BY TECHNOLOGY CONTRACTOR)	
2	EA	DOOR CONTACT	679 SERIES	SCE
1	EA	POWER SUPPLY	(BY ELECTRICAL CONTRACTOR)	
1	EA	WIRING DIAGRAMS	RISER & POINT-TO-POINT (BY HARDWARE SUPPLIER)	

1  
2 FUNCTION: L9092EU Electrically Unlocked (Fail Secure)  
3 Outside lever unlocked by 24V AC or DC. Latchbolt retracted by key outside or lever inside. Auxiliary latch deadlocks  
4 latchbolt when door is closed. Inside lever always free for immediate exit. Valid credential unlocks door.  
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8 **HW SET: 31B**

9

2	EA	CONT. HINGE	112HD	IVE
2	EA	MANUAL FLUSH BOLT	FB458	IVE
1	EA	DUST PROOF STRIKE	DP2	IVE
1	EA	STOREROOM LOCK	L9080	SCH
2	EA	OH STOP & HOLDER	90H	GLY
2	EA	ARMOR PLATE	8400 34" X 2" LDW B4E CS	IVE
1	EA	SEALS	188S	ZER
1	EA	OVERLAP ASTRAGAL	(BY DOOR SUPPLIER)	
1	EA	MEETING EDGE SEALS	188S	ZER
2	EA	DOOR SWEEP	8192	ZER
1	EA	THRESHOLD	PROFILE AS REQUIRED	ZER

10  
11 FUNCTION: L9080 (F07) Storeroom Lock  
12 Latchbolt retracted by key outside or by lever inside. Outside lever always inoperative. Auxiliary latch deadlocks  
13 latchbolt when door is closed.  
14  
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17 **HW SET: 32A**

18

2	EA	CONT. HINGE	112HD	IVE
2	EA	MANUAL FLUSH BOLT	FB458	IVE
1	EA	DUST PROOF STRIKE	DP2	IVE
1	EA	STOREROOM LOCK	L9080	SCH
			(Less Outside trim)	
2	EA	SURFACE CLOSER	4111 SCUSH	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B4E CS	IVE
1	SET	WEATHERSTRIPPING	429	ZER
1	EA	OVERLAP ASTRAGAL	(BY DOOR SUPPLIER)	
1	EA	MEETING EDGE SEALS	188S	ZER
2	EA	DOOR SWEEP	8192	ZER
1	EA	THRESHOLD	PROFILE AS REQUIRED	ZER
1	EA	RAIN DRIP	142A	ZER
2	EA	DOOR CONTACT	679 SERIES	SCE

19  
20 FUNCTION: L9080 (Less Outside Trim) Exit Latch  
21 Latchbolt retracted by lever inside. No outside trim. Auxiliary latch deadlocks latchbolt when door is closed.  
22  
23  
24

1 **HW SET: 33**

2

1	EA	CONT. HINGE	112HD EPT	IVE
1	EA	POWER TRANSFER	EPT10	VON
1	EA	EU MORTISE LOCK	L9092EU	SCH
1	EA	SURFACE CLOSER	4011 / 4111 EDA	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B4E CS	IVE
1	EA	WALL STOP	WS406/407CVX	IVE
1	EA	SMOKE SEAL	188S (AT RATED OR SMOKE & DRAFT CONTROL DRS ONLY)	ZER
		CREDENTIAL READER	(BY TECHNOLOGY CONTRACTOR)	
1	EA	DOOR CONTACT	679 SERIES	SCE
1	EA	POWER SUPPLY	(BY ELECTRICAL CONTRACTOR)	
1	EA	WIRING DIAGRAMS	RISER & POINT-TO-POINT (BY HARDWARE SUPPLIER)	

3

4 FUNCTION: L9092EU Electrically Unlocked (Fail Secure)

5 Outside lever unlocked by 24V AC or DC. Latchbolt retracted by key outside or lever inside. Auxiliary latch deadlocks  
6 latchbolt when door is closed. Inside lever always free for immediate exit. Valid credential unlocks door.

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10 **HW SET: 34**

11

1	EA	CONT. HINGE	112HD EPT	IVE
1	EA	POWER TRANSFER	EPT10	VON
1	EA	EU MORTISE LOCK	L9092EU	SCH
1	EA	SURFACE CLOSER	4111 SCUSH	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B4E CS	IVE
1	EA	SMOKE SEAL	188S (AT RATED OR SMOKE & DRAFT CONTROL DRS ONLY)	ZER
		CREDENTIAL READER	(BY TECHNOLOGY CONTRACTOR)	
1	EA	DOOR CONTACT	679 SERIES	SCE
1	EA	POWER SUPPLY	(BY ELECTRICAL CONTRACTOR)	
1	EA	WIRING DIAGRAMS	RISER & POINT-TO-POINT (BY HARDWARE SUPPLIER)	

12

13 FUNCTION: L9092EU Electrically Unlocked (Fail Secure)

14 Outside lever unlocked by 24V AC or DC. Latchbolt retracted by key outside or lever inside. Auxiliary latch deadlocks  
15 latchbolt when door is closed. Inside lever always free for immediate exit. Valid credential unlocks door.

16

17

18

19 **HW SET: 34A**

20

1	EA	SURFACE CLOSER	4111 SCUSH	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B4E CS	IVE

21

22 Balance of hardware by acoustical assembly provider.

23

24

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26 **HW SET: 35**

1

1	EA	CONT. HINGE	112HD EPT	IVE
1	EA	POWER TRANSFER	EPT10	VON
1	EA	EU MORTISE LOCK	L9092EU	SCH
1	EA	OH STOP	90S	GLY
1	EA	SURFACE CLOSER	4011 / 4111 EDA	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B4E CS	IVE
1	EA	SMOKE SEAL	188S (AT RATED OR SMOKE & DRAFT CONTROL DRS ONLY)	ZER
		CREDENTIAL READER	(BY TECHNOLOGY CONTRACTOR)	
1	EA	DOOR CONTACT	679 SERIES	SCE
1	EA	POWER SUPPLY	(BY ELECTRICAL CONTRACTOR)	
1	EA	WIRING DIAGRAMS	RISER & POINT-TO-POINT (BY HARDWARE SUPPLIER)	

2

3

FUNCTION: L9092EU Electrically Unlocked (Fail Secure)

4

Outside lever unlocked by 24V AC or DC. Latchbolt retracted by key outside or lever inside. Auxiliary latch deadlocks latchbolt when door is closed. Inside lever always free for immediate exit. Valid credential unlocks door.

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**HW SET: 36**

10

1	EA	CONT. HINGE	112HD	IVE
1	EA	STOREROOM LOCK	L9080	SCH
1	EA	ELECTRIC STRIKE	6211 FSE	VON
1	EA	OH STOP	90S	GLY
1	EA	SURFACE CLOSER	4011 / 4111 EDA	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B4E CS	IVE
1	EA	SMOKE SEAL	188S (AT RATED OR SMOKE & DRAFT CONTROL DRS ONLY)	ZER
		CREDENTIAL READER	(BY TECHNOLOGY CONTRACTOR)	
1	EA	DOOR CONTACT	679 SERIES	SCE
1	EA	POWER SUPPLY	(BY ELECTRICAL CONTRACTOR)	
1	EA	WIRING DIAGRAMS	RISER & POINT-TO-POINT (BY HARDWARE SUPPLIER)	

11

12

FUNCTION: L9080 (F07) Storeroom Lock x Electric Strike

13

Latchbolt retracted by key outside or by lever inside. Outside lever always inoperative. Auxiliary latch deadlocks latchbolt when door is closed. A valid credential releases electric strike.

14

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16

Hardware supplier shall field verify existing door and frame will accommodate specified hardware.

17

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**HW SET: 38**

21

1	EA	CONT. HINGE	112HD	IVE
1	EA	STOREROOM LOCK	L9080	SCH
1	EA	ELECTRIC STRIKE	6211 FSE	VON
1	EA	SURFACE CLOSER	4011 / 4111 EDA	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B4E CS	IVE
1	EA	WALL STOP	WS406/407CCV	IVE
1	EA	SMOKE SEAL	188S (AT RATED OR SMOKE & DRAFT CONTROL DRS ONLY)	ZER
		CREDENTIAL READER	(BY TECHNOLOGY CONTRACTOR)	
1	EA	DOOR CONTACT	679 SERIES	SCE

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1	EA	POWER SUPPLY	(BY ELECTRICAL CONTRACTOR)
1	EA	WIRING DIAGRAMS	RISER & POINT-TO-POINT (BY HARDWARE SUPPLIER)

1  
2 FUNCTION: L9080 (F07) Storeroom Lock x Electric Strike  
3 Latchbolt retracted by key outside or by lever inside. Outside lever always inoperative. Auxiliary latch deadlocks  
4 latchbolt when door is closed. A valid credential releases electric strike.  
5

6 Hardware supplier shall field verify existing door and frame will accommodate specified hardware.  
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8  
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10 **HW SET: 38A**

11

1	EA	CONT. HINGE	112HD	IVE
1	EA	STOREROOM LOCK	L9080	SCH
1	EA	ELECTRIC STRIKE	6211 FSE	VON
1	EA	SURF. AUTO OPERATOR	4642	LCN
2	EA	ACTUATOR, WALL MOUNT	8310-813 (Touchless)	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B4E CS	IVE
1	EA	WALL STOP	WS406/407CCV	IVE
1	EA	SMOKE SEAL	188S (AT RATED OR SMOKE & DRAFT CONTROL DRS ONLY)	ZER
		CREDENTIAL READER	(BY TECHNOLOGY CONTRACTOR)	
1	EA	DOOR CONTACT	679 SERIES	SCE
1	EA	POWER SUPPLY	(BY ELECTRICAL CONTRACTOR)	
1	EA	WIRING DIAGRAMS	RISER & POINT-TO-POINT (BY HARDWARE SUPPLIER)	

12  
13 FUNCTION: L9080 (F07) Storeroom Lock x Electric Strike  
14 Latchbolt retracted by key outside or by lever inside. Outside lever always inoperative. Auxiliary latch deadlocks  
15 latchbolt when door is closed. A valid credential releases electric strike. This door has a power operator. Interior  
16 actuator always active to unlock and open the door. A valid credential will unlock the door and make the exterior  
17 actuator active.  
18

19 Hardware supplier shall field verify existing door and frame will accommodate specified hardware.  
20  
21  
22

23 **HW SET: 39A**

24

1	EA	CONT. HINGE	112HD	IVE
1	EA	STOREROOM LOCK	L9080	SCH
1	EA	ELECTRIC STRIKE	6211 FSE	VON
1	EA	OH STOP	90S	GLY
1	EA	SURF. AUTO OPERATOR	4642	LCN
2	EA	ACTUATOR, WALL MOUNT	8310-813 (Touchless)	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B4E CS	IVE
1	EA	SMOKE SEAL	188S (AT RATED OR SMOKE & DRAFT CONTROL DRS ONLY)	ZER
		CREDENTIAL READER	(BY TECHNOLOGY CONTRACTOR)	
1	EA	DOOR CONTACT	679 SERIES	SCE
1	EA	POWER SUPPLY	(BY ELECTRICAL CONTRACTOR)	
1	EA	WIRING DIAGRAMS	RISER & POINT-TO-POINT (BY HARDWARE SUPPLIER)	

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1  
2 FUNCTION: L9080 (F07) Storeroom Lock x Electric Strike  
3 Latchbolt retracted by key outside or by lever inside. Outside lever always inoperative. Auxiliary latch deadlocks  
4 latchbolt when door is closed. This door has a power operator. Interior actuator always active to unlock and open the  
5 door. A valid credential will unlock the door and make the exterior actuator active. Door may be held open using  
6 switch on power operator.  
7

8 Hardware supplier shall field verify existing door and frame will accommodate specified hardware.  
9  
10  
11

12 **HW SET: 40**

13

1	EA	CONT. HINGE	112HD EPT	IVE
1	EA	POWER TRANSFER	EPT10	VON
1	EA	EU MORTISE LOCK	L9092EU	SCH
1	EA	SURFACE CLOSER	4111 SCUSH	LCN
1	EA	ARMOR PLATE	8400 34" X 2" LDW B4E CS	IVE
1	SET	WEATHERSTRIPPING	429	ZER
1	EA	DOOR SWEEP	8192	ZER
1	EA	THRESHOLD	PROFILE AS REQUIRED	ZER
1	EA	RAIN DRIP	142A	ZER
		CREDENTIAL READER	(BY TECHNOLOGY CONTRACTOR)	
1	EA	DOOR CONTACT	679 SERIES	SCE
1	EA	POWER SUPPLY	(BY ELECTRICAL CONTRACTOR)	
1	EA	WIRING DIAGRAMS	RISER & POINT-TO-POINT (BY HARDWARE SUPPLIER)	

14  
15 FUNCTION: L9092EU Electrically Unlocked (Fail Secure)  
16 Outside lever unlocked by 24V AC or DC. Latchbolt retracted by key outside or lever inside. Auxiliary latch deadlocks  
17 latchbolt when door is closed. Inside lever always free for immediate exit. Valid credential unlocks door.  
18  
19  
20

21 **HW SET: 41**

22

1	EA	CONT. HINGE	112HD EPT	IVE
1	EA	POWER TRANSFER	EPT10	VON
1	EA	ELEC PANIC HARDWARE	RX-LD-99-EO	VON
1	EA	SURFACE CLOSER	4111 SCUSH	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B4E CS	IVE
1	SET	WEATHERSTRIPPING	429	ZER
1	EA	DOOR SWEEP	8192	ZER
1	EA	THRESHOLD	PROFILE AS REQUIRED	ZER
1	EA	RAIN DRIP	142A	ZER
1	EA	DOOR CONTACT	679 SERIES	SCE

23  
24 FUNCTION: (EO) Latchbolt retracted inside by exit device push pad. No exterior trim.  
25  
26  
27

28 **HW SET: 41A**

29

1	EA	CONT. HINGE	112HD	IVE
1	EA	PANIC HARDWARE	99-L-BE	VON

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1	EA	INTERCHANGEABLE CORE	CYLINDER AS REQUIRED	SCH
1	EA	SURFACE CLOSER	4011 / 4111 EDA	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B4E CS	IVE
1	EA	WALL STOP	WS406/407CVX	IVE
1	EA	SMOKE SEAL	188S (AT RATED OR SMOKE & DRAFT CONTROL DRS ONLY)	ZER

1  
2 FUNCTION: (L-BE) Latchbolt retracted inside by exit device push pad, exterior by lever. Lever does not lock.  
3  
4 Hardware supplier shall field verify existing door and frame will accommodate specified hardware.  
5  
6  
7

8 **HW SET: 45**

1	EA	CONT. HINGE	112HD	IVE
1	EA	PANIC HARDWARE	33A-L	VON
1	EA	INTERCHANGEABLE CORE	CYLINDER AS REQUIRED	SCH
1	EA	ELECTRIC STRIKE	6211 FSE	VON
1	EA	SURFACE CLOSER	4011 / 4111 EDA	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B4E CS	IVE
1	EA	WALL STOP	WS406/407CVX	IVE
1	EA	SMOKE SEAL	188S (AT RATED OR SMOKE & DRAFT CONTROL DRS ONLY)	ZER
		CREDENTIAL READER	(BY TECHNOLOGY CONTRACTOR)	
1	EA	DOOR CONTACT	679 SERIES	SCE
1	EA	POWER SUPPLY	(BY ELECTRICAL CONTRACTOR)	
1	EA	WIRING DIAGRAMS	RISER & POINT-TO-POINT (BY HARDWARE SUPPLIER)	

10  
11 FUNCTION: (L) Latchbolt retracted inside by exit device push pad and outside by lever. Key in exterior cylinder locks  
12 or unlocks lever. A valid credential releases electric strike.  
13  
14 Hardware supplier shall field verify existing door and frame will accommodate specified hardware.  
15  
16  
17

18 **HW SET: 48A**

2	EA	CONT. HINGE	112HD EPT	IVE
2	EA	POWER TRANSFER	EPT10	VON
1	EA	MULLION	KR-9954	VON
1	EA	ELEC FIRE EXIT HARDWARE	RX-33A-EO-F	VON
1	EA	ELEC FIRE EXIT HARDWARE	RX-QEL+-33A-NL-OP-F-388	VON
2	EA	TRIM	550-DT	VON
2	EA	INTERCHANGEABLE CORE	CYLINDER AS REQUIRED	SCH
1	EA	SURFACE CLOSER	4011 / 4111 EDA	LCN
1	EA	SURF. AUTO OPERATOR	4642	LCN
2	EA	ACTUATOR, WALL MOUNT	8310-813 (Touchless) (Touchless)	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B4E CS	IVE

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2	EA	WALL STOP	WS406/407CVX	IVE
1	EA	SMOKE SEALS	188S (AT RATED OR SMOKE & DRAFT CONTROL DRS ONLY)	ZER
1	EA	MEETING EDGE SEALS (NEOPRENE)	328 (EACH LEAF)	ZER
1	EA	WIRING DIAGRAMS	RISER & POINT-TO-POINT (BY HARDWARE SUPPLIER)	
1	EA	POWER SUPPLY	PS902 900-4R FA900	SCE

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FUNCTION: (NL - less dogging) Latchbolt retracted inside by exit device push pad and outside by key in cylinder. Door locks when key is removed and door is closed. This door has a power operator. Interior actuator always active to unlock and open the door. A valid credential will unlock the active door and make the exterior actuator active. Loss of power or activation of fire alarm will disable power operator and insure fire door remains latched.

**HW SET: 48B**

2	EA	CONT. HINGE	112HD EPT	IVE
2	EA	POWER TRANSFER	EPT10	VON
1	EA	MULLION	KR-4954	VON
1	EA	ELEC PANIC HARDWARE	RX-CD-33A-EO-299	VON
1	EA	ELEC PANIC HARDWARE	RX-QEL+-33A-NL-OP-388-299	VON
2	EA	TRIM	550-DT	VON
3	EA	INTERCHANGEABLE CORE	CYLINDER AS REQUIRED	SCH
1	EA	SURFACE CLOSER	4011 / 4111 EDA	LCN
1	EA	SURF. AUTO OPERATOR	4642	LCN
1	EA	ACTUATOR, WALL MOUNT	8310-813 (Touchless)	LCN
1	EA	ACTUATOR, BOLLARD MOUNT	8310-836T (Locate at Exterior - 36" Tall)	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B4E CS	IVE
2	EA	WALL STOP	WS406/407CVX	IVE
1	EA	SMOKE SEALS	188S (AT RATED OR SMOKE & DRAFT CONTROL DRS ONLY)	ZER
1	EA	MEETING EDGE SEALS (NEOPRENE)	328 (EACH LEAF)	ZER
	SET	WEATHERSTRIPPING	429	ZER
1	EA	MEETING EDGE SEALS (BRUSH)	8193	ZER
1	EA	MULLION SEAL	8780	ZER
1	EA	MULLION SEAL	8780	ZER
2	EA	DOOR SWEEP (BRUSH)	8192	ZER
1	EA	THRESHOLD	PROFILE AS REQUIRED	ZER
1	EA	RAIN DRIP	142A	ZER
1	EA	WIRING DIAGRAMS	RISER & POINT-TO-POINT (BY HARDWARE SUPPLIER)	
1	EA	POWER SUPPLY	PS902 900-4R FA900	SCE

FUNCTION: (NL) Latchbolt retracted inside by exit device push pad and outside by key in cylinder. Door locks when key is removed and door is closed. Access from exterior when exit device push pad is dogged down. This door has a power operator. Interior actuator always active to unlock and open the door. A valid credential will unlock the active door and make the exterior actuator active. Loss of power or activation of fire alarm will disable power operator and insure fire door remains latched.



1 **HW SET: 49A**

2

1	EA	CONT. HINGE	112HD	IVE
1	EA	CLASSROOM LOCK	L9070	SCH
1	EA	SURFACE CLOSER	4011 H	LCN

3

4 FUNCTION: (F05) Classroom Lock

5 Latchbolt retracted by lever from either side unless outside is locked by key. Unlocked from outside by key. Inside  
6 lever always free for immediate exit. Auxiliary latch deadlocks latchbolt when door is closed.

7

8 Provide complete latching assembly including lock body, strike, scalp, spindle, levers, roses, cylinder, cylinder cam,  
9 blocking ring, and all required fasteners.

10

11 Hardware supplier shall coordinate with related trades to insure door and frame construction will accommodate  
12 specified hardware.

13

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15

16 **HW SET: 49B**

17

1	EA	CONT. HINGE	112HD	IVE
1	EA	PASSAGE SET	L9010	SCH
1	EA	OH STOP	100S (Where Applicable)	GLY
1	EA	WALL STOP	WS406/407CCV (Where Applicable)	IVE

18

19 FUNCTION: (F01) Passage Latch

20 Latchbolt retracted by lever from either side at all times.

21

22 Provide complete latching assembly including lock body, strike, scalp, spindle, levers, roses, cylinder, cylinder cam,  
23 blocking ring, and all required fasteners.

24

25 Hardware supplier shall coordinate with related trades to insure door and frame construction will accommodate  
26 specified hardware.

27

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30 **HW SET: 49C**

31

1	EA	CONT. HINGE	112HD	IVE
1	EA	CLASSROOM LOCK	L9070	SCH
1	EA	SURFACE CLOSER	4011	LCN
1	EA	WALL STOP	WS406/407CVX	IVE

32

33 FUNCTION: (F05) Classroom Lock

34 Latchbolt retracted by lever from either side unless outside is locked by key. Unlocked from outside by key. Inside  
35 lever always free for immediate exit. Auxiliary latch deadlocks latchbolt when door is closed.

36

37 Provide complete latching assembly including lock body, strike, scalp, spindle, levers, roses, cylinder, cylinder cam,  
38 blocking ring, and all required fasteners.

39

40 Hardware supplier shall coordinate with related trades to insure door and frame construction will accommodate  
41 specified hardware.

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**HW SET: 49D**

1	EA	CONT. HINGE	112HD	IVE
1	EA	STOREROOM LOCK	L9080	SCH
1	EA	INTERCHANGEABLE CORE	CYLINDER AS REQUIRED	SCH
1	EA	ELECTRIC STRIKE	6211 FSE	VON
1	EA	OH STOP	100S	GLY
1	EA	SURF. AUTO OPERATOR	4642	LCN
2	EA	ACTUATOR, WALL MOUNT	8310-813 (Touchless)	LCN
1	EA	KEY SWITCH	653-1414 L2	SCE
1	EA	DOOR CONTACT	7764	SCE

FUNCTION: L9080 (F07) Storeroom Lock  
Latchbolt retracted by key outside or by lever inside. Outside lever always inoperative. Auxiliary latch deadlocks latchbolt when door is closed.  
This door has a power operator. Interior actuator always active to release electric strike and power open the door. A valid credential will unlock the door and make the exterior actuator active. Wall mounted key switch permits electric strike to be unlocked for extended periods of time.  
Provide complete latching assembly including lock body, strike, scalp, spindle, levers, roses, cylinder, cylinder cam, blocking ring, and all required fasteners.  
Hardware supplier shall coordinate with related trades to insure door and frame construction will accommodate specified hardware.

**HW SET: 50**

1	EA	CONT. HINGE	112HD EPT	IVE
1	EA	POWER TRANSFER	EPT10	VON
1	EA	EU MORTISE LOCK	L9092EU	SCH
1	EA	OH STOP	100S	GLY
1	EA	WALL STOP	(Where Applicable) WS406/407CCV	IVE
1	EA	CREDENTIAL READER	(Where Applicable) (BY TECHNOLOGY CONTRACTOR)	
1	EA	DOOR CONTACT	7764	SCE
	EA	POWER SUPPLY	(BY ELECTRICAL CONTRACTOR)	

FUNCTION: Electrically Unlocked (Fail Secure)  
Outside lever unlocked by 24V AC or DC. Latchbolt retracted by key outside or lever inside. Auxiliary latch deadlocks latchbolt when door is closed. Inside lever always free for immediate exit. Valid credential unlocks door.  
Provide complete latching assembly including lock body, strike, scalp, spindle, levers, roses, cylinder, cylinder cam, blocking ring, and all required fasteners.  
Hardware supplier shall coordinate with related trades to insure door and frame construction will accommodate specified hardware.

**HW SET: 50A**

1

1	EA	CONT. HINGE	112HD EPT	IVE
1	EA	POWER TRANSFER	EPT10	VON
1	EA	EU MORTISE LOCK	L9092EU	SCH
1	EA	OH STOP	100S	GLY
			(Where Wall Stop Or Stop Arm Closer Is Not Applicable)	
1	EA	SURFACE CLOSER	4011 / 4111 EDA / 4111 SCUSH	LCN
1	EA	WALL STOP	WS406/407CCV	IVE
			(Where Applicable)	
1	EA	CREDENTIAL READER	(BY TECHNOLOGY CONTRACTOR)	
	EA	DOOR CONTACT	7764	SCE
	EA	POWER SUPPLY	(BY ELECTRICAL CONTRACTOR)	

2

3

FUNCTION: Electrically Unlocked (Fail Secure)

4

Outside lever unlocked by 24V AC or DC. Latchbolt retracted by key outside or lever inside. Auxiliary latch deadlocks latchbolt when door is closed. Inside lever always free for immediate exit. Valid credential unlocks door.

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Provide complete latching assembly including lock body, strike, scalp, spindle, levers, roses, cylinder, cylinder cam, blocking ring, and all required fasteners.

8

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Hardware supplier shall coordinate with related trades to insure door and frame construction will accommodate specified hardware.

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**HW SET: 50B**

16

1	EA	CONT. HINGE	112HD EPT	IVE
1	EA	POWER TRANSFER	EPT10	VON
1	EA	EU MORTISE LOCK	L9092EU	SCH
1	EA	OH STOP	100S	GLY
			(Where Wall Stop Or Stop Arm Closer Is Not Applicable)	
1	EA	SURFACE CLOSER	4011 / 4111 EDA / 4111 SCUSH	LCN
1	EA	WALL STOP	WS406/407CCV	IVE
			(Where Applicable)	
	EA	CREDENTIAL READER	(BY TECHNOLOGY CONTRACTOR)	
	EA	POWER SUPPLY	(BY ELECTRICAL CONTRACTOR)	

17

18

FUNCTION: Electrically Unlocked (Fail Secure)

19

Outside lever unlocked by 24V AC or DC. Latchbolt retracted by key outside or lever inside. Auxiliary latch deadlocks latchbolt when door is closed. Inside lever always free for immediate exit. Valid credential unlocks door.

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22

Provide complete latching assembly including lock body, strike, scalp, spindle, levers, roses, cylinder, cylinder cam, blocking ring, and all required fasteners.

23

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Hardware supplier shall coordinate with related trades to insure door and frame construction will accommodate specified hardware.

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**HW SET: 51**

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1	EA	CONT. HINGE	112HD	IVE
1	EA	PANIC HARDWARE	CD-33A-NL-OP	VON
1	EA	TRIM	550-DT	VON

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2	EA	INTERCHANGEABLE CORE	CYLINDER AS REQUIRED	SCH
1	EA	SURFACE CLOSER	4111 SCUSH	LCN

1  
2 FUNCTION: (NL) Latchbolt retracted inside by exit device push pad and outside by key in cylinder. Door locks when  
3 key is removed and door is closed. Access from exterior when exit device push pad is dogged down.  
4  
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7 **HW SET: 53**

1	EA	CONT. HINGE	112HD EPT	IVE
1	EA	POWER TRANSFER	EPT10	VON
1	EA	ELEC PANIC HARDWARE	RX-QEL-33A-NL-OP	VON
1	EA	TRIM	550-DT	VON
1	EA	INTERCHANGEABLE CORE	CYLINDER AS REQUIRED	SCH
1	EA	OH STOP	100S	GLY
1	EA	SURF. AUTO OPERATOR	4642	LCN
2	EA	ACTUATOR, WALL MOUNT	8310-813 (Touchless)	LCN
		CREDENTIAL READER	(BY TECHNOLOGY CONTRACTOR)	
1	EA	DOOR CONTACT	7764	SCE
1	EA	POWER SUPPLY	PS902 900-4R	SCE
1	EA	JUNCTION BOX	JB7 R2	VON
1	EA	WIRING DIAGRAMS	RISER & POINT-TO-POINT (BY HARDWARE SUPPLIER)	

9  
10 FUNCTION: Latchbolt retracted inside by exit device push pad and outside by key in cylinder. Door locks when key is  
11 removed and door is closed. This door has a power operator. Interior actuator always active to unlock and open the  
12 door. A valid credential will unlock the door and make the exterior actuator active.  
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16 **HW SET: 53A**

1	EA	CONT. HINGE	112HD EPT	IVE
1	EA	POWER TRANSFER	EPT10	VON
1	EA	MULLION	KR-4954	VON
1	EA	ELEC PANIC HARDWARE	RX-LD-33A-EO	VON
1	EA	INTERCHANGEABLE CORE	CYLINDER AS REQUIRED	SCH
1	EA	SURFACE CLOSER	4111 SCUSH	LCN
1	EA	DOOR CONTACT	7764	SCE

18  
19 FUNCTION: (EO) Latchbolt retracted inside by exit device push pad. No exterior trim.  
20  
21  
22

23 **HW SET: 54A**

1	EA	CONT. HINGE	112HD EPT	IVE
1	EA	POWER TRANSFER	EPT10	VON
1	EA	ELEC FIRE EXIT HARDWARE	RX-QEL-3347A-NL-OP-F	VON

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1	EA	TRIM	550-DT	VON
1	EA	INTERCHANGEABLE CORE	CYLINDER AS REQUIRED	SCH
1	EA	OH STOP	90S	GLY
1	EA	SURF. AUTO OPERATOR	4642	LCN
1	EA	ACTUATOR, WALL MOUNT	8310-813 (Touchless)	LCN
1	EA	ACTUATOR, BOLLARD MOUNT	8310-836T (Locate at Exterior - 36" Tall)	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B4E CS	IVE
	EA	WEATHERSTRIP	BY DR/FR SUPPLIER	
	SET	WEATHERSTRIPPING	429	ZER
1	EA	MEETING EDGE SEALS (BRUSH)	8193	ZER
1	EA	DOOR SWEEP	8192	ZER
1	EA	THRESHOLD	PROFILE AS REQUIRED	ZER
		CREDENTIAL READER	(BY TECHNOLOGY CONTRACTOR)	
1	EA	DOOR CONTACT	679 SERIES	SCE
1	EA	POWER SUPPLY	PS902 900-4R	SCE
1	EA	JUNCTION BOX	JB7 R2	VON
1	EA	WIRING DIAGRAMS	RISER & POINT-TO-POINT (BY HARDWARE SUPPLIER)	

1  
2 FUNCTION: Latchbolt retracted inside by exit device push pad and outside by key in cylinder. Door locks when key is  
3 removed and door is closed. This door has a power operator. Interior actuator always active to unlock and open the  
4 door. A valid credential will unlock the door and make the exterior actuator active.  
5

6 Hardware supplier shall coordinate with door and frame supplier to insure fixed side panel is compatible with  
7 specified hardware.  
8  
9  
10

11 **HW SET: 56**

12

2	EA	CONT. HINGE	112HD EPT	IVE
2	EA	POWER TRANSFER	EPT10	VON
1	EA	MULLION	KR-4954	VON
1	EA	ELEC PANIC HARDWARE	RX-CD-33A-EO-299	VON
1	EA	ELEC PANIC HARDWARE	RX-QEL-33A-NL-OP	VON
2	EA	TRIM	550-DT	VON
3	EA	INTERCHANGEABLE CORE	CYLINDER AS REQUIRED	SCH
2	EA	SURFACE CLOSER	4111 SCUSH	LCN
1	EA	MULLION SEAL	8780	ZER
		CREDENTIAL READER	(BY TECHNOLOGY CONTRACTOR)	
2	EA	DOOR CONTACT	7764	SCE
1	EA	POWER SUPPLY	PS902 900-4R	SCE
1	EA	WIRING DIAGRAMS	RISER & POINT-TO-POINT (BY HARDWARE SUPPLIER)	

13  
14 FUNCTION: (NL) Latchbolt retracted inside by exit device push pad and outside by key in cylinder. Door locks when  
15 key is removed and door is closed. Access from exterior when exit device push pad is dogged down. A valid  
16 credential retracts latch bolt and push pad on active door.  
17  
18  
19

20 **HW SET: 57**

1

2	EA	CONT. HINGE	112HD EPT	IVE
2	EA	POWER TRANSFER	EPT10	VON
1	EA	MULLION	KR-4954	VON
1	EA	ELEC PANIC HARDWARE	RX-CD-33A-EO-299	VON
1	EA	ELEC PANIC HARDWARE	RX-QEL-33A-NL-OP	VON
2	EA	TRIM	550-DT	VON
2	EA	INTERCHANGEABLE CORE	CYLINDER AS REQUIRED	SCH
2	EA	SURFACE CLOSER	4111 SCUSH	LCN
	EA	WEATHERSTRIP	BY DR/FR SUPPLIER	
1	EA	MULLION SEAL	8780	ZER
2	EA	DOOR SWEEP	8192	ZER
1	EA	THRESHOLD	PROFILE AS REQUIRED	ZER
1	EA	RAIN DRIP	142A	ZER
		CREDENTIAL READER	(BY TECHNOLOGY CONTRACTOR)	
2	EA	DOOR CONTACT	7764	SCE
1	EA	POWER SUPPLY	PS902 900-4R	SCE
1	EA	WIRING DIAGRAMS	RISER & POINT-TO-POINT (BY HARDWARE SUPPLIER)	

2

3

FUNCTION: (NL) Latchbolt retracted inside by exit device push pad and outside by key in cylinder. Door locks when key is removed and door is closed. Access from exterior when exit device push pad is dogged down. A valid credential retracts latch bolt and push pad on active door.

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**HW SET: 58A**

10

2	EA	CONT. HINGE	112HD EPT	IVE
2	EA	POWER TRANSFER	EPT10	VON
1	EA	ELEC PANIC HARDWARE	RX-QEL-3347A-NL-OP	VON
1	EA	ELEC PANIC HARDWARE	RX-QEL-33A-EO	VON
2	EA	TRIM	550-DT	VON
1	EA	INTERCHANGEABLE CORE	CYLINDER AS REQUIRED	SCH
2	EA	SURFACE CLOSER	4111 SHCUSH	LCN
		CREDENTIAL READER	(BY TECHNOLOGY CONTRACTOR)	
2	EA	DOOR CONTACT	7764	SCE
1	EA	POWER SUPPLY	PS902 900-4R	SCE
1	EA	WIRING DIAGRAMS	RISER & POINT-TO-POINT (BY HARDWARE SUPPLIER)	

11

12

FUNCTION: (NL) Latchbolt retracted inside by exit device push pad and outside by key in cylinder. Door locks when key is removed and door is closed. A valid credential retracts latch bolt and push pad on both doors.

13

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**HW SET: 60**

18

2	EA	CONT. HINGE	112HD EPT	IVE
2	EA	POWER TRANSFER	EPT10	VON
1	EA	ELEC PANIC HARDWARE	RX-CD-3347A-EO	VON
1	EA	ELEC PANIC HARDWARE	RX-CD-3347A-NL-OP	VON
2	EA	TRIM	550-DT	VON
3	EA	INTERCHANGEABLE CORE	CYLINDER AS REQUIRED	SCH

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2	EA	SURFACE CLOSER	4111 SCUSH	LCN
	EA	WEATHERSTRIP	BY DR/FR SUPPLIER	
2	EA	DOOR SWEEP	8192	ZER
1	EA	THRESHOLD	PROFILE AS REQUIRED	ZER
		CREDENTIAL READER	(BY TECHNOLOGY CONTRACTOR)	
2	EA	DOOR CONTACT	7764	SCE

1  
2 FUNCTION: (NL) Latchbolt retracted inside by exit device push pad and outside by key in cylinder. Door locks when  
3 key is removed and door is closed. Access from exterior when exit device push pad is dogged down.  
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7 **HW SET: 61B**

2	EA	CONT. HINGE	112HD EPT	IVE
2	EA	POWER TRANSFER	EPT10	VON
1	EA	ELEC PANIC HARDWARE	RX-QEL-3347A-EO	VON
1	EA	ELEC PANIC HARDWARE	RX-QEL-3347A-NL-OP	VON
2	EA	TRIM	550-DT	VON
1	EA	INTERCHANGEABLE CORE	CYLINDER AS REQUIRED	SCH
2	EA	SURFACE CLOSER	4111 SHCUSH	LCN
		CREDENTIAL READER	(BY TECHNOLOGY CONTRACTOR)	
2	EA	DOOR CONTACT	7764	SCE
1	EA	POWER SUPPLY	PS902 900-4R	SCE
1	EA	WIRING DIAGRAMS	RISER & POINT-TO-POINT (BY HARDWARE SUPPLIER)	

9  
10 FUNCTION: (NL) Latchbolt retracted inside by exit device push pad and outside by key in cylinder. Door locks when  
11 key is removed and door is closed. A valid credential will unlock both doors.  
12  
13  
14

15 **HW SET: 62A**

2	EA	CONT. HINGE	112HD EPT	IVE
2	EA	POWER TRANSFER	EPT10	VON
2	EA	ELEC FIRE EXIT HARDWARE	RX-QEL+-3347A-EO-F	VON
2	EA	TRIM	550-DT	VON
1	EA	INTERCHANGEABLE CORE	CYLINDER AS REQUIRED	SCH
2	EA	SURFACE CLOSER	4111 SCUSH	LCN
2	EA	KICK PLATE	8400 10" X 2" LDW B4E CS	IVE
1	SET	WEATHERSTRIPPING	429	ZER
2	EA	DOOR SWEEP	8192	ZER
1	EA	THRESHOLD	PROFILE AS REQUIRED	ZER
1	EA	KEY SWITCH	653-1414 L2 (Shared with doors F8, F9, and F10)	SCE
2	EA	DOOR CONTACT	679 SERIES	SCE
1	EA	WIRING DIAGRAMS	RISER & POINT-TO-POINT (BY HARDWARE SUPPLIER)	
1	EA	POWER SUPPLY	PS902 900-4R FA900	SCE

17  
18 FUNCTION: (DT) Latchbolt retracted inside by exit device push pad. Wall mounted key switch will dog exit device  
19 push pad down. Access from exterior when exit device push pad is dogged down. Loss of power or activation of fire  
20 alarm will release push pad, and insure fire door is latched.

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**HW SET: 62B**

2	EA	CONT. HINGE	112HD EPT	IVE
2	EA	POWER TRANSFER	EPT10	VON
1	EA	ELEC FIRE EXIT HARDWARE	RX-QEL+-3347A-EO-F	VON
1	EA	ELEC FIRE EXIT HARDWARE	RX-QEL-3347A-NL-OP-F	VON
2	EA	TRIM	550-DT	VON
2	EA	INTERCHANGEABLE CORE	CYLINDER AS REQUIRED	SCH
1	EA	OH STOP	90S	GLY
1	EA	SURFACE CLOSER	4111 SCUSH	LCN
1	EA	SURF. AUTO OPERATOR	4642	LCN
1	EA	ACTUATOR, WALL MOUNT	8310-813 (Touchless)	LCN
1	EA	ACTUATOR, BOLLARD MOUNT	8310-836T (Locate at Exterior - 36" Tall)	LCN
2	EA	KICK PLATE	8400 10" X 2" LDW B4E CS	IVE
1	SET	WEATHERSTRIPPING	429	ZER
2	EA	DOOR SWEEP	8192	ZER
1	EA	THRESHOLD CREDENTIAL READER	PROFILE AS REQUIRED (BY TECHNOLOGY CONTRACTOR)	ZER
1	EA	KEY SWITCH	653-1414 L2 (Shared with doors F8, F9, and F10)	SCE
2	EA	DOOR CONTACT	679 SERIES	SCE
1	EA	WIRING DIAGRAMS	RISER & POINT-TO-POINT (BY HARDWARE SUPPLIER)	SCE
1	EA	POWER SUPPLY	PS902 900-4R FA900	SCE

FUNCTION: (DT) Latchbolt retracted inside by exit device push pad. Wall mounted key switch will dog exit device push pad down. Access from exterior when exit device push pad is dogged down. This door has a power operator. Interior actuator always active to unlock and open the door. A valid credential will unlock the door and make the exterior actuator active. Loss of power or activation of fire alarm will release push pad, and insure fire door is latched.

**HW SET: 65**

2	EA	FLOOR STOP/HOLDER	FS40 SERIES	IVE
---	----	-------------------	-------------	-----

FUNCTION: Push/Pull  
Salvage and reuse existing hardware.  
Hardware supplier shall coordinate door stop height with existing conditions.  
Remove existing kick down door holders for accessibility compliance.  
Existing hardware shall be modified to prevent latching or locking and to insure egress at all times by pushing on face of door.

**HW SET: 66**



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2	EA	CONT. HINGE	112HD	IVE
1	EA	DUMMY PUSH BAR	330	VON
1	EA	TRIM	550-DT	VON
2	EA	SURFACE CLOSER	4111 SCUSH	LCN

1  
2  
3  
4  
5

FUNCTION: Push/Pull.

6 **HW SET: 66A**

7

2	EA	CONT. HINGE	112HD	IVE
1	EA	DUMMY PUSH BAR	330	VON
1	EA	TRIM	550-DT	VON
1	EA	OH STOP	100S	GLY
1	EA	SURFACE CLOSER	4111 SCUSH	LCN
1	EA	SURF. AUTO OPERATOR	4642	LCN
2	EA	ACTUATOR, WALL MOUNT	8310-813 (Touchless)	LCN

8  
9  
10  
11  
12  
13

FUNCTION: Push/Pull.

This door has a power operator. Both actuators always active to open the door.

14 **HW SET: 67**

15

1	EA	CONT. HINGE	112HD	IVE
1	EA	STOREROOM LOCK	L9080 (less outside trim)	SCH
1	EA	ELECTRIC STRIKE	6211 FSE	VON
1	EA	GATE CLOSER	359	RIX
1	EA	WALL STOP	WS406/407CVX	IVE
		CREDENTIAL READER	(BY TECHNOLOGY CONTRACTOR)	
1	EA	DOOR CONTACT	679 SERIES	SCE
1	EA	POWER SUPPLY	(BY ELECTRICAL CONTRACTOR)	

16  
17  
18  
19  
20  
21  
22  
23  
24

FUNCTION: L9080 (less outside trim) Storeroom Lock x Electric Strike

Latchbolt retracted by lever inside. No outside trim. Auxiliary latch deadlocks latchbolt when door is closed. A valid credential releases electric strike.

Hardware supplier shall field verify gate door and frame will accommodate specified hardware.

25 **HW SET: 68**

26  
27  
28  
29  
30  
31

All hardware by door supplier.

32 **HW SET: 69**

1

1	EA	CONT. HINGE	112HD	IVE
1	EA	CLASSROOM DEAD LOCK	L463 XB11-720	SCH
1	EA	CYLINDER	AS REQUIRED	SAR
1	EA	PUSH PLATE	8200 6" X 16"	IVE
1	EA	PULL PLATE	8303 10" 4" X 16"	IVE
1	EA	SURFACE CLOSER	4011 / 4111 EDA	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B4E CS	IVE
1	EA	WALL STOP	WS406/407CVX	IVE

2

3

FUNCTION: L463 E06091 Classroom Lock

4

Deadbolt thrown or retracted by key from outside. Inside thumbturn cylinder retracts deadbolt but cannot project it.

5

6

7

8 **HW SET: 69A**

9

10

11 FUNCTION: Push/Pull

12 Salvage and reuse existing hardware.

13 Remove existing kick down door holders for accessibility compliance.

14 Existing hardware shall be modified to prevent latching or locking and to insure egress at all times by pushing on face of door.

15

16

17

18

19 **HW SET: 69B**

20

1	EA	CONT. HINGE	112HD	IVE
1	EA	CLASSROOM DEAD LOCK	L463 XB11-720	SCH
1	EA	CYLINDER	AS REQUIRED	SAR
1	EA	PUSH PLATE	8200 6" X 16"	IVE
1	EA	PULL PLATE	8303 10" 4" X 16"	IVE
1	EA	OH STOP	90S	GLY
1	EA	SURFACE CLOSER	4011	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B4E CS	IVE

21

22 FUNCTION: L463 E06091 Classroom Lock

23 Deadbolt thrown or retracted by key from outside. Inside thumbturn cylinder retracts deadbolt but cannot project it.

24

25 Hardware supplier shall field verify existing door and frame will accommodate specified hardware.

26

27

28

29 **HW SET: 70**

30

1	EA	CONT. HINGE	112HD	IVE
1	EA	CORRIDOR LOCK	L9456 L583-363	SCH
1	EA	SURFACE CLOSER	4111 SCUSH	LCN
	EA	WEATHERSTRIP	BY DR/FR SUPPLIER	
1	EA	DOOR SWEEP (BRUSH)	8192	ZER
1	EA	THRESHOLD	PROFILE AS REQUIRED	ZER
1	EA	RAIN DRIP	142A	ZER
1	EA	DOOR CONTACT	7764	SCE

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1  
2 **FUNCTION: L9456 (F13) Corridor Lock**  
3 **Note: Door must be handed to place cylinder on the inside of storage room 221. Latchbolt retracted by lever from**  
4 **either side. Deadbolt thrown or retracted by key inside or outside thumbturn. Throwing deadbolt locks inside lever.**  
5 **Turning outside lever simultaneously retracts deadbolt and latchbolt and unlocks inside lever.**  
6

7 **Provide complete latching assembly including lock body, strike, scalp, spindle, levers, roses, cylinder, cylinder cam,**  
8 **blocking ring, and all required fasteners.**  
9 **Hardware supplier shall coordinate with related trades to insure door and frame construction will accommodate**  
10 **specified hardware.**  
11  
12  
13

14 **HW SET: 70A**

15

1	EA	CONT. HINGE	112HD	IVE
1	EA	CORRIDOR LOCK	L9456 L583-363	SCH
1	EA	SURFACE CLOSER	4111 SCUSH	LCN
	SET	WEATHERSTRIPPING	429	ZER
1	EA	DOOR SWEEP (BRUSH)	8192	ZER
1	EA	THRESHOLD	PROFILE AS REQUIRED	ZER
1	EA	RAIN DRIP	142A	ZER
1	EA	DOOR CONTACT	679 SERIES	SCE

16  
17 **FUNCTION: L9456 (F13) Corridor Lock**  
18 **Note: Door must be handed to place cylinder on the inside of storage room 221. Latchbolt retracted by lever from**  
19 **either side. Deadbolt thrown or retracted by key inside or outside thumbturn. Throwing deadbolt locks inside lever.**  
20 **Turning outside lever simultaneously retracts deadbolt and latchbolt and unlocks inside lever.**  
21  
22  
23

24 **HW SET: 70B**

25

1	EA	CONT. HINGE	112HD	IVE
1	EA	CORRIDOR LOCK	L9456 L583-363	SCH
1	EA	SURFACE CLOSER	4011	LCN
1	EA	WALL STOP	WS406/407CVX	IVE
1	SET	WEATHERSTRIPPING	429	ZER
1	EA	SURFACE DOOR BOTTOM	111	ZER
1	EA	HD THRESHOLD 1/2" X 3"	653	ZER
1	EA	THRESHOLD	PROFILE AS REQUIRED	ZER
1	EA	DOOR CONTACT	679 SERIES	SCE

26  
27 **FUNCTION: L9456 (F13) Corridor Lock**  
28 **Note: Door must be handed to place cylinder on the inside of storage room 221. Latchbolt retracted by lever from**  
29 **either side. Deadbolt thrown or retracted by key inside or outside thumb turn. Throwing deadbolt locks inside lever.**  
30 **Turning outside lever simultaneously retracts deadbolt and latchbolt and unlocks inside lever.**  
31

32 **Hardware supplier shall coordinate threshold height and profile with floor finishes and sill seal to insure a smooth**  
33 **transition between floor finishes.**  
34  
35  
36

37 **HW SET: 71**

38

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2	EA	CONT. HINGE	112HD	IVE
2	EA	TRIM	550-DT	VON
2	EA	PUSH PLATE	8200 6" X 16"	IVE
2	EA	SURFACE CLOSER	4111 EDA	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B4E CS	IVE
2	EA	WALL STOP	WS406/407CVX	IVE

1  
2  
3  
4  
5

FUNCTION: Push/Pull

**HW SET: 72**

7

2	EA	CONT. HINGE	112HD	IVE
1	EA	TWO PT CLASSRM LOCK	LM9270	SCH
2	EA	OH STOP	90S	GLY
2	EA	SURFACE CLOSER	4011 / 4111 EDA	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B4E CS	IVE
2	EA	DOOR CONTACT	679 SERIES	SCE

8

FUNCTION: LM9270 Classroom Lock

10 Latchbolt retracted by lever from either side unless outside is locked by key. Unlocked from outside by key. Inside  
11 lever always free for immediate exit. Auxiliary latch deadlocks latchbolt when door is closed.

12  
13  
14

**HW SET: 74A-F**

16

2	EA	INTERCHANGEABLE CORE	CYLINDER AS REQUIRED	SCH
---	----	-------------------------	----------------------	-----

17

18 Balance of hardware by door supplier. See SECTION 08 44 10 FIRE RATED ALUMINUM CURTAIN WALL.  
19 Hardware supplier shall coordinate with related trades to determine cylinder type and quantity will accommodate  
20 hardware.

21  
22  
23

**HW SET: 75**

25

1	EA	CONT. HINGE	112HD	IVE
1	EA	FIRE EXIT DEVICE	99L-F	VON
1	EA	INTERCHANGEABLE CORE	CYLINDER AS REQUIRED	SCH
1	EA	SURFACE CLOSER	4111 SCUSH	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B4E CS	IVE
1	EA	SMOKE SEALS	188S (AT RATED OR SMOKE & DRAFT CONTROL DRS ONLY)	ZER

26

27 FUNCTION: (L) Latchbolt retracted inside by exit device push pad and outside by lever. Key in exterior cylinder locks  
28 or unlocks lever.

29  
30  
31  
32  
33

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1

**END OF SECTION**

**SECTION 08 80 00**  
**GLAZING**

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31 **PART 1 - GENERAL**

32 **1.1 RELATED DOCUMENTS**

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

35 **1.2 SUMMARY**

- 36 A. Section includes:
- 37 1. Glass for windows, doors, interior borrowed lites, storefront framing, glazed curtain walls, skylights.
  - 38 2. Glazing sealants and accessories.

39 **1.3 COORDINATION**

- 40 A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face  
41 clearances, and adequate sealant thicknesses, with reasonable tolerances.

42 **1.4 ACTION SUBMITTALS**

- 43 A. Product Data: For each type of product.
- 44 B. Sustainable Design Submittals:
- 45 1. Product Data: For sealants, indicating VOC content.
  - 46 2. Laboratory Test Reports: For sealants, indicating compliance with requirements for low-emitting  
47 materials.
- 48 C. Glass Samples: For each type of glass product other than clear monolithic vision glass; 12 inches square.
- 49 D. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same  
50 designations indicated on Drawings.
- 51 E. Delegated-Design Submittal: For glass indicated to comply with performance requirements and design  
52 criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their  
53 preparation.

- 1 **1.5 INFORMATIONAL SUBMITTALS**  
2 A. Preconstruction adhesion and compatibility test report.
- 3 **1.6 QUALITY ASSURANCE**  
4 A. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021  
5 to conduct the testing indicated.
- 6 **1.7 PRECONSTRUCTION TESTING**  
7 A. Preconstruction Adhesion and Compatibility Testing: Test each glass product, tape sealant, gasket, glazing  
8 accessory, and glass-framing member for adhesion to and compatibility with elastomeric glazing sealants.  
9 1. Testing is not required if data are submitted based on previous testing of current sealant products  
10 and glazing materials matching those submitted.
- 11 **1.8 WARRANTY**  
12 A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer agrees to replace coated-glass  
13 units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects  
14 developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated  
15 glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications  
16 of deterioration in coating.  
17 1. Warranty Period: 10 years from date of Substantial Completion.  
18 B. Manufacturer's Special Warranty for Laminated Glass: Manufacturer agrees to replace laminated-glass units  
19 that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects  
20 developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated  
21 glass contrary to manufacturer's written instructions. Defects include edge separation, delamination  
22 materially obstructing vision through glass, and blemishes exceeding those allowed by referenced  
23 laminated-glass standard.  
24 1. Warranty Period: 10 years from date of Substantial Completion.  
25 C. Manufacturer's Special Warranty for Insulating Glass: Manufacturer agrees to replace insulating-glass units  
26 that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of  
27 hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning  
28 insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision  
29 by dust, moisture, or film on interior surfaces of glass.  
30 1. Warranty Period: 10 years from date of Substantial Completion.

31 **PART 2 - PRODUCTS**

- 32 **2.1 MANUFACTURERS**  
33 A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may  
34 be incorporated into the Work include, but are not limited to the following:  
35 1. Guardian Industries Corp.; SunGuard.  
36 2. Oldcastle BuildingEnvelope™.  
37 3. PPG Flat Glass; PPG Industries, Inc.  
38 4. Viracon, Inc.
- 39 **2.2 PERFORMANCE REQUIREMENTS**  
40 A. Delegated Design: Engage a qualified professional engineer licensed in the State of Wisconsin, as defined  
41 in Section 01 40 00 "Quality Requirements," to design glazing.  
42 B. Structural Performance: Glazing shall withstand the following design loads within limits and under conditions  
43 indicated determined according to the International Building Code and ASTM E 1300.  
44 1. Design Wind Pressures: As indicated on Drawings.  
45 2. Design Snow Loads: 40 PSF.  
46 3. Thickness of Patterned Glass: Base design of patterned glass on thickness at thinnest part of the  
47 glass.  
48 4. Differential Shading: Design glass to resist thermal stresses induced by differential shading within  
49 individual glass lites.  
50 C. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201,  
51 Category II.  
52

- 1 D. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as  
2 indicated in manufacturer's published test data, based on procedures indicated below:  
3 1. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2  
4 computer program, expressed as Btu/sq. ft. x h x deg F.  
5 2. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to  
6 NFRC 200 and based on LBL's WINDOW 5.2 computer program.  
7 3. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

8 **2.3 GLASS PRODUCTS, GENERAL**

- 9 A. Glazing Publications: Comply with published recommendations of glass product manufacturers and  
10 organizations below unless more stringent requirements are indicated. See these publications for glazing  
11 terms not otherwise defined in this Section or in referenced standards.  
12 1. GANA Publications: "Laminated Glazing Reference Manual" and "Glazing Manual."  
13 2. AAMA Publications: AAMA GDSG-1, "Glass Design for Sloped Glazing," and AAMA TIR A7, "Sloped  
14 Glazing Guidelines."  
15 3. IGMA Publication for Sloped Glazing: IGMA TB-3001, "Guidelines for Sloped Glazing."  
16 4. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for  
17 Sealed Insulating Glass Units for Commercial and Residential Use."  
18 B. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label  
19 of the SGCC or another certification agency acceptable to authorities having jurisdiction. Label shall indicate  
20 manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.  
21 C. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component  
22 lite of units with appropriate certification label of IgCC.  
23 D. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass that complies with  
24 performance requirements and is not less than the thickness indicated.  
25 E. Strength: Where annealed float glass is indicated, provide annealed float glass, heat-strengthened float  
26 glass, or fully tempered float glass. Where heat-strengthened float glass is indicated, provide heat-  
27 strengthened float glass or fully tempered float glass. Where fully tempered float glass is indicated, provide  
28 fully tempered float glass.

29 **2.4 GLASS PRODUCTS**

- 30 A. Clear Annealed Float Glass: ASTM C 1036, Type I, Class 1 (clear), Quality-Q3.  
31 B. Fully Tempered Float Glass: ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated) unless  
32 otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.  
33 C. Heat-Strengthened Float Glass: ASTM C 1048, Kind HS (heat strengthened), Type I, Condition A  
34 (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.  
35 D. Ceramic-Coated Vision Glass: ASTM C 1048, Condition C, Type I, Class 1 (clear) or Class 2 (tinted) as  
36 indicated, Quality-Q3; and complying with Specification No. 95-1-31 in GANA's "Engineering Standards  
37 Manual."

38 **2.5 LAMINATED GLASS**

- 39 A. Laminated Glass: ASTM C 1172. Use materials that have a proven record of no tendency to bubble, discolor,  
40 or lose physical and mechanical properties after fabrication and installation.  
41 1. Construction: Laminated glass with polyvinyl butyral interlayer to comply with interlayer manufacturer's  
42 written instructions.  
43 2. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with  
44 requirements.  
45 3. Interlayer Color: Clear unless otherwise indicated.

46 **2.6 INSULATING GLASS**

- 47 A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a  
48 dehydrated interspace, qualified according to ASTM E 2190.  
49 1. Sealing System: Dual seals.  
50 2. Spacer: Thermally broken Aluminum with mill or clear anodic finish.  
51



- 1     **2.7     GLAZING SEALANTS**
- 2     A.     General:
- 3         1.     Compatibility: Compatible with one another and with other materials they contact, including glass
- 4             products, seals of insulating-glass units, and glazing channel substrates, under conditions of service
- 5             and application, as demonstrated by sealant manufacturer based on testing and field experience.
- 6         2.     Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing
- 7             sealants suitable for applications indicated and for conditions existing at time of installation.
- 8         3.     Sealant shall have a VOC content of 250 g/L or less.
- 9         4.     Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.
- 10     B.     Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS,
- 11         Class 100/50, Use NT or as recommended by glass manufacturer for glazing application.
- 12     **2.8     GLAZING TAPES**
- 13     A.     Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape;
- 14         nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as
- 15         recommended in writing by tape and glass manufacturers for application indicated; and complying with
- 16         ASTM C 1281 and AAMA 800 for products indicated below:
- 17         1.     AAMA 804.3 tape, where indicated.
- 18         2.     AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
- 19         3.     AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.
- 20     B.     Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both
- 21         surfaces; and complying with AAMA 800 for the following types:
- 22         1.     AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
- 23         2.     AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of
- 24             liquid sealant.
- 25     **2.9     MISCELLANEOUS GLAZING MATERIALS**
- 26     A.     Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- 27     B.     Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
- 28     C.     Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to
- 29         maintain glass lites in place for installation indicated.
- 30     D.     Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).
- 31     E.     Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to
- 32         control glazing sealant depth and otherwise produce optimum glazing sealant performance.

33     **PART 3 - EXECUTION**

- 34     **3.1     GLAZING, GENERAL**
- 35     A.     Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing
- 36         materials, unless more stringent requirements are indicated, including those in referenced glazing
- 37         publications.
- 38     B.     Protect glass edges from damage during handling and installation. Remove damaged glass from Project
- 39         site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other
- 40         imperfections that, when installed, could weaken glass, impair performance, or impair appearance.
- 41     C.     Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction
- 42         testing.
- 43     D.     Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless
- 44         otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel
- 45         bead.
- 46     E.     Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- 47     F.     Provide spacers for glass lites where length plus width is larger than 50 inches.
- 48     G.     Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing
- 49         channel, as recommended in writing by glass manufacturer and according to requirements in referenced
- 50         glazing publications.
- 51

- 1 **3.2 TAPE GLAZING**
- 2 A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or
- 3 protrude slightly above sightline of stops.
- 4 B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them
- 5 fit opening.
- 6 C. Cover vertical framing joints by applying tapes to heads and sills first, then to jambs. Cover horizontal framing
- 7 joints by applying tapes to jambs, then to heads and sills.
- 8 D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in
- 9 tapes with compatible sealant approved by tape manufacturer.
- 10 E. Apply heel bead of elastomeric sealant.
- 11 F. Center glass lites in openings on setting blocks, and press firmly against tape by inserting dense
- 12 compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket
- 13 applications at corners and work toward centers of openings.
- 14 G. Apply cap bead of elastomeric sealant over exposed edge of tape.
- 15 **3.3 GASKET GLAZING (DRY)**
- 16 A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with
- 17 allowance for stretch during installation.
- 18 B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints
- 19 miter cut and bonded together at corners.
- 20 C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks, and press firmly
- 21 against soft compression gasket by inserting dense compression gaskets formed and installed to lock in
- 22 place against faces of removable stops. Start gasket applications at corners and work toward centers of
- 23 openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass.
- 24 Seal gasket joints with sealant recommended by gasket manufacturer.
- 25 D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks, and press firmly
- 26 against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying
- 27 pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without
- 28 developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- 29 E. Install gaskets so they protrude past face of glazing stops.
- 30 **3.4 SEALANT GLAZING (WET)**
- 31 A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and
- 32 glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel
- 33 and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in
- 34 position to control depth of installed sealant relative to edge clearance for optimum sealant performance.
- 35 B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant
- 36 to glass and channel surfaces.
- 37 C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.
- 38 **3.5 CLEANING AND PROTECTION**
- 39 A. Immediately after installation remove nonpermanent labels and clean surfaces.
- 40 B. Protect glass from contact with contaminating substances resulting from construction operations. Examine
- 41 glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during
- 42 construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.
- 43 1. If, despite such protection, contaminating substances do come into contact with glass, remove
- 44 substances immediately as recommended in writing by glass manufacturer. Remove and replace
- 45 glass that cannot be cleaned without damage to coatings.
- 46 C. Remove and replace glass that is damaged during construction period.
- 47 **3.6 MONOLITHIC GLASS SCHEDULE**
- 48 A. Glass Type GL-1; GL-2: Clear float glass, tempered where indicated on the drawings.
- 49 1. Minimum Thickness: Refer to Material Tag index.
- 50 2. Safety glazing required where indicated on the drawings.
- 51

- 1     **3.7     LAMINATED GLASS SCHEDULE**
- 2     A.     Glass Type Component of GL-5, or safety glass alternate to fully tempered safety glass: Clear laminated
- 3     glass with two plies of annealed float glass.
- 4         1.     Minimum Thickness of Each Glass Ply: 6 mm.
- 5         2.     Interlayer Thickness: 0.060 inch.
- 6         3.     Safety glazing required.
- 7     B.     Glass Type GL-8: Tinted laminated glass with two plies of clear fully tempered float glass and tinted
- 8     interlayer.
- 9         1.     Basis-of-Design Product: Saflex Vanceva Range of opaque color interlayer laminated glass products.
- 10        2.     Minimum Thickness of Each Glass Ply: 6 mm.
- 11        3.     Interlayer Thickness: 0.060 inch.
- 12        4.     Interlayer Color: Blue-green
- 13        5.     Visible Light Transmittance: N.A..
- 14        6.     Solar Heat Gain Coefficient: N.A.
- 15        7.     Safety glazing required.
- 
- 16     **3.8     INSULATING GLASS SCHEDULE**
- 17     A.     Glass Type GL-3: Low-E-coated, clear insulating glass to new exterior windows and curtain wall.
- 18         1.     Basis-of-Design Product: Oldcastle: Solarban
- 19         2.     Overall Unit Thickness: 1 inch.
- 20         3.     Minimum Thickness of Each Glass Lite: 6 mm.
- 21         4.     Outdoor Lite: 1/4 inch Heat-strengthened float glass.
- 22         5.     Interspace Content: Argon.
- 23         6.     Indoor Lite: 1/4 inch Annealed float glass.
- 24         7.     Low-E Coatings: Pyrolytic on second, hard low-e on fourth surface.
- 25         8.     Winter Nighttime U-Factor: 0.19 btu/hr-sf-F maximum.
- 26         9.     Summer Daytime U-Factor: 0.16 btu/hr-sf-F maximum.
- 27         10.    Visible Light Transmittance: 60 percent minimum
- 28         11.    Exterior reflectance: 12%.
- 29         12.    Solar Heat Gain Coefficient: 0.26 maximum.
- 30         13.    Safety glazing required where noted on the drawings.
- 31     B.     Glass Type GL-4: Low-E-coated, clear insulating glass to Interior Accessory Windows.
- 32         1.     Basis-of-Design Product: PPG: Solaban 70XL.
- 33         2.     Overall Unit Thickness: 1 inch.
- 34         3.     Minimum Thickness of Each Glass Lite: 6 mm.
- 35         4.     Outdoor Lite: Annealed float glass.
- 36         5.     Interspace Content: Argon.
- 37         6.     Indoor Lite: Annealed float glass.
- 38         7.     Low-E Coating: Pyrolytic on second surface.
- 39         8.     Winter Nighttime U-Factor: 0.28 btu/hr-sf-F maximum.
- 40         9.     Summer Daytime U-Factor: 0.26 btu/hr-sf-F maximum.
- 41         10.    Visible Light Transmittance: 64 percent minimum.
- 42         11.    Exterior reflectance: 12%.
- 43         12.    Solar Heat Gain Coefficient: 0.27 maximum.
- 44         13.    Safety glazing required where indicated on the drawings.
- 45

3.9 INSULATING-LAMINATED-GLASS SCHEDULE

- A. Glass Type GL-5: Clear insulating laminated glass to interior, acoustical partitions.
1. Basis-of-Design Product: PPG: Solarban 70XL Starphire.
  2. Overall Unit Thickness: 1-1/16 inch.
  3. Minimum Thickness of Outdoor Lite: 6 mm.
  4. Outdoor Lite: Annealed float glass.
  5. Interspace Content: Air.
  6. Indoor Lite: Clear laminated glass with two plies of annealed float glass.
    - a. Minimum Thickness of Each Glass Ply: 6 mm.
    - b. Interlayer Thickness: 0.060 inch.
  7. Low-E Coating: none.
  8. Winter Nighttime U-Factor: n.a.
  9. Summer Daytime U-Factor: n.a.
  10. Visible Light Transmittance: 70 percent minimum.
  11. Solar Heat Gain Coefficient: n.a.
  12. Safety glazing required where indicated on the drawings.
- B. Glass Type GL-7: Low-E-coated, clear insulating laminated glass to skylight.
1. Basis-of-Design Product: Oldcastle: Solarban 60 Starphire.
  2. Overall Unit Thickness: 1-3/16 inch.
  3. Minimum Thickness of Outdoor Lite: 6 mm.
  4. Outdoor Lite: Fully tempered float glass with warm grey 50% ceramic frit, Standard Line Pattern on surface 1 or 2.
  5. Interspace Content: Argon.
  6. Indoor Lite: 9/16" clear PPG Starphire laminated glass with two plies of fully tempered float glass.
    - a. Minimum Thickness of Each Glass Ply: 6 mm.
    - b. Interlayer Thickness: 0.090 inch.
  7. Low-E Coating: Pyrolytic on third surface.
  8. Winter Nighttime U-Factor: 0.28 btu/hr-sf-F maximum.
  9. Summer Daytime U-Factor: 0.27 btu/hr-sf-F maximum.
  10. Visible Light Transmittance: 46 percent minimum.
  11. Solar Heat Gain Coefficient: 0.32 maximum.
  12. Safety glazing required.

END OF SECTION

SECTION 08 81 13  
DECORATIVE GLASS GLAZING

1  
2  
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4 1.1 [RELATED DOCUMENTS](#)  
5 1.2 [SUMMARY](#)  
6 1.3 [ACTION SUBMITTALS](#)  
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8 1.5 [CLOSEOUT SUBMITTALS](#)  
9 1.6 [QUALITY ASSURANCE](#)  
10 PART 2 – PRODUCTS  
11 2.1 [GLASS PRODUCTS](#)  
12 PART 3 – EXECUTION  
13 3.1 [PREPARATION](#)  
14 3.2 [INSTALLATION](#)  
15 3.3 [GLAZING, GENERAL](#)  
16 3.4 [DECORATIVE GLASS SCHEDULE](#)

17 **PART 1 - GENERAL**

18 **1.1 RELATED DOCUMENTS**

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

21 **1.2 SUMMARY**

- 22 A. Section Includes:  
23 1. Glass with decorative film overlay.  
24 B. Related Sections:  
25 1. Section 08 80 00 "Glazing" for glass substrate for decorative film.

26 **1.3 ACTION SUBMITTALS**

- 27 A. Product Data: For each type of product.  
28 B. Glass Samples: For each type of decorative glass, 12 inches square of decorative film on 1/4 inch clear  
29 glass.  
30 C. Decorative Glazing Schedule: List decorative glass types for each location. Use same designations indicated  
31 on Drawings.

32 **1.4 INFORMATIONAL SUBMITTALS**

- 33 A. Product Certificates: For each type of decorative glass.

34 **1.5 CLOSEOUT SUBMITTALS**

- 35 A. Maintenance data.

36 **1.6 QUALITY ASSURANCE**

- 37 A. Mockup: Refer to Section 01 43 39 – Mockups for description of construction required to complete a  
38 mockup submittal for review.  
39 1. Typical window film WF-1 and WF-2 on conference room storefront system GLWS-2 glass panel.  
40 Min. width one glass panel width of finally installed system panel.  
41

1 **PART 2 - PRODUCTS**

2 **2.1 GLASS PRODUCTS**

- 3 A. Decorative Film Overlay: Translucent, dimensionally stable, cast PVC film, 2-mil-minimum thickness, with  
4 pressure-sensitive, clear adhesive back for adhering to glass and releasable protective backing.
- 5 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products  
6 that may be incorporated into the Work include, but are not limited to the following:
- 7 a. 3M.  
8 b. Avery Dennison Graphics.  
9 c. FDC Graphic Films, Inc.
- 10 2. Colors: As selected by Architect from manufacturer's full range.

11 **PART 3 - EXECUTION**

12 **3.1 PREPARATION**

- 13 A. Clean glass.

14 **3.2 INSTALLATION**

- 15 A. Install film. Remove nonpermanent labels and clean surfaces.

16 **3.3 GLAZING, GENERAL**

- 17 A. Decorative Glass: Install glazing film.

18 **3.4 DECORATIVE GLASS SCHEDULE**

- 19 A. Decorative Glass Type GL-2: Glass with decorative film overlay WF-1.
- 20 1. Basis-of-Design Product: 3M Fasara Decorative Film: 10% VLT.  
21 2. Glass Type: Clear float glass.  
22 3. Tint Color: Opaque White.  
23 4. Glass Thickness: 4.0 mm.  
24 5. Safety glazing required.  
25 6. Use: Suitable for interior applications.  
26 7. Patterns: As indicated on the drawings.

27 **END OF SECTION**

SECTION 08 88 13  
FIRE-RESISTANT GLAZING

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- 2
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- 10 PART 2 – PRODUCTS
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- 13 2.3 [FIRE-RESISTANCE-RATED GLAZING](#)
- 14 2.4 [GLAZING ACCESSORIES](#)
- 15 PART 3 – EXECUTION
- 16 3.1 [GLAZING](#)
- 17 3.2 [CLEANING AND PROTECTION](#)
- 18 3.3 [FIRE-RESISTANCE-RATED GLAZING SCHEDULE](#)

19 **PART 1 - GENERAL**

20 **1.1 RELATED DOCUMENTS**

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

23 **1.2 SUMMARY**

- 24 A. Section Includes:  
25 1. Fire-resistance-rated glazing.

26 **1.3 COORDINATION**

- 27 A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face  
28 clearances, and adequate sealant thicknesses, with reasonable tolerances.

29 **1.4 ACTION SUBMITTALS**

- 30 A. Product Data: For each type of product.  
31 B. Sustainable Design Submittals:  
32 1. Product Data: For sealants, indicating VOC content.  
33 2. Laboratory Test Reports: For sealants, indicating compliance with requirements for low-emitting  
34 materials.  
35 C. Glass Samples: For each type of glass product; 12 inches square.  
36 D. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same  
37 designations indicated on Drawings.

38 **1.5 QUALITY ASSURANCE**

- 39 A. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic  
40 effects and set quality standards for materials and execution.  
41 B. Mockup: Refer to Section 01 43 39 – Mockups for description of construction required to complete a  
42 mockup submittal for review.  
43 1. Typical window film WF-1 and WF-2 on conference room storefront system GLWS-2 glass panel.  
44 Min. width one glass panel width of finally installed system panel.  
45

- 1 **1.6 WARRANTY**  
2 A. Manufacturer's Special Warranty on Laminated Glass: Manufacturer agrees to replace laminated-glass units  
3 that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects  
4 developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated  
5 glass contrary to manufacturer's written instructions. Defects include edge separation, delamination  
6 materially obstructing vision through glass, and blemishes exceeding those allowed by referenced  
7 laminated-glass standard.  
8 1. Warranty Period: 10 years from date of Substantial Completion.

9 **PART 2 - PRODUCTS**

10 **2.1 GLASS PRODUCTS, GENERAL**

- 11 A. Glazing Publications: Comply with published recommendations of glass product manufacturers and  
12 organization below unless more stringent requirements are indicated. Refer to these publications for glazing  
13 terms not otherwise defined in this Section or in referenced standards.  
14 1. GANA Publications: "Laminated Glazing Reference Manual" and "Glazing Manual."  
15 B. Safety Glazing Labeling: Permanently mark glazing with certification label of the Safety Glazing Certification  
16 Council or another certification agency acceptable to authorities having jurisdiction. Label shall indicate  
17 manufacturer's name, type of glass, glass thickness, and safety glazing standard with which glass complies.

18 **2.2 GLASS PRODUCTS**

- 19 A. Laminated Glass: ASTM C 1172. Use materials that have a proven record of no tendency to bubble, discolor,  
20 or lose physical and mechanical properties after fabrication and installation.

21 **2.3 FIRE-RESISTANCE-RATED GLAZING**

- 22 A. Fire-Resistance-Rated Glazing: Listed and labeled by a testing agency acceptable to authorities having  
23 jurisdiction, for fire-resistance ratings indicated, based on testing according to ASTM E 119 or UL 263.  
24 B. Fire-Resistance-Rated Glazing Labeling: Permanently mark fire-resistance-rated glazing with certification  
25 label of a testing agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's  
26 name, test standard, that the glazing is approved for use in walls, and the fire-resistance rating in minutes.  
27 C. 120 minute fire resisting Laminated Glass with Intumescent Interlayers: Laminated glass made from multiple  
28 plies of uncoated, ultraclear float glass; with intumescent interlayers; and complying with 16 CFR 1201,  
29 Category II.  
30 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products  
31 that may be incorporated into the Work include, but are not limited to the following:  
32 a. Pilkington North America: PyroStop.  
33 b. SAFTI FIRST Fire Rated Glazing Solutions: SuperLite III-XL.  
34 c. Technical Glass Products: FireLite PLUS.  
35 d. Vetrotech Saint-Gobain: SGG Contraflam.

36 **2.4 GLAZING ACCESSORIES**

- 37 A. Provide glazing gaskets, glazing sealants, glazing tapes, setting blocks, spacers, edge blocks, and other  
38 glazing accessories that are compatible with glazing products and each other and are approved by testing  
39 agencies that listed and labeled fire-resistant glazing products with which products are used for applications  
40 and fire-protection ratings indicated.  
41 B. Glazing Sealants for Fire-Rated Glazing Products: Neutral-curing silicone glazing sealant complying with  
42 ASTM C 920, Type S, Grade NS, Class 50, Use NT. Comply with sealant and glass manufacturers' written  
43 instructions for selecting glazing sealants suitable for applications indicated.  
44 1. Sealant shall have a VOC content of 250 g/L or less.  
45 2. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.  
46



1 **PART 3 - EXECUTION**

2 **3.1 GLAZING**

- 3 A. Use methods approved by testing agencies that listed and labeled fire-resistant glazing products.
- 4 B. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing  
5 materials unless more stringent requirements are indicated, including those in referenced glazing  
6 publications.
- 7 C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project  
8 site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections  
9 that, when installed, could weaken glass and impair performance and appearance.
- 10 D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction  
11 testing.
- 12 E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications unless  
13 otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel  
14 bead.
- 15 F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- 16 G. Provide spacers for glass lites where length plus width is larger than 50 inches.
- 17 H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing  
18 channel, as recommended in writing by glass manufacturer and according to requirements in referenced  
19 glazing publications.

20 **3.2 CLEANING AND PROTECTION**

- 21 A. Immediately after installation, remove nonpermanent labels and clean surfaces.
- 22 B. Protect glass from contact with contaminating substances resulting from construction operations. Examine  
23 glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during  
24 construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.
- 25 1. If, despite such protection, contaminating substances do come into contact with glass, remove  
26 substances immediately as recommended in writing by glass manufacturer.
- 27 C. Remove and replace glass that is damaged during construction period.

28 **3.3 FIRE-RESISTANCE-RATED GLAZING SCHEDULE**

- 29 A. Glass Type (FRGL-1): 120-minute fire-resistance-rated glazing with 450 deg F temperature-rise limitation;  
30 laminated glass with intumescent interlayers

31 **END OF SECTION**

**SECTION 08 88 53**  
**SECURITY GLAZING**

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- 15 2.4 [GLAZING SEALANTS](#)
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- 18 PART 3 – EXECUTION
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- 20 3.2 [TAPE GLAZING](#)
- 21 3.3 [SEALANT GLAZING \(WET\)](#)
- 22 3.4 [CLEANING AND PROTECTION](#)
- 23 3.5 [LAMINATED-GLASS SECURITY GLAZING SCHEDULE](#)

24 **PART 1 - GENERAL**

25 **1.1 RELATED DOCUMENTS**

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

28 **1.2 SUMMARY**

- 29 A. Section includes forced entry security laminated glass.

30 **1.3 COORDINATION**

- 31 A. Coordinate glazing channel dimensions to provide necessary bite on security glazing, minimum edge and
- 32 face clearances, and adequate sealant thicknesses, with reasonable tolerances.

33 **1.4 ACTION SUBMITTALS**

- 34 A. Product Data: For each type of product.
- 35 B. Sustainable Design Submittals:
  - 36 1. Product Data: For sealants, indicating VOC content.
- 37 C. Security Glazing Samples: For each type of security glazing; 12 inches square.
- 38 D. Security Glazing Schedule: List security glazing types and thicknesses for each size opening and location.
- 39 Use same designations indicated on Drawings. Indicate coordinated dimensions of security glazing and
- 40 construction that receives security glazing, including clearances and glazing channel dimensions.
- 41 E. Delegated-Design Submittal: For security glazing indicated to comply with performance requirements and
- 42 design criteria, including analysis data signed and sealed by the qualified professional engineer responsible
- 43 for their preparation.

44 **1.5 INFORMATIONAL SUBMITTALS**

- 45 A. Product Test Reports: For each type of security glazing, for tests performed by a qualified testing agency.
- 46 B. Preconstruction adhesion and compatibility test reports.
- 47

1 **1.6 PRECONSTRUCTION TESTING**

- 2 A. Preconstruction Adhesion and Compatibility Testing: Test each security glazing type, tape sealant, gasket,  
3 glazing accessory, and glazing-framing member for adhesion to and compatibility with elastomeric glazing  
4 sealants.  
5 1. Testing will not be required if data based on previous testing of current sealant products and glazing  
6 materials match those submitted.

7 **1.7 WARRANTY**

- 8 A. Manufacturer's Special Warranty on Laminated Glass: Manufacturer agrees to replace laminated glass that  
9 deteriorates within specified warranty period. Deterioration of laminated glass is defined as defects  
10 developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated  
11 glass contrary to manufacturer's written instructions. Defects include edge separation, delamination  
12 materially obstructing vision through glass, and blemishes exceeding those allowed by referenced  
13 laminated-glass standard.  
14 1. Warranty Period: 10 years from date of Substantial Completion.

15 **PART 2 - PRODUCTS**

16 **2.1 PERFORMANCE REQUIREMENTS**

- 17 A. Delegated Design: Engage a qualified professional engineer licensed in the State of Wisconsin, as defined  
18 in Section 01 40 00 "Quality Requirements," to design security glazing.  
19 B. Structural Performance: Glazing shall withstand the following design loads within limits and under conditions  
20 indicated.  
21 1. Design Procedure for Glass: ASTM E 1300 and ICC's International Building Code.  
22 2. Design Wind Pressures: As indicated on Drawings.  
23 C. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category  
24 II.

25 **2.2 SECURITY GLAZING, GENERAL**

- 26 A. Glazing Publications: Comply with published recommendations of security glazing and glazing material  
27 manufacturers and organizations below unless more stringent requirements are indicated. Refer to these  
28 publications for glazing terms not otherwise defined in this Section or in referenced standards.  
29 1. GANA Publications: "Laminated Glazing Reference Manual" and "Glazing Manual."  
30 B. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label  
31 of the Safety Glazing Certification Council or another certification agency acceptable to authorities having  
32 jurisdiction. Label shall indicate manufacturer's name, type of glazing, glass thickness, and safety glazing  
33 standard with which glazing complies.

34 **2.3 GLASS PRODUCTS**

- 35 A. Float Glass: ASTM C 1036, Type I, Quality-Q3, Class I (clear) unless otherwise indicated.  
36 B. Heat-Treated Float Glass: ASTM C 1048; Type I; Quality-Q3; Class I (clear) unless otherwise indicated; of  
37 kind and condition indicated.

38 **2.4 LAMINATED GLASS**

- 39 A. Laminated Glass: ASTM C 1172. Use materials that have a proven record of no tendency to bubble, discolor,  
40 or lose physical and mechanical properties after fabrication and installation.  
41 1. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with  
42 requirements.  
43 2. Interlayer Color: Clear unless otherwise indicated.  
44

- 1 **2.5 GLAZING SEALANTS**
- 2 A. General:
- 3 1. Compatibility: Provide glazing sealants that are compatible with one another and with other materials
- 4 they contact, including security glazing, seals of insulating security glazing and air-gap security
- 5 glazing, and glazing channel substrates, under conditions of service and application, as
- 6 demonstrated by sealant manufacturer based on testing and field experience.
- 7 2. Suitability: Comply with sealant and security glazing manufacturers' written instructions for selecting
- 8 glazing sealants suitable for applications indicated and for conditions existing at time of installation.
- 9 3. Sealant shall have a VOC content of 250 g/L or less.
- 10 4. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.
- 11 B. Security Sealant: Manufacturer's standard, nonsag, tamper-resistant sealant for joints with low movement
- 12 complying with ASTM C 920, Grade NS, Class 12.5 or 25, Use NT, and with a Shore A hardness of at least
- 13 45 when tested according to ASTM C 661.
- 14 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products
- 15 that may be incorporated into the Work include, but are not limited to the following:
- 16 a. BASF Corporation; Construction Systems.
- 17 b. Pecora Corporation.
- 18 **2.6 GLAZING TAPES**
- 19 A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape;
- 20 nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as
- 21 recommended in writing by tape and security glazing manufacturers for application indicated; and complying
- 22 with ASTM C 1281 and AAMA 800 for products indicated below:
- 23 1. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
- 24 2. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.
- 25 B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both
- 26 surfaces; and complying with AAMA 800 for the following types:
- 27 1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
- 28 2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of
- 29 liquid sealant.
- 30 **2.7 MISCELLANEOUS GLAZING MATERIALS**
- 31 A. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- 32 B. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
- 33 C. Spacers: Elastomeric blocks or continuous extrusions of hardness required by security glazing manufacturer
- 34 to maintain security glazing lites in place for installation indicated.
- 35 D. Edge Blocks: Elastomeric material of hardness needed to limit security glazing lateral movement (side
- 36 walking).
- 37 E. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to
- 38 control glazing sealant depth and otherwise produce optimum glazing sealant performance.
- 39 **2.8 FABRICATION OF SECURITY GLAZING**
- 40 A. Fabricate security glazing in sizes required to fit openings indicated for Project, with edge and face
- 41 clearances, edge and surface conditions, and bite complying with written instructions of product
- 42 manufacturer and referenced glazing publications, to comply with system performance requirements.
- 43

1 **PART 3 - EXECUTION**

2 **3.1 GLAZING, GENERAL**

- 3 A. Comply with combined written instructions of manufacturers of security glazing, sealants, gaskets, and other  
4 glazing materials unless more stringent requirements are indicated, including those in referenced glazing  
5 publications.  
6 B. Protect edges of security glazing from damage during handling and installation. Remove damaged security  
7 glazing from Project site and legally dispose of off Project site. Damaged security glazing includes units with  
8 edge or face damage or other imperfections that, when installed, could weaken security glazing and impair  
9 performance and appearance.  
10 C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction  
11 testing.  
12 D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications unless  
13 otherwise required by glazing unit manufacturer. Set blocks in thin course of compatible sealant suitable for  
14 heel bead.  
15 E. Do not exceed edge pressures stipulated by security glazing manufacturers for installing lites.  
16 F. Provide spacers for security glazing lites where the length plus width is larger than 50 inches.  
17 G. Provide edge blocking where indicated or needed to prevent security glazing from moving sideways in  
18 glazing channel, as recommended in writing by security glazing manufacturer and according to requirements  
19 in referenced glazing publications.

20 **3.2 TAPE GLAZING**

- 21 A. Position tapes on fixed stops so that, when compressed by security glazing, their exposed edges are flush  
22 with or protrude slightly above sightline of stops.  
23 B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them  
24 fit opening.  
25 C. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal  
26 framing joints by applying tapes to jambs and then to heads and sills.  
27 D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in  
28 tapes with compatible sealant approved by tape manufacturer.  
29 E. Do not remove release paper from tape until just before each glazing unit is installed.  
30 F. Apply heel bead of elastomeric sealant.  
31 G. Center security glazing in openings on setting blocks and press firmly against tape by inserting dense  
32 compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket  
33 applications at corners and work toward centers of openings.  
34 H. Apply cap bead of elastomeric sealant over exposed edge of tape.

35 **3.3 SEALANT GLAZING (WET)**

- 36 A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between security glazing  
37 and glazing stops to maintain face clearances and to prevent sealant from extruding into glazing channel  
38 and blocking weep systems. Secure spacers or spacers and backings in place and in position to control  
39 depth of installed sealant relative to edge clearance for optimum sealant performance.  
40 B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant  
41 to security glazing and channel surfaces.  
42 C. Tool exposed surfaces of sealants to provide a substantial washaway from security glazing.

43 **3.4 CLEANING AND PROTECTION**

- 44 A. Immediately after installation remove nonpermanent labels and clean surfaces.  
45 B. Protect security glazing from contact with contaminating substances resulting from construction operations,  
46 including weld splatter.  
47 1. If, despite such protection, contaminating substances do come into contact with security glazing,  
48 remove substances immediately as recommended in writing by security glazing manufacturer.  
49 Remove and replace security glazing that cannot be cleaned without damage.  
50

- 1 **3.5 LAMINATED-GLASS SECURITY GLAZING SCHEDULE**  
2 A. Security Glazing (Type SGL-1): Clear laminated glass.  
3 1. Products: Subject to compliance with requirements, available products that may be incorporated into  
4 the Work include, but are not limited to, the following:  
5 2. Basis for design Oldcastle BuildingEnvelope® ArmorProtect® Plus #121000.  
6 3. Type SG-FE1 - Glass-clad polycarbonate, Clear: Inner and outer lites shall be 3mm heat  
7 strengthened glass with a single ply polycarbonate core. Overall nominal thickness shall be 7/16".  
8 Product shall comply with:  
9 a. HPW-TP-0500, Forced Entry Level 1 and Ballistics Level A, .38 Special (ballistics stoppage  
10 spall penetration)

11 **END OF SECTION**

**SECTION 08 91 19**  
**FIXED LOUVERS**

- 1
- 2
- 3 PART 1 – GENERAL
- 4 1.1 [RELATED DOCUMENTS](#)
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- 7 1.4 [INFORMATIONAL SUBMITTALS](#)
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- 9 2.1 [PERFORMANCE REQUIREMENTS](#)
- 10 2.2 [FIXED, EXTRUDED-ALUMINUM LOUVERS](#)
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- 17 3.2 [ADJUSTING](#)

18 **PART 1 - GENERAL**

19 **1.1 RELATED DOCUMENTS**

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

22 **1.2 SUMMARY**

- 23 A. Section includes fixed, extruded-aluminum louvers.
- 24 B. Related Requirements:
- 25 1. Section 08 11 13 "Hollow Metal Doors and Frames" for louvers in hollow-metal doors.
- 26 2. Section 08 14 16 "Flush Wood Doors" for louvers in flush wood doors.

27 **1.3 ACTION SUBMITTALS**

- 28 A. Product Data: For each type of product.
- 29 1. For louvers specified to bear AMCA seal, include printed catalog pages showing specified models
- 30 with appropriate AMCA Certified Ratings Seals.
- 31 B. Shop Drawings: For louvers and accessories. Include plans, elevations, sections, details, and attachments
- 32 to other work. Show frame profiles and blade profiles, angles, and spacing.
- 33 C. Samples: For each type of metal finish required.
- 34 D. Delegated-Design Submittal: For louvers indicated to comply with structural performance requirements,
- 35 including analysis data signed and sealed by the qualified professional engineer responsible for their
- 36 preparation.

37 **1.4 INFORMATIONAL SUBMITTALS**

- 38 A. Product Test Reports: Based on tests performed according to AMCA 500-L.
- 39 B. Windborne-debris-impact-resistance test reports.

40 **PART 2 - PRODUCTS**

41 **2.1 PERFORMANCE REQUIREMENTS**

- 42 A. Delegated Design: Design louvers, including comprehensive engineering analysis by a qualified
- 43 professional engineer licensed in the State of Wisconsin, using structural performance requirements and
- 44 design criteria indicated.
- 45

- 1 B. Structural Performance: Louvers shall withstand the effects of gravity loads and the following loads and  
2 stresses within limits and under conditions indicated without permanent deformation of louver components,  
3 noise or metal fatigue caused by louver-blade rattle or flutter, or permanent damage to fasteners and  
4 anchors. Wind pressures shall be considered to act normal to the face of the building.  
5 1. Wind Loads: Determine loads based on pressures as indicated on Drawings.  
6 2. Wind Loads: Determine loads based on a uniform pressure acting inward or outward.  
7 a. Refer to drawings.  
8 C. Louver Performance Ratings: Provide louvers complying with requirements specified, as demonstrated by  
9 testing manufacturer's stock units identical to those provided, except for length and width according to  
10 AMCA 500-L.

11 **2.2 FIXED, EXTRUDED-ALUMINUM LOUVERS**

- 12 A. Horizontal, Drainable-Blade Louver (LOUVER-1):  
13 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:  
14 a. Airolite Company, LLC (The).  
15 b. Greenheck Fan Corporation.  
16 c. Ruskin Company.  
17 B. Fixed-Blade Extruded-Aluminum Louvers: Horizontal Drainable-Blade Louvers as manufactured by The  
18 Airolite Co.  
19 1. Product: K6776:  
20 a. Depth: 6 inches (152 mm) nominal louver depth.  
21 b. Type: Concealed mullion.  
22 c. Percent Free Area: 54%.  
23 d. Beginning Point of Water Penetration: 1,250 fpm (6.35 m/s).  
24 e. Air Volume Flow Rate at Beginning Point of Water Penetration: 10,700 cfm (5.06 m<sup>3</sup>/s).  
25 f. Pressure Drop at Beginning Point of Water Penetration: 0.18 in. H<sub>2</sub>O (0.045 kPa).  
26 g. Blade Thickness: 0.081 in (2 mm) 0.125 in (3 mm).  
27 h. Frame Thickness: 0.081 in (2 mm) 0.125 in (3 mm).  
28 2. AMCA Seal: Mark units with AMCA Certified Ratings Seal.

29 **2.3 LOUVER SCREENS**

- 30 A. General: Provide screen at each exterior louver.  
31 1. Screen Location for Fixed Louvers: Exterior face.  
32 2. Screening Type: Bird screening.  
33 B. Louver Screen Frames: Same type and form of metal as indicated for louver to which screens are  
34 attached.  
35 C. Louver Screening for Aluminum Louvers:  
36 1. Bird Screening: Aluminum, 1/2-inch-square mesh, 0.063-inch wire.

37 **2.4 MATERIALS**

- 38 A. Aluminum Extrusions: ASTM B 221, Alloy 6063-T5, T-52, or T6.  
39 B. Aluminum Sheet: ASTM B 209, Alloy 3003 or 5005 with temper as required for forming, or as otherwise  
40 recommended by metal producer for required finish.  
41 C. Fasteners: Use types and sizes to suit unit installation conditions.  
42 1. Use hex-head or Phillips pan-head screws for exposed fasteners unless otherwise indicated.  
43 2. For fastening aluminum, use aluminum or 300 series stainless-steel fasteners.  
44 3. For fastening galvanized steel, use hot-dip-galvanized steel or 300 series stainless-steel fasteners.  
45 4. For fastening stainless steel, use 300 series stainless-steel fasteners.  
46 5. For color-finished louvers, use fasteners with heads that match color of louvers.  
47 D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

48 **2.5 FABRICATION**

- 49 A. Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowances made for  
50 fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.  
51 B. Join frame members to each other and to fixed louver blades with fillet welds concealed from view, unless  
52 otherwise indicated or size of louver assembly makes bolted connections between frame members  
53 necessary.  
54



1 **2.6 ALUMINUM FINISHES**

- 2 A. High-Performance Organic Finish: Three-coat fluoropolymer finish complying with AAMA 2605 and  
3 containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare,  
4 pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers'  
5 written instructions.  
6 1. Color and Gloss: Match Architect's sample.

7 **PART 3 - EXECUTION**

8 **3.1 INSTALLATION**

- 9 A. Locate and place louvers level, plumb, and at indicated alignment with adjacent work.  
10 B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required  
11 to protect metal surfaces and to make a weathertight connection.  
12 C. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.  
13 D. Protect unpainted galvanized and nonferrous-metal surfaces that are in contact with concrete, masonry, or  
14 dissimilar metals from corrosion and galvanic action by applying a heavy coating of bituminous paint or by  
15 separating surfaces with waterproof gaskets or nonmetallic flashing.

16 **3.2 ADJUSTING**

- 17 A. Restore louvers damaged during installation and construction so no evidence remains of corrective work. If  
18 results of restoration are unsuccessful, as determined by Architect, remove damaged units and replace  
19 with new units.

20 **END OF SECTION**

SECTION 09 03 20  
HISTORIC TREATMENT OF PLASTER

- 1  
2  
3  
4 PART 1 – GENERAL  
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8 1.4 [QUALITY ASSURANCE](#)  
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14 PART 3 – EXECUTION  
15 3.1 [EXAMINATION](#)  
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18 3.4 [ADJUSTING/CLEANING](#)  
19 3.5 [PROTECTION](#)  
20  
21

22 **PART 1---GENERAL**

23  
24 **1.1 SUMMARY**

25  
26 A. This section includes replicating ornamental plaster trim (cornice, crown molding, beams, moldings, etc.) and  
27 flat plaster work to replace that which is damaged or missing.

28  
29 B. Work shall follow the recommendations of the Secretary of the Interior's Standards for Historic Preservation,  
30 Preservation Briefs #21, Repairing Historic Flat Plaster Walls and Ceilings and # 23 Preserving Historic Ornamental  
31 Plaster.  
32

33 **1.2 PREINSTALLATION MEETING**

- 34 A. Pre-installation conference: Conduct conference at Project a minimum of one week in advance of starting  
35 mockup.  
36

37 **1.3 SUBMITTALS**

- 38  
39 A. Product Data: Submit manufacturer's product data for plaster materials, lath and accessories.  
40  
41 B. Design Data/Test Reports/Certificates:  
42  
43 1. Material Certificates: Submit producer's certificates for plaster aggregates to show that  
44 materials comply with requirements.  
45  
46 2. Schedule of Work: Submit a schedule of spaces that require flat and ornamental plaster, and a list of  
47 ornamental plaster items or areas that require repair or replacement in each of the affected, spaces. Indicate  
48 procedures to be used, and general time requirements.  
49

50 **1.4 QUALITY ASSURANCE**

51  
52 A. Regulatory Requirements: Reference Standards: Comply with applicable requirements of Chapter 9 -  
53 Ornamental Plaster, in "Plastering Skills", published by American Technical Publishers, Inc. Comply with other  
54 specified standards.

- 55 B. Plaster Specialist Qualifications: Engage an experienced plastering firm to perform work of this Section. Firm  
56 shall have completed work similar in material, design, and extent to that indicated for this Project with a record  
57 of successful in-service performance. Submit documentation of firm experience, qualification and worker

- 1 resumes. Experience only with installing new flat plaster is insufficient experience for historic treatment of  
2 plaster work.
- 3 C. Worker Qualifications: Persons who are experienced and specialize in work of types they will be performing.  
4 Submit documentation of firm experience, qualification and worker resumes.
- 5 D. Quality-Control Program: Prepare a written quality-control program for this Project. To include; processes,  
6 procedures, sequencing and systems used, demonstrate the ability of personnel to properly follow methods  
7 and use materials and tools without damaging adjacent materials and surfaces. Include provisions for  
8 supervising performance and preventing damage.
- 9 E. Mockups: Refer to Section 014339. Prepare one complete mockup (4ft. x 8ft.) of plaster repair at ceiling/beam  
10 to demonstrate aesthetic effects and to set quality standards for materials and execution and for repair. Mock-  
11 up shall include and document every process of the repair.

12  
13  
14 Construct mockup in location in where directed by Architect as illustrated in the drawings.  
15 Prepare mockup for review and approval by owner. Correct all conditions noted during review  
16 process. Re-check until approved by Owner, at no additional cost to Owner.  
17 Approved mockup shall become part of the completed Work if undisturbed at time of Substantial  
18 Completion.

19  
20  
21 **1.5 PROJECT/SITE CONDITIONS**

22  
23 A. Environmental Requirements:

- 24  
25 1. General: Comply with requirements of reference plaster application standards and recommendations of  
26 plaster manufacturer for environmental conditions before, during and after application of plaster.
- 27  
28 2. Cold Weather Protection: When outdoor temperature is below 55 degrees F., maintain continuous uniform  
29 temperature of not less than 55 degrees F., nor more than 70 degrees F., for not less than 1 week prior to plaster  
30 application, during its application, and until plaster is dry but for not less than one week after application is complete.  
31 Distribute heat evenly; prevent concentrated or uneven heat from contacting plaster near heat source.
- 32  
33 3. Ventilation: Ventilate building spaces as required to remove water in excess of that required for  
34 hydration of plaster. Begin ventilation immediately after plaster is applied and continue  
35 until it sets.
- 36  
37 4. Protection: Protect adjacent work from soiling, splattering, moisture and other harmful effects  
38 which might result from plastering. Obtain approval of the protection from the architect.

39  
40  
41 **PART 2---PRODUCTS**

42  
43 **2.1 MANUFACTURERS**

- 44  
45 A. National Gypsum Co.  
46 Gold Bond Building Products Division [www.nationalgypsum.com](http://www.nationalgypsum.com)
- 47  
48 B. USG Corporation  
49 [www.usg.com](http://www.usg.com)
- 50  
51 C. Perma-Flex Mold Company  
52 [www.perma-flex.com](http://www.perma-flex.com)
- 53  
54 D. Charles Street Supply Co.  
55 [www.charlesstsupply.com](http://www.charlesstsupply.com)
- 56

57  
58 **2.2 MATERIALS**

- 59 A. Gypsum Plaster Materials:

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1. Base coat plasters: ASTM C28, types as indicated below.
    - a. Gypsum neat plaster such as "Red Top Gypsum Plaster" (USG.com), "Two-Way Hardwall Gypsum Plaster" (National Gypsum Co.), or approved equal.
    - b. High strength gypsum neat plaster with a minimum average dry compressive strength of 2,800 psi per ASTM C472 for a mix of 100 lbs. plaster and 2 cu. ft. of sand such as "Structo-Base" (USG), or approved equal.
  2. Finish coat plasters: Types as indicated below:
    - a. Gypsum gauging plaster, ASTM C28; for flatwork such as, "Red Top Gauging Plaster" (USG), "Gold Bond Gauging Plaster" (National Gypsum Co.), or approved equal.
    - b. Gypsum molding plaster, ASTM C59; for crown moldings such as "USG No. 1 Moulding Plaster" (USG) "Gold Bond Moulding Plaster" (National Gypsum Co.), or approved equal.
    - c. Gypsum casting plaster, ASTM C59; for ornamental plaster such as "USG No. 1 Casting Plaster" (USG), or approved equal.
  3. Finishing Hydrated Limes: ASTM C206; Type S, or approved equal.
  4. Aggregates for Base Coat Plasters: ASTM C35, sand.
- B. Clean, potable water
- C. Bonding Compound for Gypsum Plaster: ASTM C631.
- D. Plaster Molds: Urethane rubber liquid mold material that can produce detailed impressions (Perma Flex Mold Co.), or approved equal.
- E. Reinforcing Fibers: Sisal hemp fibers, or polypropylene fibers, not more than 2" long (Plastic Tooling Co.), or approved equal.
- F. Anchors for Reattachment of Existing Plaster: Zinc plated washers with appropriate mechanical fasteners for existing substrates, (Charles Street Supply Co.), or approved equal.

**2.3 MIXES**

- A. Plaster Base Coat Compositions: Comply with ASTM C842 and manufacturer's directions for gypsum plaster base coat proportions for three-coat work:
1. Scratch Coat: High strength gypsum gauging plaster with job-mixed sand.
  2. Brown Coat: High strength gypsum gauging plaster with job-mixed sand.
- B. For Finish Coat: Proportion casting plaster and molding plaster to comply with the manufacturer's instructions. Proportion gypsum gauging plaster to comply with ASTM C842; 1 part plaster and 2 parts lime.

**PART 3---EXECUTION**

**3.1 EXAMINATION**

- A. Examine surfaces to receive ornamental plaster and conditions under which the ornamental plaster will be installed. Proceed with the ornamental plaster work only when substrate surfaces and conditions comply with referenced standards, to ensure satisfactory installations.

- 1 1. Promptly notify the architect of conditions that need to be corrected or coordinated.  
2

3 **3.2 PREPARATION**  
4

5 A. Surface Preparation:  
6

- 7 1. Remove ornamental or flat plaster that is damaged or loose and requires replacement, or that has to be  
8 reset.  
9  
10 2. Reinforce and secure loose ornamental or flat plaster that is to remain, using appropriate concealed  
11 methods.  
12  
13 3. Make molds, blades or screeds as necessary for replacement of ornamental plaster. Match existing plaster  
14 profiles.  
15  
16 4. Make accurate reproductions for missing, deteriorated or damaged ornamental plaster.  
17  
18 5. Clean plaster surfaces to be restored, to remove loose and deleterious materials that may affect  
19 adhesion or application of new plaster. Re-attach loose lath or install new lath as required.  
20  
21 6. Spray existing plaster to be pointed or patched with water, or use bonding agent, to ensure  
22 adhesion of new plaster. Install keying systems for larger pieces as necessary. Comply with  
23 referenced standards.  
24  
25 7. **(Deleted ADD # 3)**  
26  
27 8. Measure and layout ornamental plaster accurately to maintain pattern and alignment of the work.  
28

29 **3.3 ERECTION, INSTALLATION, APPLICATION**  
30

31 NOTE: Conform to the requirements of the latest edition of "Gypsum Construction Handbook" published by USG  
32 Corporation concerning application of ornamental plaster.  
33

34 A. Make a template from sheets of metal (brass) cut full-scale in shapes to match existing; use to screed or form  
35 gypsum plaster to desired shapes and contours.  
36

- 37 1. Coat metal sheet with layout dye - a blue dye that makes the scribed pattern easier to follow.  
38  
39 2. When the dye is dry, scribe, cut and carefully file the template to remove any roughness or other  
40 imperfections that might be transferred to the finished work.  
41  
42 3. Use a sled to guide the template as it is pushed through the plastic mass. Basic parts of the sled  
43 include a "slipper-board" and the board to which the template is nailed.  
44  
45 a. For bench work the sled is guided by the table edge. Bench-run molds are installed on the  
46 job with mechanical fasteners or adhesively attached with gypsum plaster.  
47  
48 b. For run-in-place work, a guide strip is attached to the wall or ceiling and forms one  
49 edge of the pattern; after work is completed the guide strip is removed.  
50

51 C. Mix Plaster: Use special plaster designed and manufactured for ornamental plaster work.  
52

53 NOTE: Mix the plaster a little below normal consistency for the first mix, then allow the mix to "cream" a bit  
54 before placing it on the bench in front of the template. For run-in-place work a slightly stiffer consistency is  
55 desirable.  
56

- 57 1. For Hand Mixing:  
58  
59 a. Weigh the plaster, and measure or weigh the water.  
60  
61 b. Sift plaster into water evenly. Do not drop handful of plaster into the water at one

1 time.

2  
3 c. Allow to soak 2 minutes undisturbed, then mix thoroughly. Stir from bottom, forcing  
4 material to top. Take care to avoid beating air into mix. Proper mixing forces air out of  
5 mix.

6  
7 d. Continue mixing until a smooth, even mass is produced.

8  
9 2. For Mechanical Mixing: Mechanically mix cementitious and aggregate materials for plasters  
10 to comply with applicable referenced application standards and with recommendations of plasters  
11 manufacturer.

12  
13 a. Weigh plaster and measure water accurately.

14  
15 b. Sift or strew plaster slowly and evenly.

16  
17 c. Allow it to soak 2 to 5 minutes, and mix for 2 to 5 minutes.

18  
19 NOTE: For batches of 10 to 50 lbs., use a 3" diameter, 3-blade, 25 degree pitch propeller with  
20 1/4 or 1/3 hp. 1,760 rpm direct-drive motor. For batches of 50 to 200 lb., use a 4" diameter, 3-  
21 blade, 25 degree pitch propeller with 1/2 hp. 1,760 rpm direct-drive motor.

22  
23 D. Replicate the Ornamental Trim:

24  
25 1. For Run Work or Straight Mold:

26  
27 NOTE: This method is used to produce staff work or pattern stock having parallel edges or to form a  
28 straight molding.

29  
30 a. For bench work, some plaster should be allowed to lap over the end of the bench to act as an  
31 anchor and prevent the mold from loosening from the bench before work is completed.

32  
33 b. Press small lumps of modeling clay onto the bench before the plaster is placed provide a  
34 grip for the plaster and help hold it in place.

35  
36 2. For Circular Shapes (Turning): Like run work, turning can be done in the shop or run-in-place.

37  
38 a. For bench work, place a center post in a hole in the bench.

39  
40 b. For run-in-place work, position the center post accurately at the center of the circular  
41 shape to be formed and securely attach or brace to the structural supports.

42  
43 NOTE: THE CENTER POST SHOULD HAVE A RUNNING THREAD, WITH A DOUBLE NUT FOR  
44 HEIGHT ADJUSTMENT. THE PIVOT POINT MUST BE ABSOLUTELY RIGID AND SET HIGHER THAN THE TOP  
45 OF THE PATTERN TO BE MADE, SO THAT THE TEMPLATE WILL SCREED CLEARLY AS IT  
46 ROTATES AROUND THE PIVOT POINT.

47  
48 3. Duplicate plaster molds by taking impressions from existing plaster molds; create new rubber molds  
49 from these impressions and cast plaster into these molds.

50  
51 4. Remove plaster molds after plaster has cured following plaster manufacturer's instructions.

52  
53 5. Strip and clean existing decoration to produce a clean, sharp mold.

54  
55 **3.4 ADJUSTING/CLEANING**

56  
57 A. When replication and plasterwork is completed, remove unused materials, containers and equipment. Clean  
58 floors and adjacent surfaces of all plaster debris, including plaster droppings daily.

59  
60 **3.5 PROTECTION**

**MSR, LTD**  
**24 MARCH 2016**

- 1 A. Provide final protection and maintain conditions, in a manner suitable to ensure ornamental
- 2 plaster being without damage or deterioration at time of
- 3 substantial completion.

4 **END OF SECTION**

5

SECTION 09 21 16.23

GYPSUM BOARD SHAFT WALL ASSEMBLIES

PART 1 – GENERAL

1.1 [RELATED DOCUMENTS](#)

1.2 [SUMMARY](#)

1.3 [ACTION SUBMITTALS](#)

PART 2 – PRODUCTS

2.1 [PERFORMANCE REQUIREMENTS](#)

2.2 [GYPSUM BOARD SHAFT WALL ASSEMBLIES \(GYP-1\)](#)

2.3 [PANEL PRODUCTS](#)

2.4 [NON-LOAD-BEARING STEEL FRAMING](#)

2.5 [AUXILIARY MATERIALS](#)

PART 3 – EXECUTION

3.1 [INSTALLATION](#)

**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: Gypsum board shaft wall assemblies.

**1.3 ACTION SUBMITTALS**

- A. Product Data: For each component of gypsum board shaft wall assembly.
- B. Sustainable Design Submittals:
1. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and cost.
  2. Product Certificates: For regional materials, indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include distance to Project and cost for each regional material.

**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.

**2.2 GYPSUM BOARD SHAFT WALL ASSEMBLIES (GYP-1)**

- A. Fire-Resistance Rating: 2 hours.
- B. Studs: Manufacturer's standard profile for repetitive members, corner and end members, and fire-resistance-rated assembly indicated.
1. Depth: 4 inches.
  2. Minimum Base-Metal Thickness: 0.033 inch.
- C. 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.
- D. Firestop Tracks: Provide firestop track at head of shaft wall on each floor level.
- E. Elevator Hoistway Entrances: Manufacturer's standard J-profile jamb strut with long-leg length of 3 inches, matching studs in depth.
- F. Room-Side Finish: Gypsum board.
- G. Shaft-Side Finish: Gypsum shaftliner board, Type X, As indicated by fire-resistance-rated assembly design designation.



1 H. Insulation: Sound attenuation blankets.

2 **2.3 PANEL PRODUCTS**

3 A. Panel products shall be GREENGUARD Gold Certified.

4 B. Regional Materials: Products shall be manufactured within 500 miles (800 km) of Project site from  
5 materials that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles  
6 (800 km) of Project site.

7 C. Panel Size: Provide in maximum lengths and widths available that will minimize joints in each area and  
8 that correspond with support system indicated.

9 D. Gypsum Shaftliner Board, Type X: ASTM C 1396/C 1396M; manufacturer's proprietary fire-resistive liner  
10 panels with paper faces.

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

- 13 a. American Gypsum.
- 14 b. Georgia-Pacific Building Products.
- 15 c. National Gypsum Company.
- 16 d. United States Gypsum Company.

17 2. Thickness: 1 inch.

18 3. Long Edges: Double bevel.

19 E. Gypsum Board: As specified in Section 09 29 00 "Gypsum Board."

20 **2.4 NON-LOAD-BEARING STEEL FRAMING**

21 A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer  
22 recycled content not less than 35 percent.

23 1. Minimum Recycled Content: 34.9%.

24 2. Minimum Post-Consumer Recycled Content: 24.3%.

25 3. Minimum Pre-Consumer (Post Industrial) Recycled Content: 9.4%.

26 B. Steel Framing Members: Comply with ASTM C 645 requirements for metal.

27 C. Firestop Tracks: Top runner manufactured to allow partition heads to expand and contract with movement  
28 of the structure while maintaining continuity of fire-resistance-rated assembly indicated.

29 **2.5 AUXILIARY MATERIALS**

30 A. Trim Accessories: Material and shapes as specified in Section 09 29 00 "Gypsum Board" that comply with  
31 gypsum board shaft wall assembly manufacturer's written recommendations for application indicated.

32 B. Steel Drill Screws: ASTM C 1002 unless otherwise indicated.

33 C. Track Fasteners: Power-driven fasteners of size and material required to withstand loading conditions.

34 D. Sound Attenuation Blankets: As specified in Section 09 29 00 "Gypsum Board."

35 E. Acoustical Sealant: As specified in Section 07 92 19 "Acoustical Joint Sealants."

36 **PART 3 - EXECUTION**

37 **3.1 INSTALLATION**

38 A. General: Comply with requirements of fire-resistance-rated assemblies indicated, manufacturer's written  
39 installation instructions, and ASTM C 754 other than stud-spacing requirements.

40 B. Examine panels before installation. Reject panels that are wet, moisture damaged, or mold damaged.

41 C. Sprayed Fire-Resistive Materials: Patch or replace sprayed fire-resistive materials removed or damaged  
42 during installation of shaft wall assemblies. After application, remove only to extent necessary for  
43 installation of gypsum board shaft wall assemblies.

44 D. Building Expansion Joints: Frame both sides of expansion joints with furring and other support.

45 E. Install supplementary framing around openings and as required for blocking, bracing, and support of  
46 gravity and pullout loads of fixtures, equipment, handrails, and similar items.

47 1. Elevator Hoistway: Provide jamb struts on each side of door frame.

48 F. Penetrations: Install supplementary steel framing around perimeter of penetration behind boxes containing  
49 wiring devices, elevator call buttons, elevator floor indicators, and similar items.

50 G. Isolate perimeter of gypsum panels from building structure, while maintaining continuity of fire-rated  
51 construction.

52 H. Firestop Tracks: Install to maintain continuity of fire-resistance-rated assembly indicated.

53 I. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by  
54 Architect while maintaining fire-resistance rating of gypsum board shaft wall assemblies.

- 1 J. Sound-Rated Shaft Wall Assemblies: Seal with acoustical sealant at perimeter of each assembly and at
- 2 joints and penetrations.
- 3 K. Cant Panels: At projections into shaft exceeding 4 inches, install 1/2- or 5/8-inch-thick gypsum board cants
- 4 covering tops of projections.
- 5 L. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from
- 6 the plane formed by faces of adjacent framing.
- 7 M. Remove and replace panels that are wet, moisture damaged, or mold damaged.

8

**END OF SECTION**

SECTION 09 22 16  
NON-STRUCTURAL METAL FRAMING

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17 **PART 1 - GENERAL**

18 **1.1 RELATED DOCUMENTS**

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

21 **1.2 SUMMARY**

- 22 A. Section Includes:  
23 1. Non-load-bearing steel framing systems for interior partitions.  
24 2. Suspension systems for interior ceilings and soffits.

25 **1.3 ACTION SUBMITTALS**

- 26 A. Product Data: For each type of product.  
27 B. Sustainable Design Submittals:  
28 1. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content  
29 and cost.

30 **1.4 INFORMATIONAL SUBMITTALS**

- 31 A. Evaluation reports for firestop tracks.

32 **PART 2 - PRODUCTS**

33 **2.1 PERFORMANCE REQUIREMENTS**

- 34 A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-  
35 bearing steel framing, provide materials and construction identical to those tested in assembly indicated,  
36 according to ASTM E 119 by an independent testing agency.  
37 B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those  
38 tested in assembly indicated, according to ASTM E 90 and classified according to ASTM E 413 by an  
39 independent testing agency.

40 **2.2 FRAMING SYSTEMS**

- 41 A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer  
42 recycled content not less than 35 percent.  
43 1. Minimum Recycled Content: 34.9%.  
44 2. Minimum Post-Consumer Recycled Content: 24.3%.  
45 3. Minimum Pre-Consumer (Post Industrial) Recycled Content: 9.4%.  
46

- 1 B. Framing Members, General: Comply with ASTM C 754 for conditions indicated.  
2 1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal unless otherwise  
3 indicated.  
4 2. Protective Coating: Coating with equivalent corrosion resistance of ASTM A 653/A 653M, G40, hot-  
5 dip galvanized unless otherwise indicated.  
6 C. Studs and Runners: ASTM C 645.  
7 1. Steel Studs and Runners:  
8 a. Minimum Base-Metal Thickness: 0.0179 inch.  
9 b. Depth: As indicated on Drawings.  
10 D. Slip-Type Head Joints: Where indicated, provide the following:  
11 1. Deflection Track: Steel sheet top runner manufactured to prevent cracking of finishes applied to  
12 interior partition framing resulting from deflection of structure above; in thickness not less than  
13 indicated for studs and in width to accommodate depth of studs.  
14 E. Firestop Tracks: Top runner manufactured to allow partition heads to expand and contract with movement  
15 of structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less  
16 than indicated for studs and in width to accommodate depth of studs.  
17 F. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.  
18 G. Cold-Rolled Channel Bridging: Steel, 0.0538-inch minimum base-metal thickness, with minimum 1/2-inch-  
19 wide flanges.  
20 1. Depth: 1-1/2 inches.  
21 2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches, 0.068-inch-thick, galvanized steel.  
22 H. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches, wall attachment flange of  
23 7/8 inch, minimum uncoated-metal thickness of 0.0179 inch, and depth required to fit insulation thickness  
24 indicated.

25 **2.3 FURRING (FURR-1)**

- 26 A. Refer to Drawings for type and size.  
27 B. Hat-Shaped, Rigid Furring Channels: ASTM C 645.  
28 1. Minimum Base-Metal Thickness: 0.0296 inch.  
29 2. Depth: As indicated on Drawings.  
30 C. Resilient Furring Channels: 1/2-inch-deep, steel sheet members designed to reduce sound transmission.  
31 1. Configuration: Asymmetrical.  
32 D. Cold-Rolled Furring Channels: 0.053-inch uncoated-steel thickness, with minimum 1/2-inch-wide flanges.  
33 1. Depth: As indicated on Drawings.  
34 2. Furring Brackets: Adjustable, corrugated-edge-type steel sheet with minimum uncoated-steel  
35 thickness of 0.0329 inch.  
36 3. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch-diameter wire, or  
37 double strand of 0.048-inch-diameter wire.

38 **2.4 SUSPENSION SYSTEMS**

- 39 A. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch-diameter wire, or double  
40 strand of 0.048-inch-diameter wire.  
41 B. Hanger Attachments to Concrete:  
42 1. Expansion Anchors: Fabricated from corrosion-resistant materials, with allowable load or strength  
43 design capacities calculated according to ICC-ES AC193 and ACI 318 greater than or equal to the  
44 design load, as determined by testing per ASTM E 488/E 488M conducted by a qualified testing  
45 agency.  
46 2. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated  
47 from corrosion-resistant materials, with allowable load capacities calculated according to ICC-  
48 ES AC70, greater than or equal to the design load, as determined by testing per ASTM E 1190  
49 conducted by a qualified testing agency.  
50 C. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.16 inch in diameter.  
51 D. Flat Hangers: Steel sheet, 1 by 3/16 inch by length indicated.  
52 E. Carrying Channels: Cold-rolled, commercial-steel sheet with a base-metal thickness of 0.0538 inch and  
53 minimum 1/2-inch-wide flanges.  
54 1. Depth: 2-1/2 inches.  
55

- 1 F. Furring Channels (Furring Members):  
2 1. Cold-Rolled Channels: 0.0538-inch uncoated-steel thickness, with minimum 1/2-inch-wide flanges,  
3 3/4 inch deep.  
4 2. Steel Studs and Runners: ASTM C 645.  
5 a. Minimum Base-Metal Thickness: 0.0269 inch.  
6 b. Depth: As indicated on Drawings or as required to meet deflection requirements.  
7 3. Hat-Shaped, Rigid Furring Channels: ASTM C 645, 7/8 inch deep.  
8 a. Minimum Base-Metal Thickness: 0.0179 inch.  
9 4. Resilient Furring Channels: 1/2-inch-deep members designed to reduce sound transmission.  
10 a. Configuration: Asymmetrical .

11 **2.5 AUXILIARY MATERIALS**

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

19 **PART 3 - EXECUTION**

20 **3.1 INSTALLATION, GENERAL**

- 21 A. Installation Standard: ASTM C 754.  
22 1. Gypsum Plaster Assemblies: Also comply with requirements in ASTM C 841 that apply to framing  
23 installation.  
24 2. Portland Cement Plaster Assemblies: Also comply with requirements in ASTM C 1063 that apply to  
25 framing installation.  
26 3. Gypsum Veneer Plaster Assemblies: Also comply with requirements in ASTM C 844 that apply to  
27 framing installation.  
28 4. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing  
29 installation.  
30 B. Install framing and accessories plumb, square, and true to line, with connections securely fastened.  
31 C. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars,  
32 toilet accessories, furnishings, or similar construction.  
33 D. Install bracing at terminations in assemblies.  
34 E. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame  
35 both sides of joints independently.

36 **3.2 INSTALLING FRAMED ASSEMBLIES**

- 37 A. Install framing system components according to spacings indicated, but not greater than spacings required  
38 by referenced installation standards for assembly types.  
39 B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls,  
40 install isolation strip between studs and exterior wall.  
41 C. Install studs so flanges within framing system point in same direction.  
42 D. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or  
43 substrates above suspended ceilings except where partitions are indicated to terminate at suspended  
44 ceilings. Continue framing around ducts that penetrate partitions above ceiling.  
45 1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce  
46 joints at tops of framing systems that prevent axial loading of finished assemblies.  
47 2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner  
48 track section (for cripple studs) at head and secure to jamb studs.  
49 a. Install two studs at each jamb unless otherwise indicated.  
50 b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance  
51 from jamb stud to allow for installation of control joint in finished assembly.  
52 c. Extend jamb studs through suspended ceilings and attach to underside of overhead  
53 structure.  
54 3. Other Framed Openings: Frame openings other than door openings the same as required for door  
55 openings unless otherwise indicated. Install framing below sills of openings to match framing  
56 required above door heads.

- 1 4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly  
2 indicated and support closures and to make partitions continuous from floor to underside of solid  
3 structure.
- 4 a. Firestop Track: Where indicated, install to maintain continuity of fire-resistance-rated  
5 assembly indicated.
- 6 5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.
- 7 6. Curved Partitions:  
8 a. Bend track to uniform curve and locate straight lengths so they are tangent to arcs.  
9 b. Begin and end each arc with a stud, and space intermediate studs equally along arcs. On  
10 straight lengths of no fewer than two studs at ends of arcs, place studs 6 inches o.c.
- 11 E. Direct Furring:  
12 1. Screw to wood framing.  
13 2. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or  
14 powder-driven fasteners spaced 24 inches o.c.
- 15 F. Z-Shaped Furring Members:  
16 1. Erect insulation, specified in Section 07 21 00 "Thermal Insulation," vertically and hold in place with  
17 Z-shaped furring members spaced 24 inches o.c. unless noted otherwise.  
18 2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete  
19 stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches  
20 o.c.  
21 3. At exterior corners, attach wide flange of furring members to wall with short flange extending  
22 beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of  
23 attached channel. At interior corners, space second member no more than 12 inches from corner  
24 and cut insulation to fit.
- 25 G. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from  
26 the plane formed by faces of adjacent framing.

### 27 3.3 INSTALLING SUSPENSION SYSTEMS

- 28 A. Install suspension system components according to spacings indicated, but not greater than spacings  
29 required by referenced installation standards for assembly types.
- 30 B. Isolate suspension systems from building structure where they abut or are penetrated by building structure  
31 to prevent transfer of loading imposed by structural movement.
- 32 C. Suspend hangers from building structure as follows:  
33 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum  
34 that are not part of supporting structural or suspension system.  
35 a. Splay hangers only where required to miss obstructions and offset resulting horizontal  
36 forces by bracing, countersplaying, or other equally effective means.  
37 2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that  
38 interfere with locations of hangers required to support standard suspension system members,  
39 install supplemental suspension members and hangers in the form of trapezes or equivalent  
40 devices.  
41 a. Size supplemental suspension members and hangers to support ceiling loads within  
42 performance limits established by referenced installation standards.  
43 3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye  
44 screws, or other devices and fasteners that are secure and appropriate for substrate, and in a  
45 manner that will not cause hangers to deteriorate or otherwise fail.  
46 4. Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts,  
47 eye screws, or other devices and fasteners that are secure and appropriate for structure and  
48 hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.  
49 5. Do not attach hangers to steel roof deck.  
50 6. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend  
51 through forms.  
52 7. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.  
53 8. Do not connect or suspend steel framing from ducts, pipes, or conduit.
- 54 D. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.
- 55 E. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet measured  
56 lengthwise on each member that will receive finishes and transversely between parallel members that will  
57 receive finishes.

58 END OF SECTION

**SECTION 09 24 00**

**CEMENT PLASTERING**

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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, apply to this Section.

**1.2 SUMMARY**

- A. Section Includes:
  - 1. Interior vertical plasterwork (stucco) ONLY where indicated on the interior elevation drawings.

**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. Shop Drawings: Show locations and installation of control and expansion joints, including plans, elevations, sections, details of components, and attachments to other work.

**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.
    - a. Size: 10 sq. ft. in surface area.
  - 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 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 (4.4 deg C).
  3. Protect plaster coats from freezing for not less than 48 hours after set of plaster coat has occurred.
- C. Factory-Prepared Finishes: Comply with manufacturer's written recommendations for environmental conditions for applying finishes.

### **PART 2 - PRODUCTS**

#### 2.1 METAL LATH

- A. Expanded-Metal Lath: ASTM C 847, cold-rolled carbon-steel sheet with ASTM A 653/A 653M, G60 (Z180), hot-dip galvanized-zinc coating.
  1. Diamond-Mesh Lath: Self-furring, 2.5 lb/sq. yd. (1.4 kg/sq. m).

#### 2.2 ACCESSORIES

- A. General: Comply with ASTM C 1063, and coordinate depth of trim and accessories with thicknesses and number of plaster coats required.
- B. Metal Accessories:
  1. Cornerbeads: Fabricated from zinc-coated (galvanized) steel.
    - 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.
  2. Casing Beads: Fabricated from zinc-coated (galvanized) steel; square-edged style; with expanded flanges.
  3. Control Joints: Fabricated from zinc-coated (galvanized) steel; 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.

#### 2.3 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. Fasteners for Attaching Metal Lath to Substrates: ASTM C 1063.

#### 2.4 PLASTER MATERIALS

- A. Portland Cement: ASTM C 150/C 150M, Type I.
  1. Color for Finish Coats: White.



- B. Sand Aggregate: ASTM C 897.
  - 1. Color for Job-Mixed Finish Coats: White.
- C. Ready-Mixed Finish-Coat Plaster: Mill-mixed Portland cement, aggregates, and proprietary ingredients.
  - 1. Pure white marble aggregate (no quartz), 100% acrylic polymers

## 2.5 PLASTER MIXES

- A. General: Comply with ASTM C 926 for applications indicated.
- 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 3/4 to 1-1/2 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 3/4 to 1-1/2 parts lime. Use 3 to 5 parts aggregate per part of cementitious material, 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.
  - 1. On Solid Surfaces, Not Otherwise Furred: Install self-furring, diamond-mesh lath.

### 3.4 INSTALLING ACCESSORIES

- A. Install according to ASTM C 1063 and at locations indicated on Drawings.
- B. Reinforcement for External (Outside) Corners:
  - 1. Install cornerbead at interior locations where applicable.
- 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. (13.4 sq. m).
  - 2. At distances between control joints of not greater than 18 feet (5.5 m) 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 (6 mm in 3 m) from a true plane in finished plaster surfaces when measured by a 10-foot (3-m) straightedge placed on surface.
  - 2. Finish plaster flush with metal frames and other built-in metal 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.
- B. Walls; Base-Coat Mixes for Use over Metal Lath: For scratch and brown coats, for three-coat plasterwork with 3/4-inch (19-mm) total thickness.
- C. Plaster Finish Coats: Apply to provide Insert requirements 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 ONLY where indicated on the interior elevation drawings.

**3.7 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.

**END OF SECTION 09 24 00**

**SECTION 09 29 00**  
**GYPSUM BOARD**

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20 **PART 1 - GENERAL**

21 **1.1 RELATED DOCUMENTS**

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

24 **1.2 SUMMARY**

- 25 A. Section Includes:
- 26 1. Interior gypsum board.
- 27 2. Tile backing panels.

28 **1.3 ACTION SUBMITTALS**

- 29 A. Product Data: For each type of product.
- 30 B. Sustainable Design Submittals:
  - 31 1. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and
  - 32 cost.
  - 33 2. Product Certificates: For regional materials, indicating location of material manufacturer and point of
  - 34 extraction, harvest, or recovery for each raw material. Include distance to Project and cost for each
  - 35 regional material.
  - 36 3. Product Data: For adhesives and sealants, indicating VOC content.
- 37 C. Samples: For each texture finish indicated on same backing indicated for Work.

38 **PART 2 - PRODUCTS**

39 **2.1 PERFORMANCE REQUIREMENTS**

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

45 **2.2 GYPSUM BOARD, GENERAL**

- 46 A. Gypsum board products shall be GREENGUARD Gold Certified.
- 47 B. Regional Materials: Products shall be manufactured within 500 miles of Project site from materials that have
- 48 been extracted, harvested, or recovered, as well as manufactured, within 500 miles of Project site.
- 49 C. Size: Provide maximum lengths and widths available that will minimize joints in each area and that
- 50 correspond with support system indicated.

- 1 **2.3 INTERIOR GYPSUM BOARD**
- 2 A. Gypsum Wallboard: ASTM C 1396/C 1396M.
- 3 B. Gypsum Board, Type X: ASTM C 1396/C 1396M (GYP-3 and GYP-4).
- 4 1. Thickness: 5/8 inch.
- 5 2. Long Edges: Tapered.
- 6 3. Acoustical isolation hangers: where applicable for wall designation on the drawings, use the following
- 7 product in the assembly per the detail drawings: Acoustical Surfaces Inc.: RSIC-1 Resilient Sound
- 8 Isolation Clips at 16" o.c..
- 9 C. Gypsum Ceiling Board: ASTM C 1396/C 1396M (GYP-2).
- 10 1. Thickness: 5/8 inch.
- 11 2. Long Edges: Tapered.
- 12 D. Gypsum Ceiling Board: ASTM C 1396/C 1396M (ACA-1).
- 13 1. Thickness: 5/8 inch.
- 14 2. Long Edges: Tapered.
- 15 3. Acoustical isolation hangers: where applicable for ceiling designation ACA-1 on the drawings, use
- 16 the following product in the assembly per the detail drawings: Acoustical Surfaces Inc.: RSIC-1
- 17 Resilient Sound Isolation Clips at 16" o.c..
- 18 **2.4 TILE BACKING PANELS**
- 19 A. Cementitious Backer Units: ANSI A118.9 and ASTM C 1288 or ASTM C 1325, with manufacturer's standard
- 20 edges.
- 21 1. Thickness: 5/8 inch.
- 22 2. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.
- 23 **2.5 TRIM ACCESSORIES**
- 24 A. Interior Trim: ASTM C 1047.
- 25 1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized-
- 26 steel sheet.
- 27 2. Shapes:
- 28 a. Cornerbead (TRIM-2).
- 29 b. Bullnose bead.
- 30 c. LC-Bead: J-shaped; exposed long flange receives joint compound [TRIM-1].
- 31 d. L-Bead: L-shaped; exposed long flange receives joint compound.
- 32 e. U-Bead: J-shaped; exposed short flange does not receive joint compound.
- 33 f. Expansion (control) joint.
- 34 g. Curved-Edge Cornerbead: With notched or flexible flanges
- 35 h. Shadow gap trim mid-panel (TRIM-3).
- 36 i. Shadow gap trim at panel edge (TRIM-4).
- 37 **2.6 JOINT TREATMENT MATERIALS**
- 38 A. General: Comply with ASTM C 475/C 475M.
- 39 B. Joint Tape:
- 40 1. Interior Gypsum Board: Paper.
- 41 2. Exterior Gypsum Soffit Board: Paper.
- 42 3. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.
- 43 4. Tile Backing Panels: As recommended by panel manufacturer.
- 44 C. Joint Compound for Interior Gypsum Board: For each coat, use formulation that is compatible with other
- 45 compounds applied on previous or for successive coats.
- 46 1. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-
- 47 type taping compound.
- 48 2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges,
- 49 use setting-type taping compound.
- 50 a. Use setting-type compound for installing paper-faced metal trim accessories.
- 51 3. Fill Coat: For second coat, use setting-type, sandable topping compound.
- 52 4. Finish Coat: For third coat, use setting-type, sandable topping compound.
- 53 5. Skim Coat: For final coat of Level 5 finish, use high-build interior coating product designed for
- 54 application by airless sprayer and to be used instead of skim coat to produce Level 5 finish.
- 55

- 1 D. Joint Compound for Exterior Applications:
- 2 1. Exterior Gypsum Soffit Board: Use setting-type taping compound and setting-type, sandable topping
- 3 compound.
- 4 2. Glass-Mat Gypsum Sheathing Board: As recommended by sheathing board manufacturer.
- 5 E. Joint Compound for Tile Backing Panels:
- 6 1. Glass-Mat, Water-Resistant Backing Panel: As recommended by backing panel manufacturer.
- 7 2. Cementitious Backer Units: As recommended by backer unit manufacturer.

## 8 2.7 AUXILIARY MATERIALS

- 9 A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's
- 10 written instructions.
- 11 B. Polyethylene Vapor Retarders: ASTM D 4397, 6-mil- (0.15-mm-) thick sheet, with maximum permeance
- 12 rating of 0.1 perm (5.7 ng/Pa x s x sq. m).
- 13 C. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to
- 14 continuous substrate.
- 15 1. Adhesives shall have a VOC content of 50 g/L or less.
- 16 D. Steel Drill Screws: ASTM C 1002 unless otherwise indicated.
- 17 1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112
- 18 inch thick.
- 19 2. For fastening cementitious backer units, use screws of type and size recommended by panel
- 20 manufacturer.
- 21 E. Sound-Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by
- 22 combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
- 23 1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.
- 24 2. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content
- 25 not less than 50 percent.
- 26 F. Acoustical Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with
- 27 ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and
- 28 openings in building construction as demonstrated by testing representative assemblies according to
- 29 ASTM E 90.
- 30 1. Sealant shall have a VOC content of 250 g/L or less.
- 31 G. For backbox putty, select one of the following, including all manufacturer-recommended accessories, in
- 32 conformance with Division 7 - Sealants:
- 33 1. SpecSeal SSP Intumescent Putty, Specified Technologies, Inc., Somerville, NJ.
- 34 2. IsoBacker, Kinetics Noise Products.
- 35 3. Firestop Putty Pads, Acoustical Solutions.
- 36 H. Thermal Insulation: As specified in Section 07 21 00 "Thermal Insulation."

## 37 2.8 ACOUSTIC CEILING ASSEMBLY (ACA-1)

- 38 A. Beneath Mechanical Rooms at 3, and In Chiller Room. Refer to Drawings for assembly and components.

## 39 PART 3 - EXECUTION

### 40 3.1 APPLYING AND FINISHING PANELS

- 41 A. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- 42 B. Comply with ASTM C 840.
- 43 C. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide
- 44 1/4- to 1/2-inch-wide spaces at these locations and trim edges with edge trim where edges of panels are
- 45 exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- 46 D. For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels.
- 47 Otherwise, attach trim according to manufacturer's written instructions.
- 48 E. Prefill open joints, rounded or beveled edges, and damaged surface areas.
- 49 F. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to
- 50 receive tape.
- 51 G. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
- 52 1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
- 53 2. Level 2: Panels that are substrate for tile.
- 54 3. Level 3: not required.
- 55 4. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.
- 56 a. Primer and its application to surfaces are specified in Section 09 91 23 "Interior Painting."



**SECTION 09 30 13**  
**CERAMIC TILING**

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29 **PART 1 - GENERAL**

30 **1.1 RELATED DOCUMENTS**

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

33 **1.2 SUMMARY**

- 34 A. Section Includes:

- 35 1. Ceramic mosaic wall tile.
- 36 2. Porcelain floor tile.
- 37 3. Stone thresholds.
- 38 4. Tile base and caps
- 39 5. Metal edge strips and trim.

- 40 B. Related Requirements:

- 41 1. Section 07 92 00 "Joint Sealants" for sealing of expansion, contraction, control, and isolation joints  
42 in tile surfaces.
- 43 2. Section 09 29 00 "Gypsum Board" for cementitious backer units.

44 **1.3 DEFINITIONS**

- 45 A. General: Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work  
46 of this Section unless otherwise specified.
- 47 B. ANSI A108 Series: ANSI A108.01, ANSI A108.02, ANSI A108.1A, ANSI A108.1B, ANSI A108.1C, ANSI  
48 A108.4, ANSI A108.5, ANSI A108.6, ANSI A108.8, ANSI A108.9, ANSI A108.10, ANSI A108.11, ANSI  
49 A108.12, ANSI A108.13, ANSI A108.14, ANSI A108.15, ANSI A108.16, and ANSI A108.17, which are  
50 contained in its "Specifications for Installation of Ceramic Tile."
- 51 C. Retain terms that remain after this Section has been edited for a project. Coordinate with tile sizes used in  
52 "Tile Products" Article.
- 53 D. Module Size: Actual tile size plus joint width indicated.
- 54 E. Face Size: Actual tile size, excluding spacer lugs.
- 55

- 1 **1.4 PREINSTALLATION MEETINGS**
- 2 A. Preinstallation Conference: Conduct conference at Project site.
- 3 1. Review requirements in ANSI A108.01 for substrates and for preparation by other trades.
- 4 **1.5 ACTION SUBMITTALS**
- 5 A. Product Data: For each type of product.
- 6 B. Sustainable Design Submittals:
- 7 1. Product Data: For adhesives, indicating VOC content.
- 8 2. Product Data for Credit IEQ 4.3: For grout sealers, documentation indicating that products comply
- 9 with requirements of FloorScore certification.
- 10 3. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting
- 11 materials.
- 12 C. Shop Drawings: Show locations of each type of tile and tile pattern for typical applications. Show widths,
- 13 details, and locations of industry recommended expansion, contraction, control, and isolation joints in tile
- 14 substrates and finished tile surfaces for specific room by room applications.
- 15 D. Samples:
- 16 1. Each type and composition of tile and for each color and finish required.
- 17 2. Assembled samples mounted on a rigid panel, with grouted joints, for each type and composition of
- 18 tile and for each color and finish required.
- 19 3. Stone thresholds.
- 20 **1.6 INFORMATIONAL SUBMITTALS**
- 21 A. Qualification Data: For Installer.
- 22 **1.7 MAINTENANCE MATERIAL SUBMITTALS**
- 23 A. Furnish extra materials that match and are from same production runs as products installed and that are
- 24 packaged with protective covering for storage and identified with labels describing contents.
- 25 1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed for each
- 26 type, composition, color, pattern, and size indicated.
- 27 **1.8 QUALITY ASSURANCE**
- 28 A. Installer Qualifications:
- 29 1. Foreman or supervising installer is a five-star member of the National Tile Contractors Association
- 30 or a Trowel of Excellence member of the Tile Contractors' Association of America.
- 31 2. Installer employs Ceramic Tile Education Foundation Certified Installers or installers recognized by
- 32 the U.S. Department of Labor as Journeyman Tile Layers.
- 33 B. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic
- 34 effects and set quality standards for materials and execution.
- 35 1. Build mockup of each type of floor tile installation.
- 36 2. Subject to compliance with requirements, approved mockups may become part of the completed
- 37 Work if undisturbed at time of Substantial Completion.
- 38 **PART 2 - PRODUCTS**
- 39 **2.1 PRODUCTS, GENERAL**
- 40 A. ANSI Ceramic Tile Standard: Provide Standard-grade tile that complies with ANSI A137.1 for types,
- 41 compositions, and other characteristics indicated.
- 42 B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI
- 43 standards referenced in other Part 2 articles, ANSI standards referenced by TCNA installation methods
- 44 specified in tile installation schedules, and other requirements specified.
- 45



- 1     **2.2     TILE PRODUCTS**
- 2     A.     Ceramic Tile Type (CT-1# and CT-2#): glazed ceramic wall tile. Refer to material Tag List.
- 3         1.     Composition: Ceramic.
- 4         2.     Certification: Porcelain tile certified by the Porcelain Tile Certification Agency.
- 5         3.     Module Size: 4"x7" Rhomboid and 8"x8" Hexagonal.
- 6         4.     Grout Color: Match Architect's sample.
- 7         5.     Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching
- 8                 characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard
- 9                 shapes:
- 10                a.     Trim Units CT#ACC-#: Refer to Material Tag List.
- 11                b.     External Corners for thinset Mortar Installations
- 12                c.     Internal Corners for thinset Mortar Installations.
- 13     B.     Ceramic Tile Type CT-3: Porcelain floor tile.
- 14         1.     Refer to material Tag List.
- 15         2.     Certification: Tile certified by the Porcelain Tile Certification Agency.
- 16         3.     Face Size: 12"x12"
- 17         4.     Face Size Variation: Rectified.
- 18         5.     Dynamic Coefficient of Friction: Not less than 0.42.
- 19         6.     Grout Color: Match Architect's sample.
- 20     **2.3     THRESHOLDS**
- 21     A.     General: Fabricate to sizes and profiles indicated or required to provide transition between adjacent floor
- 22                 finishes.
- 23         1.     Bevel edges at 1:2 slope, with lower edge of bevel aligned with or no greater than 1/16 inch above
- 24                 adjacent floor surface. Finish bevel to match top surface of threshold. Limit height of threshold to 1/2
- 25                 inch or less above adjacent floor surface.
- 26     B.     Marble Thresholds (THOLD-1): ASTM C 503/C 503M, with a minimum abrasion resistance of 12 according
- 27                 to ASTM C 1353 or ASTM C 241/C 241M and with honed finish.
- 28         1.     Description: Uniform, fine- to medium-grained white stone with gray veining. Refer to Material Tag
- 29                 Index.
- 30     **2.4     TILE BACKING PANELS**
- 31     A.     Cementitious Backer Units: Refer to Section 09 29 00 – Gypsum Board.
- 32         1.     Thickness: 5/8 inch.
- 33     **2.5     WATERPROOF MEMBRANE**
- 34     A.     Application: Provide at bathroom floors.
- 35     B.     Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- 36         1.     Bonsal American, an Oldcastle company.
- 37         2.     LATICRETE LLC.
- 38         3.     MAPEI Corporation.
- 39     C.     General: Manufacturer's standard product, selected from the following that complies with ANSI A118.10 and
- 40                 is recommended by the manufacturer for the application indicated. Include reinforcement and accessories
- 41                 recommended by manufacturer.
- 42     D.     Fluid-Applied Membrane: Liquid-latex rubber or elastomeric polymer.
- 43         1.     Basis of Design: Laticrete Hydroban.
- 44

- 1 **2.6 SETTING MATERIALS**  
2 A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:  
3 1. Bonsal American, an Oldcastle company.  
4 2. LATICRETE LLC.  
5 3. MAPEI Corporation.  
6 B. Portland Cement Mortar (Thickset) Installation Materials: ANSI A108.02.  
7 1. Latex Additive: Manufacturer's standard water emulsion, serving as replacement for part or all of  
8 gaging water, of type specifically recommended by latex-additive manufacturer for use with field-  
9 mixed portland cement and aggregate mortar bed.  
10 a. Basis of Design: Laticrete 3701 Mortar Admixture.  
11 C. Latex-Portland Cement Mortar (Thinset): ANSI A118.4.  
12 1. Product shall be approved for setting beds up to 5/8 inch.  
13 a. Basis of Design: Laticrete 253 Gold (bagged).  
14 2. Provide prepackaged, dry-mortar mix containing dry, redispersible, vinyl acetate or acrylic additive  
15 to which only water is added at Project site.  
16 3. Provide prepackaged, dry-mortar mix combined with acrylic resin or styrene-butadiene-rubber liquid-  
17 latex additive at Project site.  
18 4. For large format floor tile (tile of 8 inches by 8 inches or greater) provide medium setting bed to  
19 achieve 100% coverage.  
20 5. For wall applications, provide mortar that complies with requirements for nonsagging mortar in  
21 addition to the other requirements in ANSI A118.4.

- 22 **2.7 GROUT MATERIALS**  
23 A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:  
24 1. Bonsal American, an Oldcastle company.  
25 2. LATICRETE LLC.  
26 3. MAPEI Corporation.  
27 B. High-Performance Tile Grout: ANSI A118.7.  
28 1. Polymer Type: Ethylene vinyl acetate or acrylic additive, in dry, redispersible form, prepackaged with  
29 other dry ingredients.  
30 2. Unsanded and sanded grout with polymer additive added in field.  
31 a. Basis of Design: Laticrete 1500 and 1600 (bagged).  
32 b. Basis of Design: Laticrete 1776 Grout Enhancer.  
33 C. Grout for PregROUTED Tile Sheets: Same product used in factory to pregROUT tile sheets.  
34 D. Color: As selected by Architect from manufacturer's standard.

- 35 **2.8 MISCELLANEOUS MATERIALS**  
36 A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation  
37 provided or approved by manufacturer of tile-setting materials for installations indicated.  
38 B. Floor Transition Edge:  
39 1. Description; Tile to concrete transition.  
40 a. Manufacturer: Schluter.  
41 b. Collection: SCHIENE  
42 c. Size: 1/4" height.  
43 2. Description: wood to tile transition.  
44 a. Manufacturer: Schluter.  
45 b. Collection: RENO-T.  
46 c. Size: 1/4" height.  
47 C. Metal Edge Strips: Angle or L-shape, height to match tile and setting-bed thickness, metallic or combination  
48 of metal and PVC or neoprene base, designed specifically for flooring applications; stainless-steel,  
49 ASTM A 666, 300 Series exposed-edge material.  
50 D. Grout Sealer: Manufacturer's standard product for sealing grout joints and that does not change color or  
51 appearance of grout.  
52 1. Grout sealers shall comply with requirements of FloorScore certification.

- 53 **2.9 MIXING MORTARS AND GROUT**  
54 A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written  
55 instructions.  
56 B. Add materials, water, and additives in accurate proportions.  
57 C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other  
58 procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for  
59 installations indicated.

1 **PART 3 - EXECUTION**

2 **3.1 EXAMINATION**

- 3 A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance  
4 with requirements for installation tolerances and other conditions affecting performance of the Work.  
5 1. Verify that substrates for setting tile are firm; dry; clean; free of coatings that are incompatible with  
6 tile-setting materials, including curing compounds and other substances that contain soap, wax, oil,  
7 or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.  
8 2. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work,  
9 and similar items located in or behind tile has been completed.  
10 3. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not  
11 coordinated, adjust joint locations in consultation with Architect.  
12 B. Proceed with installation only after unsatisfactory conditions have been corrected.

13 **3.2 PREPARATION**

- 14 A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with adhesives with  
15 trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.  
16 B. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile  
17 units taken from one package show same range of colors as those taken from other packages and match  
18 approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before  
19 installing.

20 **3.3 CERAMIC TILE INSTALLATION**

- 21 A. Comply with TCNA's "Handbook for Ceramic, Glass, and Stone Tile Installation" for TCNA installation  
22 methods specified in tile installation schedules. Comply with parts of the ANSI A108 series "Specifications  
23 for Installation of Ceramic Tile" that are referenced in TCNA installation methods, specified in tile installation  
24 schedules, and apply to types of setting and grouting materials used.  
25 1. For the following installations, follow procedures in the ANSI A108 series of tile installation standards  
26 for providing 95 percent mortar coverage:  
27 a. Tile floors consisting of tiles 8 by 8 inches or larger.  
28 B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without  
29 interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without  
30 disrupting pattern or joint alignments.  
31 C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces.  
32 Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely  
33 to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.  
34 D. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.  
35 E. Where accent tile differs in thickness from field tile, vary setting-bed thickness so that tiles are flush.  
36 F. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in  
37 both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are  
38 less than half of a tile. Provide uniform joint widths unless otherwise indicated.  
39 1. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so  
40 joints between sheets are not apparent in finished work.  
41 2. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align  
42 joints.  
43 3. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base,  
44 walls, or trim, align joints unless otherwise indicated.  
45 G. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and  
46 isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do  
47 not saw-cut joints after installing tiles.  
48 1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.  
49 H. Stone Thresholds: Install stone thresholds in same type of setting bed as adjacent floor unless otherwise  
50 indicated.  
51 1. At locations where mortar bed (thickset) would otherwise be exposed above adjacent floor finishes,  
52 set thresholds in latex-portland cement mortar (thinset).  
53 I. Metal Edge Strips: Install at locations indicated.  
54 J. Grout Sealer: Apply grout sealer to cementitious grout joints in tile floors according to grout-sealer  
55 manufacturer's written instructions. As soon as grout sealer has penetrated grout joints, remove excess  
56 sealer and sealer from tile faces by wiping with soft cloth.

1 **3.4 TILE BACKING PANEL INSTALLATION**

- 2 A. Use latex-portland cement mortar for bonding material unless otherwise directed in manufacturer's written  
3 instructions.

4 **3.5 ADJUSTING AND CLEANING**

- 5 A. Remove and replace tile that is damaged or that does not match adjoining tile. Provide new matching units,  
6 installed as specified and in a manner to eliminate evidence of replacement.  
7 B. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign  
8 matter.  
9 1. Remove grout residue from tile as soon as possible.  
10 2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions  
11 but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout  
12 manufacturers and only after determining that cleaners are safe to use by testing on samples of tile  
13 and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of  
14 cleaning. Flush surfaces with clean water before and after cleaning.

15 **3.6 PROTECTION**

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

21 **3.7 INTERIOR CERAMIC TILE INSTALLATION SCHEDULE**

- 22 A. Interior Floor Installations, Concrete Subfloor:  
23 1. Ceramic Tile Installation: TCNA F112 and ANSI A108.1A; cement mortar bed (thickset) bonded to  
24 concrete.  
25 a. Ceramic Tile Type: Refer to Materials Tag list.  
26 b. Grout: High-performance grout.  
27 2. Ceramic Tile Installation: TCNA F113; thinset mortar.  
28 a. Ceramic Tile Type:  
29 b. Thinset Mortar: Latex- portland cement mortar.  
30 c. Mediumset Mortar: Latex- portland cement mortar. Large format tile.  
31 d. Grout: High-performance grout. Color as selected.  
32 e. Grout Sealer: As specified.  
33 B. Interior Wall Installations, Metal Studs or Furring:  
34 1. Ceramic Tile Installation: TCNA W244C or TCNA W244F; thinset mortar on cementitious backer  
35 units or fiber-cement backer board.  
36 a. Ceramic Tile Type: Refer Material Tag List.  
37 b. Thinset Mortar: Improved modified dry-set mortar.  
38 c. Grout: High-performance grout. Color as selected.

39 **END OF SECTION**

SECTION 09 30 16.00  
CLAY TILE FLOOR REHABILITATION

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25 **PART 1 - GENERAL**

26 **1.1 SUMMARY**

- 27 A. Section includes complete rehabilitation and selective replacement (with new or salvaged tile) of unglazed
- 28 clay tile floors. All work will match existing color range and variations, historic details and finishes.
- 29 B. Portions of the original clay tile floors have been covered with a self-leveling, cement-based underlayment
- 30 and carpet or rubber disk flooring. The testing, proper removal and disposal of such materials shall be the
- 31 responsibility of the contractor.
- 32 C. Portions of the original clay tile floor have been damaged by the installation of fasteners to hold steel stud
- 33 partition tracks. All damaged tile (holes, chips, broken edges, cracks) will be repaired with materials to match
- 34 existing. Severely damaged clay tiles will be selectively replaced with new or salvaged tile.
- 35 D. Work shall follow the recommendations of The Secretary of the Interior's Standards for Historic Preservation:
- 36 Preservation Briefs #40, Preserving Historic Ceramic Tile Floors.

37 **1.2 UNIT PRICES**

- 38 A. Refer to Sheet G002.

39 **1.3 DEFINITIONS**

- 40 A. Rehabilitation: The process of making possible a compatible use through repair and alterations while
- 41 retaining and preserving the original elements, portions and features.

42 **1.4 PREINSTALLATION MEETING**

- 43 A. Preinstallation Conference: Conduct conference at Project a minimum of one week in advance of starting
- 44 mockup.

45 **1.5 ACTION SUBMITTALS**

- 46 A. Product Data: For each type of product.
- 47 B. Shop Drawings:
  - 48 1. Include plans and detail drawings illustrating areas of damage and missing sections, deterioration
  - 49 and deficiencies in existing clay tile floor and proposed repairs and treatment methods.
- 50 C. Samples:
  - 51 1. Replacement tile: Salvaged or new, six 12x12" tile representing the range and variation of colors
  - 52 2. Cured grout sample

1 **1.6 QUALITY ASSURANCE**

- 2 A. Clay Tile Floor Rehabilitation Specialist Qualifications: Engage an experienced flooring firm to perform work  
3 of this Section. Firm shall have completed work similar in material, design, and extent to that indicated for  
4 this Project with a record of successful in-service performance. Submit documentation of firm experience,  
5 qualification and worker resumes. Experience only with installing new clay tile floors is insufficient experience  
6 clay tile floor rehabilitation work.
- 7 B. Rehabilitation Worker Qualifications: Persons who are experienced and specialize in rehabilitation work of  
8 types they will be performing. Submit documentation of firm experience, qualification and worker resumes.
- 9 C. Quality-Control Program: Prepare a written quality-control program for this Project. To include; processes,  
10 procedures, sequencing and systems used, demonstrate the ability of personnel to properly follow methods  
11 and use materials and tools without damaging adjacent materials and surfaces. Include provisions for  
12 supervising performance and preventing damage.
- 13 D. Mockups: Refer to Section 01 4339. Prepare one complete mockup (8ft. x 8ft.) of clay tile floor repair and  
14 rehabilitation to demonstrate aesthetic effects and to set quality standards for materials and execution and  
15 for repair and rehabilitation. Mock-up shall include and document every process of the repair and  
16 rehabilitation, including: removal of applied underlayment, tile preparation and repair, removal of damaged  
17 tile, installation of salvaged tile and final finish.
- 18 1. Construct mockup in location in where directed by Architect as illustrated in the drawings.
  - 19 2. Prepare mockup for review and approval by owner. Correct all conditions noted during review  
20 process. Re-check until approved by Owner, at no additional cost to Owner.
  - 21 3. Approved mockup shall become part of the completed Work if undisturbed at time of Substantial  
22 Completion.

23 **PART 2 - PRODUCTS**

24 **2.1 TILE**

- 25 A. Provide new or salvaged tile:
- 26 1. 12" x 12" x 3/4" unglazed clay tile [**XTILE-2A**], custom color range and variation to match existing floor  
27 tile.
  - 28 2. 6" x 6" x 3/4" unglazed clay tile [**XTILE-2E**], custom color range and variation to match existing floor  
29 tile.
  - 30 3. Manufacturers:
    - 31 a. **Rustico Tile and Stone** of Leander, TX  
32 rusticotile.com  
33 512-260-9111  
34 Saltillo Tile, 12 x 12", traditional finish, unglazed, custom terra cotta color range  
35
    - 36 b. **Classic Terra Cotta** of Topanga, CA  
37 Terracotta pavers.com  
38 888-837-7286  
39 12x12" paver, Villa Style, traditional finish, custom terra cotta color range  
40
    - 41 c. **Western Quarry Tile** of Gardena, CA  
42 westernquarry.com  
43 310-768-8500  
44 2 x 12" paver, flat surface, wire cut, unglazed, custom terra cotta color range  
45
    - 46 d. **Ancient Floors** of Springfield, MO  
47 ancientfloors.com  
48 417-664-3524  
49 12 x 12" paver, Mexican Saltillo Tile, traditional finish, unglazed, custom terra cotta color  
50 range

51 **2.2 SETTING BED MORTAR**

- 52 A. Complying with ANSI A108 .1.

53 **2.3 GROUT**

- 54 A. Grey sanded grout:
- 55 1. Manufacturer's standard grey sanded grout for use with clay tiles.

1 **2.4 CLEANERS**

- 2 A. Accomplish cleaning of clay tile with a multi-purpose high-alkaline cleaner, stripper and degreaser. Tile  
3 Doctor, Pro-Clean, or equal.

4 **2.5 SEALER**

- 5 A. Water-based acrylic polymers, low-sheen finish. Tile Doctor, Seal & Go, or equal.

6 **PART 3 - EXECUTION**

7 **3.1 EXAMINATION**

- 8 A. Examine the areas, substrate and conditions of the existing clay tile floor areas.

9 **3.2 PROTECTION DURING WORK**

- 10 1. Provide durable temporary interior protection for adjacent finishes, surfaces and materials.  
11 2. If interior finishes, surfaces or materials are damaged by the repair or rehabilitation process, repair  
12 will be done by the selected subcontractor responsible for damaged areas and paid for by the clay  
13 tile floor rehabilitation subcontractor by way of credit or subsequent payment applications.

14 **3.3 REHABILITATION SEQUENCE**

- 15 A. The clay tile floor repair and rehabilitation work of this project includes, but is not limited to, the following:  
16 1. Initial examination of existing clay tile floor areas.  
17 2. Protect adjacent surfaces and materials.  
18 3. Remove floor covering (carpet/rubber disk flooring) over clay tile flooring.  
19 4. Remove underlayment materials over clay tile flooring.  
20 5. Examine and document condition of clay tile floor areas.  
21 6. Remove severely damaged clay floor tiles.  
22 7. Clean clay floor tiles.  
23 8. Repair clay floor tiles.  
24 9. Install new or salvaged clay floor tiles  
25 10. Grout.  
26 11. Clean and seal clay floor tiles.  
27 12. Protect clay tile floors until substantial completion.

28 **3.4 REPLACEMENT OF SEVERELY DAMAGED TILES**

- 29 A. Carefully remove grout surrounding severely damage tile using a grout saw and hand tools to minimize  
30 potential damage to adjacent tile.  
31 B. Carefully remove tile using hand tools.  
32 C. Carefully remove tile setting bed using hand tools.  
33 D. Install new setting bed mortar and install tile and grout and seal.

34 **3.5 REPAIR OF CLAY TILES**

- 35 A. Clean tile. Utilize mortar patch tinted to blend with each individual tile or epoxy-mixed with colored enamel  
36 to blend with each individual tile. Clean all residue from tile and seal.

37 **3.6 ADJUSTMENT/CLEANING**

- 38 A. Clean grout and setting materials from face of tile while materials are workable. Leave face of tile clean and  
39 free of all foreign matter.  
40 B. Leave finished installation clean and free of defective tile work.

41 **3.7 PROTECTION**

- 42 A. Protect completed tile work with heavy covering during the construction period to prevent damage and wear.  
43 B. Prohibit all foot and wheel traffic from using tiled areas for at least 7 days upon completion of the Work.

44 **END OF SECTION**

SECTION 09 51 13  
ACOUSTICAL PANEL CEILINGS

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27 **PART 1 - GENERAL**

28 **1.1 RELATED DOCUMENTS**

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

31 **1.2 SUMMARY**

- 32 A. Section includes acoustical panels and exposed suspension systems for interior ceilings.  
33 B. Related Requirements:  
34 1. Section 09 51 23 "Acoustical Tile Ceilings" for ceilings consisting of mineral-base acoustical tiles  
35 used with fully concealed suspension systems, stapling, or adhesive bonding.  
36 C. Products furnished, but not installed under this Section, include anchors, clips, and other ceiling  
37 attachment devices to be cast in concrete.

38 **1.3 PREINSTALLATION MEETINGS**

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

40 **1.4 ACTION SUBMITTALS**

- 41 A. Product Data: For each type of product.  
42 B. Sustainable Design Submittals:  
43 1. Recycled content.  
44 2. Laboratory Test Reports: For ceiling products, indicating compliance with requirements for low-  
45 emitting materials.  
46 C. Samples: For each exposed product and for each color and texture specified, 6 inches in size.  
47 D. Samples for Verification: For each component indicated and for each exposed finish required, prepared on  
48 Samples of sizes indicated below:  
49 1. Acoustical Panels: Set of full-size Samples of each type, color, pattern, and texture.  
50 2. Exposed Suspension-System Members, Moldings, and Trim: Set of 6-inch- long Samples of each  
51 type, finish, and color.  
52



- 1 **1.5 INFORMATIONAL SUBMITTALS**
- 2 A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown
- 3 and coordinated with each other, using input from installers of the items involved:
- 4 1. Ceiling suspension-system members.
- 5 2. Structural members to which suspension systems will be attached.
- 6 3. Method of attaching hangers to building structure.
- 7 a. Furnish layouts for cast-in-place anchors, clips, and other ceiling attachment devices whose
- 8 installation is specified in other Sections.
- 9 4. Carrying channels or other supplemental support for hanger-wire attachment where conditions do
- 10 not permit installation of hanger wires at required spacing.
- 11 5. Size and location of initial access modules for acoustical panels.
- 12 6. Items penetrating finished ceiling and ceiling-mounted items including the following:
- 13 a. Lighting fixtures.
- 14 b. Diffusers.
- 15 c. Grilles.
- 16 d. Speakers.
- 17 e. Sprinklers.
- 18 f. Access panels.
- 19 g. Perimeter moldings.
- 20 7. Minimum Drawing Scale: 1/8 inch = 1 foot.
- 21 B. Product Test Reports: For each acoustical panel ceiling, for tests performed by manufacturer and
- 22 witnessed by a qualified testing agency.
- 23 **1.6 CLOSEOUT SUBMITTALS**
- 24 A. Maintenance Data: For finishes to include in maintenance manuals.
- 25 **1.7 MAINTENANCE MATERIAL SUBMITTALS**
- 26 A. Furnish extra materials, from the same product run, that match products installed and that are packaged
- 27 with protective covering for storage and identified with labels describing contents.
- 28 1. Acoustical Ceiling Units: Full-size panels equal to 2 percent of quantity installed.
- 29 **1.8 DELIVERY, STORAGE, AND HANDLING**
- 30 A. Deliver acoustical panels, suspension-system components, and accessories to Project site and store them
- 31 in a fully enclosed, conditioned space where they will be protected against damage from moisture,
- 32 humidity, temperature extremes, direct sunlight, surface contamination, and other causes.
- 33 B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture
- 34 content.
- 35 **1.9 FIELD CONDITIONS**
- 36 A. Environmental Limitations: Do not install acoustical panel ceilings until wet-work in spaces is complete and
- 37 dry, work above ceilings is complete.
- 38 **PART 2 - PRODUCTS**
- 39 **2.1 MANUFACTURERS**
- 40 A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that
- 41 may be incorporated into the Work include, but are not limited to the following:
- 42 1. Armstrong World Industries, Inc.
- 43 2. CertainTeed Corporation.
- 44 3. United States Gypsum Company.
- 45 B. Source Limitations: Obtain each type of acoustical ceiling panel and its supporting suspension system
- 46 from single source from single manufacturer.
- 47

1     **2.2     PERFORMANCE REQUIREMENTS**

- 2     A.     Ceiling products shall comply with the requirements of the California Department of Public Health's  
3           "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor  
4           Sources Using Environmental Chambers."  
5     B.     Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify  
6           products with appropriate markings of applicable testing agency.  
7           1.     Flame-Spread Index: Class A according to ASTM E 1264.  
8           2.     Smoke-Developed Index: 450 or less.

9     **2.3     ACOUSTICAL PANELS (ACT-1)**

- 10    A.     Basis of Design: Armstrong Optima Square Tegular 2' x 2'  
11    B.     Classification: Class A.  
12    C.     Color: White  
13    D.     LR: 0.90.  
14    E.     NRC: 0.95, Type E-400 mounting according to ASTM E 795.  
15    F.     CAC: N.A.  
16    G.     AC: 190.  
17    H.     Edge/Joint Detail: Tegular.  
18    I.     Thickness: 1".  
19    J.     Modular Size: 24" x 24".  
20    K.     Suspension System: Narrow faced suspension system.

21    **2.4     ACOUSTICAL PANELS (ACT-2)**

- 22    A.     Basis of Design: Armstrong Ultima Vector 2' x 2'  
23    B.     Classification: Class A.  
24    C.     Color: White  
25    D.     LR: 0.87.  
26    E.     NRC: 0.80, Type E-400 mounting according to ASTM E 795.  
27    F.     CAC: 35.  
28    G.     AC: 170.  
29    H.     Edge/Joint Detail: Vector (per Armstrong).  
30    I.     Thickness: 1".  
31    J.     Modular Size: 24" x 24".  
32    K.     Ensure Vector tiles are mounted facing the same direction per the markings on the backs of the tiles.  
33    L.     Suspension System: Wide faced suspension system.

34    **2.5     METAL SUSPENSION SYSTEM**

- 35    A.     Metal Suspension-System Standard: Provide manufacturer's standard, direct-hung, metal suspension  
36           system and accessories according to ASTM C 635/C 635M and designated by type, structural  
37           classification, and finish indicated.
- 38    B.     Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less  
39           than 25 percent.
- 40    C.     Wide-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from  
41           cold-rolled steel sheet; prepainted, electrolytically zinc coated, or hot-dip galvanized, G30 coating  
42           designation; with prefinished 15/16-inch-wide metal caps on flanges.  
43           1.     Structural Classification: Intermediate-duty system.  
44           2.     End Condition of Cross Runners: Override (stepped) or butt-edge type.  
45           3.     Face Design: Flat, flush.  
46           4.     Cap Material: Cold-rolled steel.  
47           5.     Cap Finish: Painted white.
- 48    D.     Narrow-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from  
49           cold-rolled steel sheet; prepainted, electrolytically zinc coated, or hot-dip galvanized, G30 coating  
50           designation; with prefinished 9/16-inch-wide metal caps on flanges.  
51           1.     Structural Classification: Intermediate-duty system.  
52           2.     End Condition of Cross Runners: Override (stepped) or butt-edge type.  
53           3.     Face Design: Flat, flush.  
54           4.     Cap Material: Cold-rolled steel.  
55           5.     Cap Finish: Painted white.

1 **2.6 ACCESSORIES**

- 2 A. Attachment Devices: Size for five times the design load indicated in ASTM C 635/C 635M, Table 1, "Direct  
3 Hung," unless otherwise indicated. Comply with seismic design requirements.  
4 1. Anchors in Concrete: Anchors of type and material indicated below, with holes or loops for  
5 attaching hangers of type indicated and with capability to sustain, without failure, a load equal to  
6 five times that imposed by ceiling construction, as determined by testing according to  
7 ASTM E 488/E 488M or ASTM E 1512 as applicable, conducted by a qualified testing and  
8 inspecting agency.  
9 a. Type: Postinstalled bonded anchors.  
10 b. Corrosion Protection: Carbon-steel components zinc plated according to ASTM B 633,  
11 Class SC 1 (mild) service condition.  
12 B. Wire Hangers, Braces, and Ties: Provide wires as follows:  
13 1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.  
14 2. Size: Wire diameter sufficient for its stress at three times hanger design load  
15 (ASTM C 635/C 635M, Table 1, "Direct Hung") will be less than yield stress of wire, but not less  
16 than 0.106-inch- diameter wire.  
17 C. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.  
18 D. Flat Hangers: Mild steel, zinc coated or protected with rust-inhibitive paint.  
19 E. Angle Hangers: Angles with legs not less than 7/8 inch wide; formed with 0.04-inch-thick, galvanized-steel  
20 sheet complying with ASTM A 653/A 653M, G90 coating designation; with bolted connections and 5/16-  
21 inch-diameter bolts.

22 **2.7 METAL EDGE MOLDINGS AND TRIM**

- 23 A. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated,  
24 manufacturer's standard moldings for edges and penetrations that comply with seismic design  
25 requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges  
26 of suspension-system runners.  
27 1. Edge moldings shall fit acoustical panel edge details and suspension systems indicated and match  
28 width and configuration of exposed runners unless otherwise indicated.  
29 2. For lay-in panels with reveal edge details, provide stepped edge molding that forms reveal of same  
30 depth and width as that formed between edge of panel and flange at exposed suspension member.  
31 3. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit  
32 penetration exactly.

33 **2.8 ACOUSTICAL SEALANT**

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

35 **PART 3 - EXECUTION**

36 **3.1 EXAMINATION**

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

44 **3.2 PREPARATION**

- 45 A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite  
46 edges of each ceiling. Avoid using less-than-half-width panels at borders unless otherwise indicated, and  
47 comply with layout shown on reflected ceiling plans.  
48 B. Layout openings for penetrations centered on the penetrating items.  
49

1 **3.3 INSTALLATION**

- 2 A. Install acoustical panel ceilings according to ASTM C 636/C 636M and manufacturer's written instructions.
- 3 B. Suspend ceiling hangers from building's structural members and as follows:
- 4 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum
- 5 that are not part of supporting structure or of ceiling suspension system.
- 6 2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by
- 7 bracing, countersplaying, or other equally effective means.
- 8 3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that
- 9 interfere with location of hangers at spacings required to support standard suspension-system
- 10 members, install supplemental suspension members and hangers in form of trapezes or equivalent
- 11 devices.
- 12 4. Secure wire hangers to ceiling-suspension members and to supports above with a minimum of
- 13 three tight turns. Connect hangers directly to structure or to inserts, eye screws, or other devices
- 14 that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to
- 15 age, corrosion, or elevated temperatures.
- 16 5. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members,
- 17 by attaching to inserts, eye screws, or other devices that are secure and appropriate for both the
- 18 structure to which hangers are attached and the type of hanger involved. Install hangers in a
- 19 manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated
- 20 temperatures.
- 21 6. When steel framing does not permit installation of hanger wires at spacing required, install carrying
- 22 channels or other supplemental support for attachment of hanger wires.
- 23 7. Space hangers not more than 48 inches o.c. along each member supported directly from hangers
- 24 unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
- 25 8. Size supplemental suspension members and hangers to support ceiling loads within performance
- 26 limits established by referenced standards.
- 27 C. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where
- 28 necessary to conceal edges of acoustical panels.
- 29 1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings
- 30 before they are installed.
- 31 2. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3
- 32 inches from ends. Miter corners accurately and connect securely.
- 33 3. Do not use exposed fasteners, including pop rivets, on moldings and trim.
- 34 D. Install suspension-system runners so they are square and securely interlocked with one another. Remove
- 35 and replace dented, bent, or kinked members.
- 36 E. Install acoustical panels with undamaged edges and fit accurately into suspension-system runners and
- 37 edge moldings. Scribe and cut panels at borders and penetrations to provide precise fit.
- 38 1. For reveal-edged panels on suspension-system runners, install panels with bottom of reveal in firm
- 39 contact with top surface of runner flanges.
- 40 2. Paint cut edges of panel remaining exposed after installation; match color of exposed panel
- 41 surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.

42 **3.4 ERECTION TOLERANCES**

- 43 A. Suspended Ceilings: Install main and cross runners level to a tolerance of 1/8 inch in 12 feet, non-
- 44 cumulative.
- 45 B. Moldings and Trim: Install moldings and trim to substrate and level with ceiling suspension system to a
- 46 tolerance of 1/8 inch in 12 feet, non-cumulative.

47 **3.5 CLEANING**

- 48 A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension-
- 49 system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish
- 50 damage.
- 51 B. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently
- 52 eliminate evidence of damage.

53 **END OF SECTION**

SECTION 09 51 23  
ACOUSTICAL TILE CEILINGS

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18 **PART 1 - GENERAL**

19 **1.1 RELATED DOCUMENTS**

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

22 **1.2 SUMMARY**

- 23 A. Section includes acoustical tiles and concealed suspension systems for ceilings.
- 24 B. Related Requirements:
- 25 1. Section 095113 "Acoustical Panel Ceilings" for ceilings consisting of mineral-base and glass-fiber-
- 26 base acoustical panels and exposed suspension systems.

27 **1.3 PREINSTALLATION MEETINGS**

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

29 **1.4 ACTION SUBMITTALS**

- 30 A. Product Data: For each type of product.
- 31 B. Sustainable Design Submittals:
- 32 1. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content
- 33 and cost.
- 34 C. Samples: For each exposed product and for each color and texture specified.
- 35

- 1 **1.5 INFORMATIONAL SUBMITTALS**
- 2 A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown
- 3 and coordinated with each other, using input from installers of the items involved:
- 4 1. Ceiling suspension-system members.
- 5 2. Structural members to which suspension systems will be attached.
- 6 3. Method of attaching hangers to building structure.
- 7 a. Furnish layouts for cast-in-place anchors, clips, and other ceiling attachment devices whose
- 8 installation is specified in other Sections.
- 9 4. Carrying channels or other supplemental support for hanger-wire attachment where conditions do
- 10 not permit installation of hanger wires at required spacing.
- 11 5. Size and location of initial access modules for acoustical tile.
- 12 6. Items penetrating finished ceiling and ceiling-mounted items including the following:
- 13 a. Lighting fixtures.
- 14 b. Diffusers.
- 15 c. Grilles.
- 16 d. Speakers.
- 17 e. Sprinklers.
- 18 f. Access panels.
- 19 g. Perimeter moldings.
- 20 7. Show operation of hinged and sliding components adjacent to acoustical tiles.
- 21 8. Minimum Drawing Scale: 1/8 inch = 1 foot (1:96).
- 22 B. Product test reports.
- 23 C. Evaluation reports.
- 24 **1.6 CLOSEOUT SUBMITTALS**
- 25 A. Maintenance data.
- 26 **1.7 QUALITY ASSURANCE**
- 27 A. Testing Agency Qualifications: Qualified according to NVLAP.
- 28 B. Mockup: Refer to Section 01 43 39 – Mockups for description of construction required to complete a
- 29 mockup submittal for review.
- 30 1. Typical ACT-3 and ESS-1 assembly in open office bay, min. full structural bay x 4ft wide panels
- 31 each side of ESS-1. Location to be south-east corner of open office at Ground Level.

32 **PART 2 - PRODUCTS**

- 33 **2.1 PERFORMANCE REQUIREMENTS**
- 34 A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that
- 35 may be incorporated into the Work include, but are not limited to the following:
- 36 1. Armstrong World Industries, Inc.
- 37 2. CertainTeed Corporation.
- 38 3. United States Gypsum Company.
- 39 B. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify
- 40 products with appropriate markings of applicable testing agency.
- 41 1. Flame-Spread Index: Comply with ASTM E 1264 for Class A materials.
- 42 2. Smoke-Developed Index: 450 or less.
- 43 **2.2 ACOUSTICAL TILE CEILINGS, GENERAL**
- 44 A. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less
- 45 than 50 percent.
- 46 B. Acoustical Tile Standard: Comply with ASTM E 1264.
- 47 C. Metal Suspension System Standard: Comply with ASTM C 635.
- 48 D. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung,"
- 49 unless otherwise indicated. Comply with seismic design requirements.
- 50



**SECTION 096429**  
**WOOD FLOORING**

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- 14 2.1 [FIELD-FINISHED WOOD FLOORING](#)
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- 19 3.3 [INSTALLATION OF WOOD FLOORS ON JOIST FLOOR CONSTRUCTION](#)
- 20 3.4 [FIELD FINISHING OF NEW AND EXISTING WOOD FLOORING](#)
- 21 3.5 [AFTER FINISHING - PROTECTION](#)

22 **PART 1 - GENERAL**

23 **1.1 RELATED DOCUMENTS**

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

26 **1.2 SUMMARY**

- 27 A. This Section includes:
  - 28 1. Field finished tongue and groove plank wood flooring.
  - 29 2. Re-finishing of existing tongue and groove wood plank flooring.
- 30 B. Related Sections:
  - 31 1. Section 26 0533 - Raceways and Boxes for Electrical Systems to receive wood flooring at recessed
  - 32 electrical floor boxes.

33 **1.3 SUBMITTALS**

- 34 A. Product Data: For each type of product indicated.
- 35 B. Shop Drawings: Show installation details including location and layout of each type of wood flooring.
- 36 C. A list of techniques to obtain a finished product. This detailed list shall include all incremental steps and a
- 37 schedule of preparation, installation, sanding, finishing, and protection.
- 38 D. Samples for Initial Selection: Manufacturer's wood species and installer's color charts showing the full range
- 39 of colors and finishes available for wood flooring. If re-claimed or salvaged hardwood flooring is to be used,
- 40 provide samples representative of the flooring to be used.
- 41 E. Re-claimed flooring products: Prior to obtaining re-claimed flooring, mock-ups shall be constructed in order
- 42 to illustrate the likeness between the original floor and the re-claimed floor materials.
- 43 F. Samples for Verification: For each type of wood flooring and accessory, with stain color and finish required,
- 44 approximately 24 inches long and of same thickness and material indicated for the Work and showing the
- 45 full range of normal color and texture variations expected.
- 46 G. Mockups: Refer to Section 01 43 39. Provide mock up quantities and locations.
  - 47 1. Mockups for material installation shall be a minimum of 3'x3' to serve as the representative sample
  - 48 of each type of wood to be installed. Wood type mock-ups may be placed on moveable plates but
  - 49 all materials in constructing the plates shall match the substrates of the floor to which the actual wood
  - 50 floor is to be installed. Material sample mockups shall be constructed of the anticipated range of
  - 51 quality of the delivered on-site product. "Typical" sample boards supplied by the hardwood flooring
  - 52 supplier will not be accepted. Mockups shall serve to set quality standards for installation and shall
  - 53 determine the color and texture range for floor to be installed. Approved mock-ups shall stay on-site
  - 54 following approval. See section 1.4 of this specification for additional mock-up requirements.



- 1           2.       Locations for finishes and care shall be a minimum of 3' x 3' to serve as representative samples of  
2           each type of wood flooring in the house and shall serve as the standard of work quality to the  
3           remainder of the work. Finish mockup locations are indicated on the drawing accompanying this  
4           specification. Mock-ups shall stay on-site following approval.

5   **1.4       QUALITY ASSURANCE**

- 6    A.       Source Limitations: For new field-finished wood flooring, obtain each species, grade, and cut of wood from  
7           one source with resources to provide materials and products of consistent quality in appearance and  
8           physical properties.  
9    B.       Re-claimed Wood: For wood flooring products to be installed from re-claimed supply, the source and location  
10           of the reclaimed wood shall come from one location and supplier.  
11   C.       Forest Certification: Provide new wood flooring produced from wood obtained from forests certified by an  
12           FSC-accredited certification body to comply with FSC 1.2, "Principles and Criteria."  
13   D.       Hardwood Flooring: Comply with NOFMA's "Official Flooring Grading Rules" for species, grade, and cut.  
14           1.       Certification: Provide flooring that carries NOFMA grade stamp on each bundle or piece.  
15           2.       Overstock: Provide 5% overstock of each floor tile type that does not meet the approved color range.  
16   E.       Conform to the National Wood Flooring Association's (NWFA) "Installation Guidelines: Wood Flooring".  
17   F.       Mockups: Refer to Section 01043 39. Install mockups to verify selections made under sample submittals  
18           and to demonstrate aesthetic effects and set quality standards for materials and execution.  
19           1.       To set quality standards for installation, install mockups of each representative floor area at locations  
20           approved in the shop submittals  
21           2.       To set quality standards for material installation, sanding and application of field finishes, prepare  
22           finish mockup of floor area.  
23           3.       Mock ups in areas where the existing floor is present shall be completed while the existing floor  
24           remains shall be done in a way that protects the existing floor.  
25           4.       Work can continue only after written authorization from the architect to that finish and appearance  
26           are acceptable

27   **1.5       DELIVERY, STORAGE, AND HANDLING**

- 28   A.       Prior to the delivery of materials, supplier, contractor and installer shall coordinate the time and location of  
29           material delivery.  
30   B.       On the day of material delivery, installer must be present to verify the material is correct as specified. The  
31           installer shall approve all deliveries of material and will coordinate the location of storage for the material to  
32           be delivered with contractor.  
33   C.       Deliver wood flooring materials in unopened cartons or bundles. Cartons or bundles delivered on wood  
34           pallets shall be evenly stacked, and thoroughly wrapped in secured to prevent damage after delivery. Each  
35           pallet, carton or bundle shall be clearly marked with the following  
36           1.       Species  
37           2.       Plank size  
38           3.       Floor or general location where product will be used  
39   D.       Protect wood flooring from exposure to moisture. Do not deliver wood flooring until after concrete, masonry,  
40           plaster, ceramic tile, and similar wet work is complete and dry. Proceed with delivery of wood floor materials  
41           as directed by the contractor.  
42   E.       Do not store wood flooring in plastic containers or in wrapping that might cause moisture or condensation to  
43           be trapped in the containers.  
44   F.       Do not store wood flooring, even if it is in a container, directly in contact with concrete, dirt or the ground,  
45           plumbing or any other water source.  
46   G.       Store wood flooring materials away from exterior doors, HVAC equipment, supply ducts or return duct work  
47   H.       Store wood flooring materials away from areas where painting,, welding, soldering, or use of power driven  
48           tools are used.  
49   I.       Store wood flooring materials in a dry, warm, ventilated, weather tight location.  
50   J.       While in storage, conduct selected moisture tests weekly and monitor the moisture content of the floor.  
51           Maintain a moisture content between 5%-8%  
52   K.       If the product is to be moved it shall be handled carefully so as not to cause damage. The flooring materials  
53           may not be moved using power or motorized equipment, such as a fork lift, unless it is stored on wood  
54           pallets.

55   **1.6       INSTALLER QUALIFICATIONS**

- 56   A.       Installer shall have completed similar scale and scope of projects prior to beginning of the work.  
57   B.       Installer shall have at least 10 years of experience in installing, re-finishing, and finishing wood floors of  
58           tongue and groove maple.

- 1 C. Installer shall be able to provide the owner with a portfolio of projects illustrating similar completed work and  
2 references with contacts to verify work. Projects shall be similar in scope and size to this project. Similar  
3 projects included within the portfolio shall be in number: a minimum of 5 projects completed within the last  
4 three years.
- 5 D. Installer shall be a member of the National Wood Flooring Association in good standing and shall have  
6 access to their full array of publications, technical specifications and product literature. Such documents are  
7 referenced within this specification and guide the standard of quality for this project.
- 8 E. The installer must be prepared to show in writing that a source for re-claimed wood flooring has been located  
9 and will be acquired upon approval by the owner and architect.
- 10 F. Installer shall have the necessary tools and equipment to fulfill the work as specified. It shall be the  
11 responsibility of the installer to operate and maintain the equipment so it functions within the correct  
12 operating and safety perimeters.

13 **1.7 PROJECT CONDITIONS**

- 14 A. The building should be completely enclosed
- 15 B. All outside doors and windows must be in place and have latching mechanisms
- 16 C. Surface Drainage should direct water away from the building
- 17 D. All concrete, masonry, plastering, drywall, and other wet work should be completed and thoroughly dry.  
18 Verify these conditions with the contractor
- 19 E. All existing flooring to be refinished should have a moisture content within the parameters indicated in  
20 NWFA's "Installation Guidelines: Wood Flooring".
- 21 F. Substrate Inspection: Prior to installation, carefully inspect the substrate plywood or boards for the following:  
22 1. Level and true  
23 2. Properly nailed or fastened  
24 3. Correct joinery  
25 4. Proper coverage  
26 5. Unused holes or penetrations  
27 6. If holes or penetrations are intended but no yet cut though substrate, conduct at this time. Provide  
28 proper blocking beneath substrate to prevent deflection  
29
- 30 G. Upon completion of the inspection of the substrate it shall be the responsibility of the contractor to fix all  
31 substrate deficiencies prior to installation and finishing
- 32 H. HVAC system shall be in place and properly functioning
- 33 I. All texturing and painting primer coats should be completed prior to installation of the wood floors
- 34 J. Floor will not be exposed to extremes of humidity or moisture. Interior environmental conditions must be  
35 near the average for the geographical area.
- 36 K. Conditioning period begins not less than seven days before wood flooring installation, is continuous through  
37 installation, and continues not less than seven days after wood flooring installation.  
38 1. Environmental Conditioning: Maintain an ambient temperature between 65 and 75 deg F and relative  
39 humidity planned for building occupants in spaces to receive wood flooring during the conditioning  
40 period.  
41 2. Wood Flooring Conditioning: Move wood flooring into spaces where it will be installed, no later than  
42 the beginning of the conditioning period.  
43 a. Do not install flooring until it adjusts to relative humidity of, and is at same temperature as,  
44 space where it is to be installed.  
45 b. Open sealed packages to allow wood flooring to acclimatize immediately on moving flooring  
46 into spaces in which it will be installed.
- 47 L. After conditioning period, maintain relative humidity and ambient temperature planned for building  
48 occupants.
- 49 M. Finish wood flooring after other finishing operations, including painting of plaster, have been completed but  
50 before the installation of the finish baseboards .

51 **1.8 PROTECTION**

- 52 A. Protect adjacent walls, plaster, trim and finished surfaces from scratches, dents, or other damage during all  
53 phases of the installation. Use pads, guards, protection board or sheets to prevent damage

54 **1.9 EXTRA MATERIALS**

- 55 A. Furnish extra materials described below, before installation begins, that match products installed and that  
56 are packaged with protective covering for storage and identified with labels describing contents.  
57 1. Wood Flooring: Equal to 2 (two) percent of amount installed for each type of wood flooring indicated.

1 **PART 2 - PRODUCTS**

2 **2.1 FIELD-FINISHED WOOD FLOORING**

- 3 A. If new, the wood shall be Kiln dried to 6 to 9 percent maximum moisture content, tongue and groove, edge  
4 grain, and end matched, and with backs channeled (kerfed) for stress relief.
- 5 B. Solid-Wood, Strip flooring Type **WD-1**: This wood type may be existing to remain, re-claimed historic, or new  
6 to match historic.
- 7 1. Species and Grade: White Maple.
  - 8 2. Cut: edge grain
  - 9 3. Thickness: 3/4 inch
  - 10 4. Face Width: 2-1/4 inches.
  - 11 5. Lengths: 4'-0 minimum.
  - 12 6. Location: Provide flooring type WD-1 to areas indicated on the room finish schedule.
  - 13 7. This wood type, as approved from mockups, shall be reclaimed or brand new. Provide samples of  
14 both new and reclaimed for approval.
  - 15 8. Obtain written approval of sample prior to purchasing wood floor type WD-1 new or reclaimed.
- 16 C. Solid Wood Strip flooring Type **WD-2**: Soft Maple Flooring. This wood type may be existing to remain or re-  
17 claimed historic, or new.
- 18 1. Species and Grade: Select Soft Maple – White Maple.
  - 19 2. Cut: Rift Sawn.
  - 20 3. Thickness: 3/4 inch.
  - 21 4. Face Width: 2-1/4 inches.
  - 22 5. Lengths: Comply to NOFMA and NWFA standards.
  - 23 6. Location: Provide flooring type **WD-2** to areas indicated on the attached floor plans.
  - 24 7. This wood type, as approved from samples, shall be brand new.
  - 25 8. Obtain written approval of samples prior to purchasing wood floor type WD-2 new or reclaimed.

26 **2.2 ACCESSORY MATERIALS**

- 27 A. Sand Paper: Use materials as recommended by NWFA's "Installation Guidelines: Wood Flooring".
- 28 B. Application Materials: Use materials as recommended by NWFA's "Installation Guidelines: Wood Flooring".
- 29 C. Wood Flooring Adhesive: Mastic recommended by flooring and adhesive manufacturers for application  
30 indicated.
- 31 D. Trowelable Leveling and Patching Compound: Latex-modified, hydraulic-cement-based formulation  
32 approved by wood flooring manufacturer.
- 33 E. Resilient acoustical mat below all areas of new wood floor over existing concrete topping: **MAT-2** – refer to  
34 Materials List 000020 for product reference.
- 35 F. Fasteners: As recommended by NWFA's "Installation Guidelines: Wood Flooring". Use sizes and spacing  
36 to conform to Section V appendix item CA
- 37 G. Cork Expansion Strip: Composition cork strip.
- 38 H. Trim:
- 39 1. Base: Existing and new where required – see A700-series drawings
  - 40 2. Base Shoe Molding: None
  - 41 3. Threshold: Of the same species as the floor. Threshold locations shall match the original profiles  
42 and locations. Installer shall coordinate with the contractor to obtain profiles and locations of original  
43 thresholds. Each threshold shall be tapered on each side and routed at bottom of one side to  
44 accommodate wood flooring. See detail 1 on sheet A6.1.
  - 45 4. Reducer Strip: wide, tapered on 1 side, and in thickness matching wood flooring.
  - 46 5. Grille Frames: Coordinate with contractor and grille installer for grille sizes. All grille openings shall  
47 be trimmed in picture frame style edges sized to fit the respective grille opening. Cut proper profile  
48 to ensure the grille is properly set in the opening and site flush with the top of the wood floor.
- 49 I. Finishing Materials: As approved from submittals. Finishing materials shall be water-based.
- 50 1. Materials for finishing shall include penetrating stains to achieve proper color and a natural  
51 conversion varnish for a durable finish coat
  - 52 2. Manufacturers:
    - 53 a. Bonakemi USA, Inc.-Stains and polyurethane coatings
    - 54 b. Approved equal

1 **PART 3 - EXECUTION**

2 **3.1 EXAMINATION**

- 3 A. Examine substrates, areas and conditions, with Installer present, for compliance with requirements for  
4 maximum moisture content, installation tolerances, and other conditions affecting performance of wood  
5 flooring.  
6 1. Verify that substrates comply with tolerances and other requirements specified in other Sections.  
7 2. For adhesively applied wood flooring, verify that substrates are free of cracks, ridges, depressions,  
8 scale, and foreign deposits that might interfere with adhesion of resilient products.  
9 3. Proceed with installation only after unsatisfactory conditions have been corrected.  
10 B. Substrate Moisture Testing, General: Perform tests to comply with applicable recommendations in NWFA's  
11 "Installation Guidelines: Wood Flooring."

12 **3.2 PREPARATION**

- 13 A. Grind high spots and fill low spots on concrete substrates to produce a maximum 1/8-inch deviation in any  
14 direction when checked with a 10-foot straight edge.  
15 B. Repair substrate boards to ensure level surfaces within the tolerances indicated in NWFA's "Installation  
16 Guidelines: Wood Flooring."  
17 C. Remove coatings, including curing compounds, and other substances on substrates that are incompatible  
18 with installation adhesives and that contain soap, wax, oil, or silicone, using mechanical methods  
19 recommended by manufacturer. Do not use solvents.  
20 D. Broom or vacuum clean substrates to be covered immediately before product installation. After cleaning,  
21 examine substrates for moisture, alkaline salts, carbonation, or dust. Proceed with installation only after  
22 unsatisfactory conditions have been corrected.  
23 E. Layout all flooring for a given area and select boards of uniform color range for installation. Discard all  
24 boards not of uniform color or install these boards inside closets.

25 **3.3 INSTALLATION OF WOOD FLOORS ON WOOD SLEEPER CONSTRUCTION**

- 26 A. Comply with flooring manufacturer's written installation instructions, but not less than applicable  
27 recommendations in NWFA's "Installation Guidelines: Wood Flooring."  
28 B. Subfloor: Prepare and according to requirements within this specification and with NWFA's "Installation  
29 Guidelines: Wood Flooring."  
30 C. Provide expansion space at walls and other obstructions and terminations of flooring per the specifications  
31 indicated in of NWFA's "Installation Guidelines: Wood Flooring."  
32 D. Asphalt-Saturated Felt: Where strip or plank flooring is nailed to solid-wood subfloor, install flooring over a  
33 layer of asphalt-saturated felt.  
34 E. Solid-Wood, Plank Flooring: Blind nail or staple flooring to substrate with method recommended by NWFA's  
35 "Installation Guidelines: Wood Flooring."  
36 1. Wood Trim: Nail baseboard to wall and nail shoe molding or other trim to baseboard; do not nail to  
37 flooring.

38 **3.4 FIELD FINISHING OF NEW AND EXISTING WOOD FLOORING**

- 39 A. Machine-sand flooring to remove offsets, ridges, cups, and sanding-machine marks that would be noticeable  
40 after finishing. Vacuum and tack with a clean cloth immediately before applying finish.  
41 1. Comply with applicable recommendations in NWFA's "Installation Guidelines: Wood Flooring."  
42 B. Where possible Fill and repair wood flooring seams and defects.  
43 1. Apply floor-finish materials as recommended by finish manufacturer for application indicated and as  
44 specified in NWFA's "Installation Guidelines: Wood Flooring."  
45 C. Do not use less than one coat of floor sealer and Four finish coats.  
46 1. Apply stains and preservative coats to achieve an even color distribution matching approved  
47 Samples and mock-up panels.  
48 D. Cover wood flooring after finishing.  
49 E. Do not cover wood flooring after finishing until finish reaches full cure, and not before seven days after  
50 applying last finish coat.

51 **3.5 AFTER FINISHING - PROTECTION**

- 52 A. Protect installed wood flooring during remainder of construction period with covering of heavy kraft paper or  
53 other suitable material. Do not use plastic sheet or film that might cause condensation.  
54 1. Use Red Rosin Kraft Paper to cover all surfaces. Leave max. of 6" around the edges of all walls for  
55 installation of finish trim and shoe.



SECTION 09 65 13  
RESILIENT BASE AND ACCESSORIES

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14 **PART 1 - GENERAL**

15 **1.1 RELATED DOCUMENTS**

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

18 **1.2 SUMMARY**

- 19 A. Section Includes:  
20 1. Resilient base.

21 **1.3 ACTION SUBMITTALS**

- 22 A. Product Data: For each type of product.  
23 B. Sustainable Design Submittals:  
24 1. Product Data: For adhesives, indicating VOC content.  
25 C. Samples: For each exposed product and for each color and texture specified, not less than 12 inches long.

26 **PART 2 - PRODUCTS**

27 **2.1 THERMOSET-RUBBER BASE (RB-1)**

- 28 A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that  
29 may be incorporated into the Work include, but are not limited to, the following:  
30 1. Johnsonite; A Tarkett Company.  
31 B. Product Standard: ASTM F 1861, Type TS (rubber, vulcanized thermoset), Group I (solid, homogeneous).  
32 1. Style and Location:  
33 a. Style A, Straight: Provide in areas with carpet and resilient flooring.  
34 C. Thickness: 0.125 inch.  
35 D. Height: 4 inches.  
36 E. Lengths: Cut lengths 48 inches long or coils in manufacturer's standard length.  
37 F. Outside Corners: Job formed or preformed.  
38 G. Inside Corners: Job formed or preformed.  
39 H. Colors: 63 Burnt Umber

40 **2.2 INSTALLATION MATERIALS**

- 41 A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended  
42 hydraulic-cement-based formulation provided or approved by resilient-product manufacturer for  
43 applications indicated.  
44 B. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and  
45 substrate conditions indicated.  
46 1. Adhesives shall have a VOC content of 50] g/L or less and 60 g/L or less for rubber stair treads.  
47 C. Stair-Tread Nose Filler: Two-part epoxy compound recommended by resilient stair-tread manufacturer to  
48 fill nosing substrates that do not conform to tread contours.  
49 D. Floor Polish: Provide protective, liquid floor-polish products recommended by resilient stair-tread  
50 manufacturer.

1 **PART 3 - EXECUTION**

2 **3.1 PREPARATION**

- 3 A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient  
4 products.  
5 B. Do not install resilient products until they are the same temperature as the space where they are to be  
6 installed.

7 **3.2 RESILIENT BASE INSTALLATION**

- 8 A. Comply with manufacturer's written instructions for installing resilient base.  
9 B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other  
10 permanent fixtures in rooms and areas where base is required.  
11 C. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces  
12 aligned.  
13 D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact  
14 with horizontal and vertical substrates.  
15 E. Do not stretch resilient base during installation.  
16 F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with  
17 manufacturer's recommended adhesive filler material.  
18 G. Preformed Corners: Install preformed corners before installing straight pieces.  
19 H. Job-Formed Corners:  
20 1. Outside Corners: Use straight pieces of maximum lengths possible and form with returns not less  
21 than 6 inches in length.  
22 a. Form without producing discoloration (whitening) at bends.  
23 2. Inside Corners: Use straight pieces of maximum lengths possible and form with returns not less  
24 than 3 inches in length.  
25 a. Miter or cope corners to minimize open joints.

26 **3.3 CLEANING AND PROTECTION**

- 27 A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.

28 **END OF SECTION**

SECTION 09 66 13

PORTLAND CEMENT TERRAZZO FLOORING

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19 **PART 1 - GENERAL**

20 **1.1 RELATED DOCUMENTS**

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

23 **1.2 SUMMARY**

- 24 A. Section includes poured-in-place portland cement terrazzo flooring.

25 **1.3 ACTION SUBMITTALS**

- 26 A. Product Data: For each type of product.
- 27 B. Sustainable Design Submittals:
  - 28 1. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and
  - 29 cost.
  - 30 2. Product Data: For adhesives, indicating VOC content.
- 31 C. Shop Drawings: Include terrazzo installation requirements. Include plans, elevations, sections, component
- 32 details, and attachments to other work.
- 33 D. Samples: For each exposed product and for each color and texture specified.

34 **1.4 CLOSEOUT SUBMITTALS**

- 35 A. Maintenance data.

36 **1.5 QUALITY ASSURANCE**

- 37 A. Installer Qualifications: An installer who is a contractor member of NTMA.
- 38 B. Mockup: Refer to Section 01 43 39 – Mockups for description of construction required to complete a mockup
- 39 submittal for review.
- 40 C. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic
- 41 effects and set quality standards for materials and execution.

42 **1.6 FIELD CONDITIONS**

- 43 A. Environmental Limitations: Maintain temperature above 50 deg F for 48 hours before and during terrazzo
- 44 installation.
- 45 B. Control and collect water and dust produced by grinding operations. Protect adjacent construction from
- 46 detrimental effects of grinding operations.



1 **PART 2 - PRODUCTS**

2 **2.1 PERFORMANCE REQUIREMENTS**

- 3 A. NTMA Standards: Comply with NTMA's "Terrazzo Specifications and Design Guide" and with written  
4 recommendations for terrazzo type indicated unless more stringent requirements are specified.

5 **2.2 PORTLAND CEMENT TERRAZZO**

- 6 A. Portland Cement Terrazzo System (TZ-1): Monolithic.  
7 1. Underbed: Comply with NTMA's "Terrazzo Specifications and Design Guide" for terrazzo system  
8 indicated for component proportions and mixing.  
9 2. Topping: Comply with NTMA's "Terrazzo Specifications and Design Guide" for terrazzo system  
10 indicated for matrix and aggregate proportions and mixing.  
11 a. Terrazzo Topping Thickness: As indicated.  
12 b. Mix Color and Pattern: Refer to Material Tag Index.  
13 B. Materials:  
14 1. Portland Cement: ASTM C 150, Type 1.  
15 a. Color for Exposed Matrix: Refer to Material Tag Index.  
16 2. Water: Potable.  
17 3. Sand: ASTM C 33/C 33M.  
18 4. Aggregates: Comply with NTMA gradation standards for mix indicated and contain no deleterious or  
19 foreign matter.  
20 a. Abrasion and Impact Resistance: Less than 40 percent loss per ASTM C 131.  
21 b. 24-Hour Absorption Rate: Less than 0.75 percent.  
22 c. Dust Content: Less than 1.0 percent by weight.  
23 5. Matrix Pigments: Pure mineral or synthetic pigments, alkali resistant, durable under exposure to  
24 sunlight, and compatible with terrazzo matrix.  
25 6. Bonding Agent: Neat portland cement, or epoxy or acrylic bonding agents formulated for use with  
26 topping indicated.

27 **2.3 STRIP MATERIALS**

- 28 A. Standard Divider Strips: One-piece, flat-type strips for grouting into sawed joints prepared in substrate.  
29 1. Material: Brass.  
30 2. Depth: As indicated.  
31 3. Width: As indicated.  
32 B. Control-Joint Strips: Separate, double L-type angles, positioned back to back, that match material and color  
33 of divider strips and in depth required for topping thickness indicated.  
34 C. Accessory Strips: Match divider-strip width, material, and color unless otherwise indicated. Use the following  
35 types of accessory strips as required to provide a complete installation:  
36 1. Base-bead strips for exposed top edge of terrazzo base.  
37 2. Edge-bead strips for exposed edges of terrazzo.  
38 3. Nosings for terrazzo stair treads and landings.  
39 D. Abrasive Strips: Abrasive nosing strip and two-line abrasive inserts at nosings. Silicon carbide or aluminum  
40 oxide, or combination of both, in epoxy-resin binder and set in channel.  
41 1. Width: 1/2 inch.  
42 2. Depth: As required by terrazzo thickness.  
43 3. Length: 4 inches less than stair width.  
44 4. Color: As selected by Architect from full range of industry colors.

45 **2.4 MISCELLANEOUS ACCESSORIES**

- 46 A. Strip Adhesive: Recommended by manufacturer for this use.  
47 1. Adhesives shall have a VOC content of 70 g/L or less.  
48 B. Strip Anchoring Devices: Provide mechanical anchoring devices or adhesives for strip materials as  
49 recommended by manufacturer and as required for secure attachment to substrate.  
50 C. Isolation and Expansion-Joint Material: Closed-cell polyethylene foam, nonabsorbent to liquid water and  
51 gas, and non-outgassing in unruptured state; butyl rubber; rubber; or cork; minimum 1/2 inch wide.  
52 D. Portland Cement Terrazzo Cleaner: Chemically neutral cleaner with pH factor between 7 and 10 that is  
53 biodegradable, phosphate free, and recommended by cleaner manufacturer for use on terrazzo type  
54 indicated.  
55

- 1 E. Sealer: Slip- and stain-resistant, penetrating-type sealer that is chemically neutral; does not affect terrazzo  
2 color or physical properties; is recommended by sealer manufacturer; and complies with NTMA's "Terrazzo  
3 Specifications and Design Guide" for terrazzo type indicated.  
4 1. Surface Friction: Not less than 0.6 according to ASTM D 2047.  
5 2. Acid-Base Properties: With pH factor between 7 and 10.

6 **PART 3 - EXECUTION**

7 **3.1 PREPARATION**

- 8 A. Clean substrates of substances, including oil, grease, and curing compounds, that might impair terrazzo  
9 bond. Provide clean, dry, and neutral substrate for terrazzo application.  
10 1. Roughen concrete substrates before installing terrazzo system according to NTMA's written  
11 recommendations.  
12 B. Verify that concrete substrates are dry and moisture-vapor emissions are within acceptable levels according  
13 to manufacturer's written instructions.  
14 1. Moisture Testing: Test for moisture content by method recommended in writing by terrazzo  
15 manufacturer. Proceed with installation only after substrates pass testing.

16 **3.2 INSTALLATION**

- 17 A. Comply with NTMA's written recommendations for terrazzo and accessory installation.  
18 B. Installation Tolerance: Limit variation in terrazzo surface from level to 1/4 inch in 10 feet; noncumulative.  
19 C. Underbed:  
20 1. Comply with NTMA's "Terrazzo Specifications and Design Guide" for underbed installation.  
21 2. Cover entire surface to receive terrazzo with dusting of sand.  
22 3. Install isolation membrane over sand, overlapping ends and edges a minimum of 3 inches.  
23 4. Install welded-wire reinforcement, overlapping at edges and ends at least two squares. Stop mesh a  
24 minimum of 1 inch short of expansion joints.  
25 5. Place underbed and screed to elevation indicated below finished floor elevation.  
26 D. Strip Materials:  
27 1. Divider and Control-Joint Strips:  
28 a. Locate divider strips directly over control joints, breaks, and saw cuts in concrete slabs.  
29 2. Accessory Strips: Install as required to provide a complete installation.  
30 3. Abrasive Strips: Install with surface of abrasive strip positioned 1/16 inch higher than terrazzo  
31 surface.  
32 E. Terrazzo Installation: Pour in place and seed additional aggregates in matrix to uniformly distribute granular  
33 material and produce a surface with a minimum of 70 percent aggregate exposure. Cure and finish portland  
34 cement terrazzo according to NTMA's "Terrazzo Specifications and Design Guide" for terrazzo type  
35 indicated.  
36 F. Repair: Cut out and replace terrazzo areas that evidence lack of bond with substrate or underbed, including  
37 areas that emit a "hollow" sound if tapped. Cut out terrazzo areas in panels defined by strips and replace to  
38 match adjacent terrazzo, or repair panels according to NTMA's written recommendations, as approved by  
39 Architect.

40 **3.3 CLEANING AND PROTECTION**

- 41 A. Terrazzo Cleaning:  
42 1. Remove grinding dust from installation and adjacent areas.  
43 2. Wash surfaces with cleaner immediately after final cleaning of terrazzo flooring according to NTMA's  
44 written recommendations and manufacturer's written instructions; rinse surfaces with water and allow  
45 them to dry thoroughly.  
46 B. Sealing:  
47 1. Seal surfaces according to NTMA's written recommendations.  
48 2. Apply sealer according to sealer manufacturer's written instructions.  
49 C. Protection: Provide final protection and maintain conditions, in a manner acceptable to Installer, that ensure  
50 that terrazzo is without damage or deterioration at time of Substantial Completion.

51 **END OF SECTION**

SECTION 09 67 23  
RESINOUS FLOORING

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16 **PART 1 - GENERAL**

17 **1.1 SUMMARY**

- 18 A. Section includes resinous flooring systems.

19 **1.2 PREINSTALLATION MEETINGS**

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

21 **1.3 ACTION SUBMITTALS**

- 22 A. Product Data: For each type of product.  
23 B. Sustainable Design Submittals:  
24 C. Samples: For each type of exposed finish required.

25 **1.4 INFORMATIONAL SUBMITTALS**

- 26 A. Material certificates.  
27 B. Material test reports.

28 **1.5 CLOSEOUT SUBMITTALS**

- 29 A. Maintenance data.

30 **1.6 QUALITY ASSURANCE**

- 31 A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

32 **1.7 FIELD CONDITIONS**

- 33 A. Environmental Limitations: Comply with resinous flooring manufacturer's written instructions for substrate  
34 temperature, ambient temperature, moisture, ventilation, and other conditions affecting resinous flooring  
35 application.  
36 B. Lighting: Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting  
37 conditions during resinous flooring application.  
38 C. Close spaces to traffic during resinous flooring application and for 24 hours after application unless  
39 manufacturer recommends a longer period.  
40

1 **PART 2 - PRODUCTS**

2 **2.1 RESINOUS FLOORING (EPOXY-1)**

- 3 A. Resinous Flooring System: Abrasion-, impact-, and chemical-resistant, aggregate-filled, and resin-based  
4 monolithic floor surfacing designed to produce a seamless floor and integral cove base.
- 5 B. System Characteristics:
- 6 1. Color and Pattern: As selected by Architect from manufacturer's full range.
  - 7 2. Wearing Surface: Textured for slip resistance.
  - 8 3. Overall System Thickness: Minimum 3/16 inch.
  - 9 4. Federal Agency Approvals: USDA approved for food-processing environments.
- 10 C. Primer: Type recommended by resinous flooring manufacturer for substrate and resinous flooring system  
11 indicated.
- 12 D. Patching and Fill Material: Resinous product of or approved by resinous flooring manufacturer and  
13 recommended by manufacturer for application indicated.
- 14 E. Body Coats:
- 15 1. Resin: Epoxy.
  - 16 2. Formulation Description: 100 percent solids.
  - 17 3. Type: Pigmented.
  - 18 4. Application Method: Troweled or screeded.
  - 19 5. Number of Coats: One.
  - 20 6. Thickness of Coats: 1/8 inch.
  - 21 7. Aggregates: Colored quartz (ceramic-coated silica).
- 22 F. Topcoats: Sealing or finish coats.
- 23 1. Resin: Epoxy.
  - 24 2. Formulation Description: 100 percent solids.
  - 25 3. Type: Clear.
  - 26 4. Number of Coats: One.
  - 27 5. Thickness of Coats: 1/16 inch.
  - 28 6. Finish: Matte.
- 29 G. System Physical Properties: Provide resinous flooring system with the following minimum physical  
30 property requirements when tested according to test methods indicated:
- 31 1. Compressive Strength: 10,000 psi minimum according to ASTM C 579.
  - 32 2. Tensile Strength: 2000 psi minimum according to ASTM C 307.
  - 33 3. Flexural Strength: 4000 psi minimum according to ASTM C 580.
  - 34 4. Water Absorption: 0.05 percent maximum according to ASTM C 413.
  - 35 5. Coefficient of Friction: 0.9 according to ASTM D-2047.

36 **PART 3 - EXECUTION**

37 **3.1 PREPARATION**

- 38 A. Prepare and clean substrates according to resinous flooring manufacturer's written instructions for  
39 substrate indicated. Provide clean, dry substrate for resinous flooring application.
- 40 B. Concrete Substrates: Provide sound concrete surfaces free of laitance, glaze, efflorescence, curing  
41 compounds, form-release agents, dust, dirt, grease, oil, and other contaminants incompatible with resinous  
42 flooring.
- 43 1. Roughen concrete substrates as follows:
    - 44 a. Shot-blast surfaces with an apparatus that abrades the concrete surface, contains the  
45 dispensed shot within the apparatus, and recirculates the shot by vacuum pickup.
    - 46 b. Comply with ASTM C 811 requirements unless manufacturer's written instructions are more  
47 stringent.
  - 48 2. Repair damaged and deteriorated concrete according to resinous flooring manufacturer's written  
49 instructions.
  - 50 3. Verify that concrete substrates are dry and moisture-vapor emissions are within acceptable levels  
51 according to manufacturer's written instructions.
  - 52 4. Alkalinity and Adhesion Testing: Verify that concrete substrates have pH within acceptable range.  
53 Perform tests recommended by manufacturer. Proceed with application only after substrates pass  
54 testing.

- 1 C. Patching and Filling: Use patching and fill material to fill holes and depressions in substrates according to  
2 manufacturer's written instructions.  
3 D. Resinous Materials: Mix components and prepare materials according to resinous flooring manufacturer's  
4 written instructions.

5 **3.2 APPLICATION**

- 6 A. Apply components of resinous flooring system according to manufacturer's written instructions to produce  
7 a uniform, monolithic wearing surface of thickness indicated.  
8 1. Expansion and Isolation Joint Treatment: At substrate expansion and isolation joints, comply with  
9 resinous flooring manufacturer's written instructions.  
10 B. Primer: Apply primer over prepared substrate at manufacturer's recommended spreading rate.  
11 C. Integral Cove Base: Apply cove base mix to wall surfaces before applying flooring. Apply according to  
12 manufacturer's written instructions. Round internal and external corners.  
13 1. Integral Cove Base: 4 inches high.  
14 D. Troweled or Screeded Body Coats: Apply troweled or screeded body coats in thickness indicated for  
15 flooring system. Hand or power trowel and grout to fill voids. When body coats are cured, remove trowel  
16 marks and roughness using method recommended by manufacturer.  
17 1. Aggregates: Broadcast aggregates at rate recommended by manufacturer and, after resin is cured,  
18 remove excess aggregates to provide surface texture indicated.  
19 E. Topcoats: Apply topcoats in number indicated for flooring system and at spreading rates recommended in  
20 writing by manufacturer and to produce wearing surface indicated.  
21 F. Protect resinous flooring from damage and wear during the remainder of construction period.

22 **END OF SECTION**

**SECTION 09 68 13**  
**TILE CARPETING**

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19 **PART 1 - GENERAL**

20 **1.1 RELATED DOCUMENTS**

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

23 **1.2 SUMMARY**

- 24 A. Section includes modular carpet tile.

25 **1.3 PREINSTALLATION MEETINGS**

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

27 **1.4 ACTION SUBMITTALS**

- 28 A. Product Data: For each type of product.
- 29 B. Sustainable Design Submittals:
- 30 1. Product Data: For adhesives, indicating VOC content.
  - 31 2. Laboratory Test Reports: For flooring products, indicating compliance with requirements for testing  
32 and product requirements of CRI's "Green Label Plus" testing program.
  - 33 3. Laboratory Test Reports: For flooring products, indicating compliance with requirements for low-  
34 emitting materials.
- 35 C. Shop Drawings: For carpet tile installation, plans showing the following:
- 36 1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are  
37 required in carpet tiles.
  - 38 2. Carpet tile type, color, and dye lot.
  - 39 3. Type of subfloor.
  - 40 4. Type of installation.
  - 41 5. Pattern of installation.
  - 42 6. Pattern type, location, and direction.
  - 43 7. Pile direction.
  - 44 8. Type, color, and location of insets and borders.
  - 45 9. Type, color, and location of edge, transition, and other accessory strips.
  - 46 10. Transition details to other flooring materials.
- 47 D. Samples: For each exposed product and for each color and texture required.
- 48

1 **1.5 INFORMATIONAL SUBMITTALS**

- 2 A. Product test reports.
- 3 B. Sample warranty.

4 **1.6 CLOSEOUT SUBMITTALS**

- 5 A. Maintenance data.

6 **1.7 QUALITY ASSURANCE**

- 7 A. Installer Qualifications: Certified by the International Certified Floorcovering Installers Association at the
- 8 Commercial II certification level.

9 **1.8 WARRANTY**

- 10 A. Special Warranty for Carpet Tiles: Manufacturer agrees to repair or replace components of carpet tile
- 11 installation that fail in materials or workmanship within specified warranty period.
- 12 1. Warranty Period: 10 years from date of Substantial Completion.

13 **PART 2 - PRODUCTS**

14 **2.1 CARPET TILE (CPT-1)**

- 15 A. Tandus, Centiva
- 16 B. Color: Galvanized Pewter 11709
- 17 C. Pattern: Avant 04840
- 18 D. Installation: Vertical Ashlar
- 19 E. Reclamation: 100% recyclable in the ReStart® Program
- 20 F. Stain Resistance: >8 (AATCC 175-08 Stain Resistance Pile Floor Coverings)
- 21 G. Platform Sizes: 9 inches x 36 inches tile.
- 22 H. Primary Backing: ER3® Modular with RS adhesive, 10-40 OSY yarn
  - 23 1. Minimum 45% Recycled Content, with at least 20% Post-consumer content and the balance (25%)
  - 24 Pre-consumer content (dry weightbasis).
- 25 I. Construction: Stratatec® Patterned Symtex®
- 26 J. Face Weight: 25 oz/sq yd | 848 g/sq m
- 27 K. Gauge: 5/64 | 50.4 rows/ 10 cm
- 28 L. Stitches Per Inch: 10.4 stitches / inch | 40.9 stitches/10 cm
- 29 M. Pile Height Average: .187 inch | 4.7 mm
- 30 N. Fiber System: Dynex SD® Nylon (Permanent Stain Resistance)
- 31 O. Dye Method: 100% Solution Dyed
- 32 P. Soil/Stain Protection: Ensure
- 33 Q. Colorfastness to Light: > 4 after 100 hours (AATCC 16E)
- 34 R. Fluorine: Minimum 500 ppm (CRI TM-102).
- 35 S. Antimicrobial Chemicals: No antimicrobials (EPA Registered pesticides) added to product (ASTM E2471-
- 36 05)
- 37 T. Electrostatic Propensity: 1.4 kV (AATCC 134); Permanent Conductive Fiber
- 38 U. Surface Flammability: Passes CPSC FF 1-70 (ASTM D-2859)
- 39 V. Flooring Radiant Panel: Class 1 (mean average CRF: 0.45 w/sq cm or higher) (ASTM E-648)
- 40 W. Smoke Generation: Less than 450 (ASTM E-662)
- 41 X. Installation Method: Vertical Ashlar -9 inches X 36 inches.

42 **2.2 CARPET TILE (MAT-1)**

- 43 A. Interface – Entry Level Colorline.
- 44 B. Color: Refer to Material Tag List.
- 45 C. Style: 1290102500.
- 46 D. Installation: Refer to Drawing.
- 47 E. Fiber Content: 100 percent nylon 6, 6.
- 48 F. Fiber Type: Solution dyed.
- 49 G. Pile Characteristic: Tufted textured loop.
- 50 H. Density: 6720 oz./cu. yd.
- 51 I. Pile Thickness: .150 inches for finished carpet tile.
- 52 J. Primary Backing/Backcoating: Glasbac tile.
- 53 K. Size: 50 cm by 50 cm.

- 1 L. Applied Treatments:
- 2 1. Preservative Treatment: Intersept.
- 3 2. Soil-Resistance Treatment: Protekt2.
- 4 M. Sustainable Design Requirements:
- 5 1. Carpet and cushion shall comply with testing and product requirements of CRI's "Green Label Plus"
- 6 testing program.
- 7 2. Recycled Content: 42%.
- 8 N. Warranty: 15 years.

9 **2.3 INSTALLATION ACCESSORIES**

- 10 A. Carpet Accessory: Trim CPTTRIM-1: Refer to Material Tag list.
- 11 1. Description: Carpet to concrete transition.
- 12 a. Manufacturer: TrafficMaster
- 13 b. Collection: Silver Hammared carpet tack bar
- 14 c. Size: 1/4" height.
- 15 B. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation
- 16 provided or recommended by carpet tile manufacturer.
- 17 C. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and
- 18 subfloor conditions indicated, that comply with flammability requirements for installed carpet tile, and are
- 19 recommended by carpet tile manufacturer for releasable installation.
- 20 1. Adhesives shall have a VOC content of 50 g/L or less.

21 **PART 3 - EXECUTION**

22 **3.1 PREPARATION**

- 23 A. General: Comply with CRI's "CRI Carpet Installation Standards" and with carpet tile manufacturer's written
- 24 installation instructions for preparing substrates indicated to receive carpet tile.
- 25 B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill
- 26 cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8
- 27 inch wide or wider, and protrusions more than 1/32 inch unless more stringent requirements are required
- 28 by manufacturer's written instructions.
- 29 C. Concrete Substrates: Remove coatings, including curing compounds, and other substances that are
- 30 incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use
- 31 mechanical methods recommended in writing by adhesive and carpet tile manufacturers.
- 32 D. Metal Substrates: Clean grease, oil, soil and rust, and prime if recommended in writing by adhesive
- 33 manufacturer. Rough sand painted metal surfaces and remove loose paint. Sand aluminum surfaces, to
- 34 remove metal oxides, immediately before applying adhesive.
- 35 E. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

36 **3.2 INSTALLATION**

- 37 A. General: Comply with CRI's "CRI Carpet Installation Standard," Section 18, "Modular Carpet" and with
- 38 carpet tile manufacturer's written installation instructions.
- 39 B. Installation Method: As recommended in writing by carpet tile manufacturer.
- 40 C. Maintain dye-lot integrity. Do not mix dye lots in same area.
- 41 D. Maintain pile-direction patterns recommended in writing by carpet tile manufacturer.
- 42 E. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including
- 43 cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by
- 44 carpet tile manufacturer.
- 45 F. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges,
- 46 alcoves, and similar openings.
- 47 G. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating
- 48 on carpet tile as marked on subfloor. Use nonpermanent, nonstaining marking device.
- 49 H. Install pattern parallel to walls and borders.
- 50 I. Access Flooring: Stagger joints of carpet tiles so carpet tile grid is offset from access flooring panel grid.
- 51 Do not fill seams of access flooring panels with carpet adhesive; keep seams free of adhesive.
- 52 J. Protect carpet tile against damage from construction operations and placement of equipment and fixtures
- 53 during the remainder of construction period. Use protection methods indicated or recommended in writing
- 54 by carpet tile manufacturer.

55 **END OF SECTION**



SECTION 09 75 16  
STONE BASE

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- 20 3.3 [INSTALLATION OF STONE BASE](#)
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23 **PART 1 - GENERAL**

24 **1.1 RELATED DOCUMENTS**

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

27 **1.2 SUMMARY**

- 28 A. Section includes stone base.

29 **1.3 ACTION SUBMITTALS**

- 30 A. Product Data: For each variety of stone, stone accessory, and manufactured product.
- 31 B. Sustainable Design Submittals:
  - 32 1. Product Certificates: For regional materials, indicating location of material manufacturer and point
  - 33 of extraction, harvest, or recovery for each raw material. Include distance to Project and cost for
  - 34 each regional material.
  - 35 2. Product Data: For adhesives, indicating VOC content.
- 36 C. Shop Drawings: Show fabrication and installation details for stone base, including dimensions and profiles
- 37 of stone units.
- 38 D. Samples for Verification:
  - 39 1. For each stone type indicated. Include two or more Samples in each set and show the full range of
  - 40 variations in appearance characteristics in completed Work.
  - 41 2. For each color of grout required.

42 **1.4 QUALITY ASSURANCE**

- 43 A. Mockup: Refer to Section 01 43 39 – Mockups for description of construction required to complete a
- 44 mockup submittal for review.
- 45 B. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for fabrication and
- 46 installation.
  - 47 1. Build mockup of typical wall area as shown on Drawings.
  - 48 2. Build mockup for stone base, not less than 72 inches long.
  - 49 3. Subject to compliance with requirements, approved mockups may become part of the completed
  - 50 Work if undisturbed at time of Substantial Completion.

1 **PART 2 - PRODUCTS**

2 **2.1 STONE, GENERAL**

- 3 A. Source Limitations for Stone: Obtain each variety of stone, regardless of finish, from a single  
4 quarry, whether specified in this Section or in another Section of the Specifications.  
5 B. Varieties and Sources: Subject to compliance with requirements, provide stone of varieties and from  
6 sources complying with Section 04 45 50 "Existing Marble Refrbishment."  
7 C. Regional Materials: Stone shall be fabricated within 500 miles of Project site from materials that have been  
8 extracted, harvested, or recovered within 500 miles of Project site.

9 **2.2 MARBLE [BASE-1]**

- 10 A. Material Standard: Comply with ASTM C 503.  
11 B. Varieties and Sources: Subject to compliance with requirements, provide the following:  
12 1. Stone Species: Tinos Oasis Green Marble Polished.  
13 C. Finish: Match Architect's sample of existing historic marble wall base.  
14 D. Match Architect's samples.

15 **2.3 MARBLE [BASE-2]**

- 16 A. Material Standard: Comply with ASTM C 503.  
17 B. Varieties and Sources: Subject to compliance with requirements, provide the following:  
18 1. Stone Species: White Carrera Marble – polished..  
19 C. Finish: Match Architect's sample, and match profile of existing historic marble wall base.  
20 D. Match Architect's samples.

21 **2.4 SETTING MATERIALS**

- 22 A. Molding Plaster (Dry locations): ASTM C 59/C 59M.  
23 B. Setting Spots (Wet location): Portland Cement: ASTM C 150, Type I or Type II.  
24 1. Low-Alkali Cement: Not more than 0.60 percent total alkali when tested according to ASTM C 114.  
25 C. Hydrated Lime: ASTM C 207, Type S.  
26 D. Aggregate: ASTM C 144.  
27 E. Water: Potable.  
28 F. Adhesives, General: Use only adhesives formulated for stone and ceramic tile and recommended by their  
29 manufacturer for the application indicated.  
30 G. Water-Cleanable Epoxy Adhesive (As needed for application): ANSI A118.3.  
31 1. Adhesives shall have a VOC content of 65 g/L or less.

32 **2.5 GROUT**

- 33 A. Grout Colors: As selected by Architect from manufacturer's full range.  
34 B. Sand-Portland Cement Grout: ANSI A108.10, composed of white or gray cement and white or colored  
35 aggregate to produce required color.  
36 C. Standard Cement Grout: ANSI A118.6, packaged.  
37 D. Polymer-Modified Tile Grout: ANSI A118.7, packaged.

38 **2.6 POINTING MORTAR MATERIALS**

- 39 A. Portland Cement: ASTM C 150, Type I or Type II. Provide natural color or white cement as required to  
40 produce mortar color indicated.  
41 1. Low-Alkali Cement: Not more than 0.60 percent total alkali when tested according to ASTM C 114.  
42 B. Hydrated Lime: ASTM C 207, Type S.

43 **2.7 STONE FABRICATION**

- 44 A. Select stone for intended use to prevent fabricated units from containing cracks, seams, and starts that  
45 could impair structural integrity or function.  
46 B. Cut stone to produce pieces of thickness, size, and shape indicated and to comply with fabrication and  
47 construction tolerances recommended by applicable stone association.  
48 1. Where items are installed with adhesive or where stone edges are visible in the finished work,  
49 make items uniform in thickness and of identical thickness for each type of item; gage back of  
50 stone if necessary.  
51 2. Dress joints straight and at right angle to face unless otherwise indicated.  
52

- 1 C. Fabricate molded work to produce stone shapes with a uniform profile throughout entire unit length and
- 2 with precisely formed arris slightly eased to prevent snipping, and matched at joints between units.
- 3 1. Produce moldings with machines having abrasive shaping wheels made to reverse contour of
- 4 molding shape; do not sculpt moldings.
- 5 D. Nominal Thickness: Refer to Drawings.
- 6 E. Top-Edge Detail: square to match existing historic marble base.
- 7 F. Ends: square to match existing historic marble base unless otherwise indicated.
- 8 G. Joints: 3/16-inch-wide grouted joints.
- 9 1. Locate joints at midpoints between adjacent paneling joints unless otherwise indicated.

10 **2.8 MIXES**

- 11 A. Spotting Plaster: Stiff mix of molding plaster and water.
- 12 B. Mortar, General: Comply with referenced standards and with manufacturers' written instructions for mix
- 13 proportions, mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures
- 14 needed to produce mortar of uniform quality and with optimum performance characteristics.
- 15 1. Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-
- 16 repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated. Do not
- 17 use calcium chloride.
- 18 2. Combine and thoroughly mix cementitious materials, water, and aggregates in a mechanical batch
- 19 mixer unless otherwise indicated. Discard mortar when it has reached initial set.
- 20 C. Setting Mortar: Comply with ASTM C 270, Proportion Specification, Type N.
- 21 D. Pointing Mortar: Comply with ASTM C 270, Proportion Specification, Type O. Provide pointing mortar
- 22 mixed to match Architect's sample and complying with the following:
- 23 1. Pigmented Pointing Mortar: Select and proportion pigments with other ingredients to produce color
- 24 required. Do not exceed pigment-to-cement ratio of 1:10, by weight.
- 25 E. Grout: Comply with mixing requirements of referenced ANSI standards and with manufacturer's written
- 26 instructions.

27 **PART 3 - EXECUTION**

28 **3.1 SETTING STONE, GENERAL**

- 29 A. Do necessary field cutting as stone is set. Use power saws with diamond blades to cut stone. Cut lines
- 30 straight and true, with edges eased slightly to prevent snipping.
- 31 B. Set stone to comply with requirements indicated. Install anchors, supports, fasteners, and other
- 32 attachments indicated or necessary to secure stone in place. Shim and adjust anchors, supports, and
- 33 accessories to set stone accurately in locations indicated, with edges and faces aligned according to
- 34 established relationships and indicated tolerances.
- 35 C. Provide expansion, control, and pressure-relieving joints of widths and at locations indicated.
- 36 1. Sealing of expansion and other joints is specified in Section 07 92 00 "Joint Sealants."
- 37 2. Keep expansion joints free of plaster, mortar, grout, and other rigid materials.

38 **3.2 CONSTRUCTION TOLERANCES**

- 39 A. Variation from Level: For lintels, sills, chair rails, horizontal bands, horizontal grooves, and other
- 40 conspicuous lines, do not exceed 1/8 inch in 10 feet, 1/4 inch in 20 feet, 3/8 inch maximum.
- 41 B. Variation in Joint Width: Do not vary from average joint width more than plus or minus 1/16 inch or one-
- 42 fourth of nominal joint width, whichever is less.
- 43 C. Variation in Plane between Adjacent Stone Units (Lipping): Do not exceed 1/32-inch difference between
- 44 planes of adjacent units.

45 **3.3 INSTALLATION OF STONE BASE**

- 46 A. Stone Base: At locations with stone paneling, set units firmly against setting spots. Locate setting spots at
- 47 anchors and spaced not more than 18 inches apart unless otherwise indicated. Provide no fewer than two
- 48 anchors per piece for stone base up to 48 inches in length, plus one additional anchor for each additional
- 49 24 inches of length.
- 50 B. Stone Base: At locations without stone paneling, adhere units to plywood backing with full spread of water-
- 51 cleanable epoxy adhesive. Hold adhesive back from exposed edges of joints to allow for grouting.
- 52 C. Stone Base: At locations without stone paneling, adhere units to gypsum board with full spread of water-
- 53 cleanable epoxy adhesive. Hold adhesive back from exposed edges of joints to allow for grouting.
- 54 D. Grout joints after setting stone.

1 **3.4 GROUTING JOINTS**

- 2 A. Grout stone to comply with ANSI A108.10.  
3 1. Use unsanded grout mixture for joints 1/8 inch and narrower.  
4 B. Remove temporary shims before grouting.  
5 C. Tool joints uniformly and smoothly with plastic tool.

6 **3.5 ADJUSTING AND CLEANING**

- 7 A. In-Progress Cleaning: Clean stone base as work progresses. Remove adhesive, grout, mortar, and  
8 sealant smears immediately.  
9 B. Clean stone base no fewer than six days after completion of grouting and pointing, using clean water and  
10 soft rags or stiff-bristle fiber brushes. Do not use wire brushes, acid-type cleaning agents, cleaning  
11 compounds with caustic or harsh fillers, or other materials or methods that could damage stone.  
12 C. Sealer Application: Apply stone sealer to comply with stone producer's and sealer manufacturer's written  
13 instructions and recommendations.

14 **END OF SECTION**

SECTION 09 84 33  
SOUND-ABSORBING FABRIC UNITS

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23 **PART 1 - GENERAL**

24 **1.1 RELATED DOCUMENTS**

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

27 **1.2 SUMMARY**

- 28 A. Section includes shop-fabricated, sound-absorbing acoustical panel units tested for acoustical  
29 performance.

30 **1.3 PREINSTALLATION MEETINGS**

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

32 **1.4 ACTION SUBMITTALS**

- 33 A. Product Data: For each type of product.  
34 B. Sustainable Design Submittals:  
35 1. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content  
36 and cost.  
37 2. Product Certificates: For regional materials, indicating location of material manufacturer and point  
38 of extraction, harvest, or recovery for each raw material. Include distance to Project and cost for  
39 each regional material.  
40 3. Chain-of-Custody Certificates: For certified wood products. Include statement of costs.  
41 4. Chain-of-Custody Qualification Data: For manufacturer and vendor.  
42 5. Product Data: For adhesives, indicating VOC content.  
43 6. Product Data: For composite wood products, indicating that product contains no urea  
44 formaldehyde.  
45 C. Shop Drawings: For unit assembly and installation.  
46 D. Samples: For each exposed product and for each color and texture specified.

47 **1.5 INFORMATIONAL SUBMITTALS**

- 48 A. Product certificates.

49 **1.6 CLOSEOUT SUBMITTALS**

- 50 A. Maintenance data.

1 **1.7 QUALITY ASSURANCE**

- 2 A. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-  
3 accredited certification body.  
4 B. Vendor Qualifications: A vendor that is certified for chain of custody by an FSC-accredited certification  
5 body.  
6 C. Mockup: Refer to Section 01 43 39 – Mockups for description of construction required to complete a  
7 mockup submittal for review.  
8 1. Room 260: One typical acoustical wall panel AWP-1A and new wood muntin detail. West side of  
9 Room 260.  
10 2. Room 260: Typical acoustical ceiling panel AWP-1B and refinished wood nailer detail. West end of  
11 ceiling.  
12 3. Room 260: Typical acoustical ceiling panel AWP-1B at new HVAC diffuser assembly. West end of  
13 ceiling.

14 **1.8 PRODUCT DELIVERY, STORAGE, AND HANDLING**

- 15 A. Delivery: Deliver acoustical wall panels to the project site in unbroken and undamaged original factory  
16 packaging and clearly labeled with the manufacturer's identification label, quality or grade.  
17 B. Storage: Store materials in a clean, dry, climate controlled storage area within temperature and humidity  
18 ranges recommended by manufacturer. Provide protection from damage and exposure to harmful  
19 environmental conditions.  
20 C. Acclimatization: Before installing acoustical wall panels, allow panels to acclimatize to room temperature  
21 and humidity.  
22 D. Handling: Carefully handle acoustical wall panels to avoid soiling and damage.

23 **1.9 PROJECT CONDITIONS**

- 24 A. Environmental Conditions:  
25 1. Do not apply acoustical treatments when surface and ambient temperatures are outside the  
26 temperature ranges required by the wall panel manufacturer.  
27 2. Do not install acoustical panels until wet work such as concrete, plastering and painting is done and  
28 building is completely enclosed.  
29 3. Provide continuous ventilation and heating facilities to maintain substrate surface and ambient  
30 temperatures above 60 degrees F and not more than 85 degrees F unless required otherwise by  
31 manufacturer's instructions.  
32 4. Maintain constant recommended temperature and humidity for at least 48 hours prior to, throughout  
33 the installation period and continuously after panel installation completion.  
34 5. Field Measurements: Check and verify actual wall surfaces by accurate field measurements before  
35 fabrication.

36 **1.10 WARRANTY**

- 37 A. Submit manufacturer's 1 year written warranty against manufacturing defects from date of substantial  
38 completion.

39 **1.11 MAINTENANCE**

- 40 A. Replacement Materials: Provide each type of acoustical wall panel fabric for maintenance purposes.  
41 Furnish replacement materials from the same production run as installed materials. Protect material with  
42 clearly marked packaging indicating product identification and project location.

43 **PART 2 - PRODUCTS**

44 **2.1 PERFORMANCE REQUIREMENTS**

- 45 A. Fire-Test-Response Characteristics: Units shall comply with "Surface-Burning Characteristics" or "Fire  
46 Growth Contribution" Subparagraph below, or both, as determined by testing identical products by UL or  
47 another testing and inspecting agency acceptable to authorities having jurisdiction:  
48 1. Surface-Burning Characteristics: Comply with ASTM E 84 or UL 723; testing by a qualified testing  
49 agency. Identify products with appropriate markings of applicable testing agency.  
50 a. Flame-Spread Index: 25 or less.  
51 b. Smoke-Developed Index: 450 or less.  
52 2. Fire Growth Contribution: Comply with acceptance criteria of local code and authorities having  
53 jurisdiction when tested according to NFPA 265 Method B Protocol or NFPA 286.  
54

- 1 **2.2 SOUND-ABSORBING WALL UNITS**  
2 A. Sound-Absorbing Wall Panel AWP-1A (1 inch thick), AWP-1B (2 inches thick), AWP-2 (2 inches thick):  
3 Manufacturer's standard panel construction consisting of facing material laminated to front face, edges,  
4 and back edge border of core.  
5 1. Surface Material (FABRIC-A): Provide material fully laminated to the fiberglass core face, edges  
6 and returned no less than 1 inches to the back of the panel to provide fully finished edges and  
7 tailored corners.  
8 a. Product: Luum, Linen Weave Sesame, 1018-07, Panel fabric 66"w, 100% recycled  
9 polyester, class A rated.  
10 2. Surface Material (FABRIC-B): Provide material fully laminated to the fiberglass core face, edges  
11 and returned no less than 2 inches to the back of the panel to provide fully finished edges and  
12 tailored corners.  
13 a. Product: DesignTex, Gammut 3468-808, Panel fabric 54"w, 100% postconsumer recycled  
14 polyester, class A rated.  
15 3. Basis-of-Design Product for AWP-1A and 1B and AWP-2: Subject to compliance with requirements,  
16 provide Sound Designs™, Koroseal Acoustical Treatments, Koroseal Interior Products, LLC,  
17 Fairlawn, OH or comparable product by one of the following:  
18 a. Armstrong World Industries.  
19 b. Decoustics Limited; a Saint Gobain company.  
20 c. Pinta Acoustic, Inc.  
21 d. Wenger Corporation.  
22 B. Core Composition: 6-7 pound per cubic foot fiberglass insulation containing a minimum 40% post-  
23 consumer recycled glass as a percent of glass weight as certified by Scientific Certification Systems.  
24 C. Core surface: Plain.  
25 D. Z-Clip Mounting to walls. Existing wood nailers hold panels in place in ceiling of Room 260.  
26 E. Panel Dimensions: Size and shape as indicated on Drawings  
27 F. Edge Profile: Square edge hardened with water-based resin hardener.  
28 G. Surface Burning Characteristics: All panel components have a Class 1/A fire rating when tested in  
29 accordance with ASTM E 84.

- 30 **2.3 MATERIALS**  
31 A. Composite Wood Products: Products shall be made without urea formaldehyde.  
32 B. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less  
33 than 95 percent.  
34 C. Regional Materials: Products shall be manufactured within 500 miles of Project site.  
35 D. Certified Wood: Wood products shall be certified as "FSC Pure" or "FSC Mixed Credit" according to  
36 FSC STD-01-00 and FSC STD-40-004.

- 37 **2.4 FABRICATION**  
38 A. Standard Construction: Use manufacturer's standard construction unless otherwise indicated; with facing  
39 material applied to face, edges, and back border of dimensionally stable core; and with rigid edges to  
40 reinforce panel perimeter against warpage and damage.  
41 B. Core-Face Layer: Evenly stretched over core face and edges and securely attached to core; free from  
42 puckers, ripples, wrinkles, or sags.  
43 C. Facing Material: Apply fabric facing fully covering visible surfaces of unit; with material stretched straight,  
44 on the grain, tight, square, and free from puckers, ripples, wrinkles, sags, blisters, seams, adhesive, or  
45 other visible distortions or foreign matter.  
46 1. Fabrics with Directional or Repeating Patterns or Directional Weave: Mark fabric top and attach  
47 fabric in same direction so pattern or weave matches in adjacent units.  
48 D. Dimensional Tolerances of Finished Units: Plus or minus 1/16 inch.  
49

1 **PART 3 - EXECUTION**

2 **3.1 INSTALLATION**

- 3 A. Install units in locations indicated. Unless otherwise indicated, install units with vertical surfaces and edges  
4 plumb, top edges level and in alignment with other units, faces flush, and scribed to fit adjoining work  
5 accurately at borders and at penetrations.  
6 B. Comply with manufacturer's written instructions for installation of units using type of mounting devices  
7 indicated. Mount units securely to supporting substrate.  
8 C. Align fabric pattern and grain with adjacent units.

9 **3.2 CLEANING**

- 10 A. Clip loose threads; remove pills and extraneous materials.  
11 B. Clean panels on completion of installation to remove dust and other foreign materials according to  
12 manufacturer's written instructions.

13 **END OF SECTION**



**SECTION 09 91 13**  
**EXTERIOR PAINTING**

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18 **PART 1 - GENERAL**

19 **1.1 RELATED DOCUMENTS**

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

22 **1.2 SUMMARY**

- 23 A. Section includes surface preparation and the application of paint systems on the following exterior  
24 substrates:
- 25 1. Concrete.
  - 26 2. Steel and iron.
  - 27 3. Galvanized metal.

28 **1.3 DEFINITIONS**

- 29 A. MPI Gloss Level 1: Not more than five units at 60 degrees and 10 units at 85 degrees, according to  
30 ASTM D 523.
- 31 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.
- 32 C. MPI Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to  
33 ASTM D 523.
- 34 D. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.
- 35 E. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.
- 36 F. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

37 **1.4 ACTION SUBMITTALS**

- 38 A. Product Data: For each type of product. Include preparation requirements and application instructions.
- 39 1. Include printout of current "MPI Approved Products List" for each product category specified, with the  
40 proposed product highlighted.
- 41 B. Sustainable Design Submittals:
- 42 1. Product Data: For paints and coatings, indicating VOC content.
  - 43 2. Refer to Section 01 81 13.
- 44 C. Samples: For each type of paint system and each color and gloss of topcoat.
- 45

1 **1.5 QUALITY ASSURANCE**

- 2 A. Mockup: Refer to Section 01 43 39 – Mockups for description of construction required to complete a mockup  
3 submittal for review.  
4 B. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify  
5 preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality  
6 standards for materials and execution.  
7 1. Architect will select one surface to represent surfaces and conditions for application of each paint  
8 system.  
9 a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft.  
10 b. Other Items: Architect will designate items or areas required.  
11 2. Final approval of color selections will be based on mockups.  
12 a. If preliminary color selections are not approved, apply additional mockups of additional colors  
13 selected by Architect at no added cost to Owner.

14 **PART 2 - PRODUCTS**

15 **2.1 MANUFACTURERS**

- 16 A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may  
17 be incorporated into the Work:  
18 1. Benjamin Moore & Co.  
19 2. Hallman Lindsay Paints, Inc.  
20 3. PPG: including their Dulux/ICI Paints, AkzoNobel.  
21 4. Sherwin-Williams Company (The), including their Valspar range.  
22 B. Products: Subject to compliance with requirements, available products that may be incorporated into the  
23 Work include, but are not limited to products listed in the Exterior Painting Schedule for the paint category  
24 indicated.

25 **2.2 PAINT, GENERAL**

- 26 A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved  
27 Products Lists."  
28 B. Material Compatibility:  
29 1. Materials for use within each paint system shall be compatible with one another and substrates  
30 indicated, under conditions of service and application as demonstrated by manufacturer, based on  
31 testing and field experience.  
32 2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers  
33 for use in paint system and on substrate indicated.  
34 C. VOC Content: For field applications, paints and coatings shall comply with VOC content limits of authorities  
35 having jurisdiction and the following VOC content limits:  
36 1. Flat Paints and Coatings: 50 g/L.  
37 2. Nonflat Paints and Coatings: 50 g/L.  
38 3. Dry-Fog Coatings: 150 g/L.  
39 4. Primers, Sealers, and Undercoaters: 100 g/L.  
40 5. Rust-Preventive Coatings: 100 g/L.  
41 6. Zinc-Rich Industrial Maintenance Primers: 100 g/L.  
42 7. Pretreatment Wash Primers: 420 g/L.  
43 8. Shellacs, Clear: 730 g/L.  
44 9. Shellacs, Pigmented: 550 g/L.  
45 D. Colors: As indicated in a color schedule.  
46

1 **PART 3 - EXECUTION**

2 **3.1 EXAMINATION**

- 3 A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum  
4 moisture content and other conditions affecting performance of the Work.  
5 B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:  
6 1. Concrete: 12 percent.  
7 2. Fiber-Cement Board: 12 percent.  
8 3. Masonry (Clay and CMUs): 12 percent.  
9 4. Wood: 15 percent.  
10 5. Portland Cement Plaster: 12 percent.  
11 6. Gypsum Board: 12 percent.  
12 C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and  
13 primers.  
14 D. Proceed with coating application only after unsatisfactory conditions have been corrected.  
15 1. Application of coating indicates acceptance of surfaces and conditions.

16 **3.2 PREPARATION**

- 17 A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting  
18 Specification Manual" applicable to substrates and paint systems indicated.  
19 B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be  
20 painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied  
21 protection before surface preparation and painting.  
22 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that  
23 were removed. Remove surface-applied protection.

24 **3.3 APPLICATION**

- 25 A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Manual."  
26 B. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller  
27 tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

28 **3.4 CLEANING AND PROTECTION**

- 29 A. Protect work of other trades against damage from paint application. Correct damage to work of other trades  
30 by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged  
31 condition.  
32 B. At completion of construction activities of other trades, touch up and restore damaged or defaced painted  
33 surfaces.

34 **3.5 EXTERIOR PAINTING SCHEDULE**

- 35 A. Concrete Substrates, Nontraffic Surfaces:  
36 1. Latex System MPI EXT 3.1A (PT-8):  
37 a. Prime Coat: Primer, alkali resistant, water based, MPI #3.  
38 b. Intermediate Coat: Latex, exterior, matching topcoat.  
39 c. Topcoat: Latex, exterior, flat (MPI Gloss Level 1), MPI #10.  
40 B. Steel and Iron Substrates (PT-7):  
41 1. Water-Based Light Industrial Coating System MPI EXT 5.1C:  
42 a. Prime Coat: Primer, alkyd, anti-corrosive for metal, MPI #79.  
43 b. Intermediate Coat: Light industrial coating, exterior, water based, matching topcoat.  
44 c. Topcoat: Light industrial coating, exterior, water based (MPI Gloss Level 3), MPI #161.  
45 C. Galvanized-Metal Substrates (PT-9):  
46 1. Water-Based Light Industrial Coating System MPI EXT 5.3J:  
47 a. Prime Coat: Primer, galvanized, water based, MPI #134.  
48 b. Intermediate Coat: Light industrial coating, exterior, water based, matching topcoat.  
49 c. Topcoat: Light industrial coating, exterior, water based (MPI Gloss Level 3), MPI #161.

50 **END OF SECTION**

**SECTION 09 91 23**  
**INTERIOR PAINTING**

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19 **PART 1 - GENERAL**

20 **1.1 RELATED DOCUMENTS**

- 21 A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and
- 22 Division 01 Specification Sections, apply to this Section.
- 23 B. Section 06 03 12 "Historic Wood Repair and Handrails" for historic treatment using clear coats and varnishes.
- 24 C. Section 09 93 00 "Stains and Varnishes" for historic treatment using clear coats and varnishes.

25 **1.2 SUMMARY**

- 26 A. Section includes surface preparation and the application of paint systems on the following interior substrates:
- 27 1. Concrete.
- 28 2. Cement board.
- 29 3. Concrete masonry units (CMUs).
- 30 4. Steel and iron.
- 31 5. Galvanized metal.
- 32 6. Aluminum (not anodized or otherwise coated).
- 33 7. Wood.
- 34 8. Gypsum board.
- 35 9. Plaster.

36 **1.3 DEFINITIONS**

- 37 A. MPI Gloss Level 1: Not more than five units at 60 degrees and 10 units at 85 degrees, according to
- 38 ASTM D 523.
- 39 B. MPI Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to
- 40 ASTM D 523.
- 41 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.
- 42 D. MPI Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to
- 43 ASTM D 523.
- 44 E. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.
- 45 F. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.
- 46 G. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

47 **1.4 ACTION SUBMITTALS**

- 48 A. Product Data: For each type of product. Include preparation requirements and application instructions.
- 49 1. Include Printout of current "MPI Approved Products List" for each product category specified, with
- 50 the proposed product highlighted.
- 51 B. Sustainable Design Submittals:
- 52 1. Product Data: For paints and coatings, indicating VOC content.
- 53 C. Samples: For each type of paint system and in each color and gloss of topcoat.

1 **1.5 QUALITY ASSURANCE**

- 2 A. Mockup: Refer to Section 01 43 39 – Mockups for description of construction required to complete a mockup  
3 submittal for review.
- 4 B. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify  
5 preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality  
6 standards for materials and execution.
- 7 1. Architect will select one surface to represent surfaces and conditions for application of each paint  
8 system.
- 9 a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft.  
10 b. Other Items: Architect will designate items or areas required.
- 11 2. Final approval of color selections will be based on mockups.
- 12 a. If preliminary color selections are not approved, apply additional mockups of additional colors  
13 selected by Architect at no added cost to Owner.
- 14 C. Qualifications for Decorative Finishes Installer
- 15 1. The Contractor shall be proficient in the application of specialized decorative finishes. He shall have  
16 the ability to produce new work as well as replicate existing finishes. The Contractor shall have ten  
17 years of documented experience in providing work of this type and size and have worked in at least  
18 three similar projects in the last five years. The work of this Contract includes the application of  
19 decorative paint in accordance with established schedules or as specified by the Owner. The ability  
20 to read a schedule and determine the color and type of coating is required of the Contractor. The  
21 Contractor shall be required to apply stippled surfaces, as well as faux marble, to match existing real  
22 and faux surfaces. Restoration of existing stenciled surfaces and creation and application of new  
23 stencil designs is part of the work of this Contract. Designing as well as applying raised plaster  
24 stencils is required. The contractor shall have the ability to provide touch up services to complicated,  
25 multi-colored murals and trompe l'oeil finishes. Palette matching and tint-machine mixing of colors  
26 is required. Contractor shall have a comprehensive knowledge of color systems and the capability  
27 to utilize a paint-tinting machine. Knowledge of gold leaf, its handling and application is essential.  
28 Additionally the Contractor will be required to match and touchup complicated paint and/or stain  
29 finishes on woodwork and furniture. The Contractor shall have the ability to determine the type of  
30 coatings and have the knowledge and experience to work with them.
- 31 2. Work of this contract will occur, but not limited to, in Room 260, Level Two Corridor 263/264, Level  
32 One Main Corridor Room 101; 150 and 190.

33 **PART 2 - PRODUCTS**

34 **2.1 MANUFACTURERS**

- 35 A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may  
36 be incorporated into the Work:
- 37 1. Benjamin Moore & Co.  
38 2. Hallman Lindsay Paints, Inc.  
39 3. PPG: including their Dulux/ICI Paints, AkzoNobel.  
40 4. Sherwin-Williams Company (The), including their Valspar range.
- 41 B. Products: Subject to compliance with requirements, provide one of the products listed in the Interior Painting  
42 Schedule for the paint category indicated.

43 **2.2 PAINT, GENERAL**

- 44 A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved  
45 Products Lists."
- 46 B. Material Compatibility:
- 47 1. Materials for use within each paint system shall be compatible with one another and substrates  
48 indicated, under conditions of service and application as demonstrated by manufacturer, based on  
49 testing and field experience.
- 50 2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers  
51 for use in paint system and on substrate indicated.  
52

- 1 C. VOC Content: For field applications that are inside the weatherproofing system, paints and coatings shall  
2 comply with VOC content limits of authorities having jurisdiction and the following VOC content limits:  
3 1. Flat Paints and Coatings: 50 g/L.  
4 2. Nonflat Paints and Coatings: 150 g/L.  
5 3. Dry-Fog Coatings: 400 g/L.  
6 4. Primers, Sealers, and Undercoaters: 200 g/L.  
7 5. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.  
8 6. Zinc-Rich Industrial Maintenance Primers: 340 g/L.  
9 7. Pretreatment Wash Primers: 420 g/L.  
10 8. Shellacs, Clear: 730 g/L.  
11 9. Shellacs, Pigmented: 550 g/L.  
12 D. Low-Emitting Materials: Interior paints and coatings shall comply with the testing and product requirements  
13 of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile  
14 Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."  
15 E. Colors: As indicated in a color schedule.  
16 F. Decorative Finishes: The Project includes preservation or rehabilitation of historic designated painted  
17 surfaces. Replicating historic paints, and restoration of historic designated painted surfaces is not included  
18 in the scope of Work.  
19 1. Paint companies products selected shall make latex paints in colors that are close to historic colors  
20 as well as appropriate gloss levels, but contain no white lead and no hazardous volatile organic  
21 compounds.

22 **2.3 SPECIAL COATING (PT-5)**

- 23 A. Basis of Design: Products specified are those as manufactured by Master Coating Technologies.  
24 1. System: Two-component polyurethane-fortified coating and cross-linker.  
25 2. Product; "Scuffmaster ScrubTough," Master Coating Technologies.
- 26 B. Performance:  
27 1. VOC: Coatings shall have less than 50 g/l of VOC's.  
28 2. Fire Rating: Coatings shall be Type I or Class A fire-rated, ASTM E 84.  
29 3. Scrub Test: Greater than 8000 cycles, ASTM D 2486.  
30 4. Impact Resistance: Greater than 60 in/lbs, ASTM D 2794.  
31 5. Chemical Resistance: 10 (test maximum) for all chemicals tested, ASTM D 1308.  
32 6. Finish: 10 percent to 15 percent gloss at 60 degrees.  
33 7. Stain Removal: 8 to 10 (test maximum) for all stains tested, four-hour Open Spot Test.
- 34 C. Primers: Provide primer recommended by manufacturer for substrate.  
35 1. Concrete and Masonry: Suitable heavy-bodied latex vinyl acrylic block filler (if filling pores is desired).  
36 Provide manufacturer's recommended product if uniform base color with pores exposed is desired.  
37 a. Basis of Design: "Primemaster Primer/Sealer," Master Coating Technologies.  
38 2. Primed Metals: No primer required.  
39 3. Unprimed Metals: In accordance with the manufacturer's recommendations.  
40 4. New Gypsum Board:  
41 a. Basis of Design: "Primemaster Primer/Sealer," Master Coating Technologies.  
42 5. Ceramic Tile and Glazed Block:  
43 a. Basis of Design: "Primemaster Bonding Primer," Master Coating Technologies.  
44 6. Vinyl Wall Covering and Plastic: In accordance with the manufacturer's recommendations.  
45

1 **PART 3 - EXECUTION**

2 **3.1 EXAMINATION**

- 3 A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum  
4 moisture content and other conditions affecting performance of the Work.
- 5 B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:  
6 1. Concrete: 12 percent.  
7 2. Fiber-Cement Board: 12 percent.  
8 3. Masonry (Clay and CMUs): 12 percent.  
9 4. Wood: 15 percent.  
10 5. Gypsum Board: 12 percent.  
11 6. Plaster: 12 percent.
- 12 C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and  
13 primers.  
14 1. Historic Designated Painted Surfaces: Acrylic latex paints are stronger than oil/alkyd paints. When a  
15 stronger paint is applied over a weaker paint, it will tend to pull off any weaker paint which may have  
16 begun to lose its bond with its substrate. Verify existing paint and test for compatibility.
- 17 D. Proceed with coating application only after unsatisfactory conditions have been corrected.  
18 1. Application of coating indicates acceptance of surfaces and conditions.

19 **3.2 PREPARATION**

- 20 A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting  
21 Specification Manual" applicable to substrates and paint systems indicated.
- 22 B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be  
23 painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied  
24 protection before surface preparation and painting.  
25 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that  
26 were removed. Remove surface-applied protection if any.
- 27 C. Historic Designated Painted Surfaces: Heat/scraping, mechanical sanders and chemical stripping is  
28 prohibited.

29 **3.3 APPLICATION**

- 30 A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Architectural  
31 Painting Specification Manual."
- 32 B. Historic Designated Painted Surfaces: Surfaces shall receive an intermediate coat that is compatible with  
33 the existing paint to form a bond and with the topcoat paint type and finish scheduled.
- 34 C. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller  
35 tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

36 **3.4 INTERIOR PAINTING SCHEDULE**

- 37 A. Concrete Substrates, Nontraffic Surfaces (PT-1 for non-traffic concrete):  
38 1. Institutional Low-Odor/VOC Latex System MPI INT 3.1M:  
39 a. Prime Coat: Primer sealer, interior, institutional low odor/VOC, MPI #149.  
40 b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.  
41 c. Topcoat: Latex, interior, institutional low odor/VOC, flat (MPI Gloss Level 2), MPI #143.
- 42 B. Concrete Substrates, Traffic Surfaces (PT-1 for traffic concrete, non-mechanical areas):  
43 1. Latex Floor Enamel System MPI INT 3.2A:  
44 a. Prime Coat: Floor paint, latex, matching topcoat.  
45 b. Intermediate Coat: Floor paint, latex, matching topcoat.  
46 c. Topcoat: Floor paint, latex, low gloss (maximum MPI Gloss Level 3), MPI #60.
- 47 C. CMU Substrates (PT-3 for CMU):  
48 1. Institutional Low-Odor/VOC Latex System MPI INT 3.1M:  
49 a. Prime Coat: Primer sealer, interior, institutional low odor/VOC, MPI #149.  
50 b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.  
51 c. Topcoat: Latex, interior, institutional low odor/VOC, flat (MPI Gloss Level 2), MPI #143.
- 52 D. Steel Substrates (PT-2 for steel):  
53 1. Institutional Low-Odor/VOC Latex System MPI INT 5.1S:  
54 a. Prime Coat: Primer, rust inhibitive, water based MPI #107.  
55 b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.  
56 c. Topcoat: Latex, interior, institutional low odor/VOC (MPI Gloss Level 2), MPI #144.  
57

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- 1 E. Aluminum (Not Anodized or Otherwise Coated) Substrates (PT-2 for aluminum):
- 2 1. Institutional Low-Odor/VOC Latex System MPI INT 5.4G:
- 3 a. Prime Coat: Primer, quick dry, for aluminum, MPI #95.
- 4 b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
- 5 c. Topcoat: Latex, interior, institutional low odor/VOC (MPI Gloss Level 2), MPI #144.
- 6 F. Gypsum Board and Plaster Substrates (PT-1 and PT-4 (dryfall) for gypsum board):
- 7 1. Institutional Low-Odor/VOC Latex System MPI INT 9.2M:
- 8 a. Prime Coat: Primer sealer, interior, institutional low odor/VOC, MPI #149.
- 9 b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
- 10 c. Topcoat: Latex, interior, institutional low odor/VOC, flat (MPI Gloss Level 2), MPI #143.
- 11 G. Insulation-Covering Substrates: Including pipe and duct coverings (PT-4 for exposed building services).
- 12 1. Institutional Low-Odor/VOC Dryfall Latex System MPI INT 10.1D:
- 13 a. Prime Coat: Primer sealer, latex, interior, MPI #50.
- 14 b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
- 15 c. Topcoat: Latex, interior, institutional low odor/VOC, flat (MPI Gloss Level 2), MPI #143.
- 16 H. Existing Anodized Window Frames (PT-7) at Levels 0 and 1.
- 17 1. Color to match Benjamin Moore HC-131.

18 **3.5 PAINT COLOR SCHEDULE**  
 19 A. TABLE OF PAINT COLORS  
 20

<b>DESIGNATION</b>	<b>BENJAMIN MOORE COLOR REFERENCE</b>
PT-_A	Lehigh Green HC-131
PT-_B	Chantily Lace 2121-70
PT-_C	Not Used
PT-_D	Not Used
PT-_E	Not Used
PT-_F	Woodland Snow 2161-70
PT-_G	Gray 2121-10
PT-_H	Metallic Silver 2132-60
PT-_J	Byzantine Gold 1099
	<b>OTHER REFERENCES</b>
PT-_K	Scuffmaster: Scrubtough Max, Ref GOH 11459544, Color XC 019 STM
PT-_L	PPG Light Silver, ref: AD3Y1346N

21 **END OF SECTION**



**SECTION 09 93 00**  
**STAINS AND VARNISHES**

**PART 1 – GENERAL**

- 1.1 [RELATED DOCUMENTS](#)
- 1.2 [SCOPE OF WORK](#)
- 1.3 [DEFINITIONS](#)
- 1.4 [SUBMITTALS](#)
- 1.5 [QUALITY ASSURANCE](#)
- 1.6 [DELIVERY, STORAGE, AND HANDLING](#)
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**PART 2 – PRODUCTS**

- 2.1 [MATERIALS AND MANUFACTURERS](#)

**PART 3 – EXECUTION**

- 3.1 [EXAMINATION](#)
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- 3.3 [STRIPPING](#)
- 3.4 [STAINING AND VARNISHING](#)
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- 3.6 [FIELD QUALITY CONTROL](#)
- 3.7 [CLEANING](#)
- 3.8 [PROTECTION](#)
- 3.9 [SCHEDULE](#)

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Applicable provisions of Division 1 govern work of this Section.

**1.2 SCOPE OF WORK**

- A. Work of this Section includes on-site surface preparation, stripping, wood staining and finishing of new and existing finished wood items and surfaces. The terms "Varnish," "Transparent Finish" and "Shellac" are used interchangeably in this specification section and imply the same finish material, per the products listings. Components and surfaces to be finished include the following:

- 1 Room 260: Strip down to original, unfinished wood surface per 3.2 and 3.3 below, and refinish all existing wood; doors, casing, wainscot, paneling, beam support moldings, base and shoe per finishing sections below.
- 2 Room 260: Finish all new wood to match refinished, existing wood per the finishing sections below.
- 3 Second Floor Corridor 263 and existing, historic wall bases at Level 2 and 3: Prepare per 3.2 and 3.3 below and finish all existing wood; doors, transoms, casings, wainscot.
- 4 All Historic doors and frames, architraves, wood wall bases (either left in place or relocated): Prepare per 3.2 and 3.3 below and finish per finishing sections below.
- 5 All new wood and wood handrails: Finish per finishing sections below.

- B. Related Work.

1. Section 06 03 12 – Historic Wood Repair
2. Section 08 21 10 - Wood Door Rehabilitation.
3. Section 09 90 23 – Interior Painting.

**1.3 DEFINITIONS**

- A. Stain and Transparent Finish includes coating systems materials, primers, emulsions, stains,

1 sealers and fillers, and other applied materials whether used as prime, intermediate, or finish  
2 transparent coats on finished wood.

- 3 B. Refinishing is defined as all the process(es) necessary to restore woodwork. Stripping is  
4 defined as the process of removing existing coatings from woodwork without damage to the  
5 wood. Finishing is defined as the process of applying stain and protective coating and all  
6 related preparatory and follow-up tasks.

7  
8 **1.4 SUBMITTALS**

- 9  
10 A. Product Data: Manufacturer's technical information, label analysis, and application instructions  
11 for each material proposed for use.

- 12  
13 1. List each material and cross-reference the specific coating and finish system and  
14 application. Identify each material by the manufacturer's catalog number and general  
15 classification. Indicate VOC content.

- 16  
17 B. Samples for initial and final color selection in the form of manufacturer's color charts.

- 18  
19 C. Mock-ups and Samples: Refer to Section 01 43 39. Prepare samples of staining and shellac  
20 finish, on new and existing woods, and stripping on existing wood for review and approval by  
21 Architect. Include one existing door, and a minimum of four 10' long lengths of wood trim of  
22 each type as selected by the Architect. Duplicate finishes of Owner samples.

- 23  
24 1. Sample submission must include example of blending new and existing woods and  
25 stain and light and dark areas of wood to produce even, matched colors and tones.

- 26  
27 D. Mock-up Room 260: Refer to Section 01 43 39. Provide full-finish example in mock-up Room  
28 260, 4 feet wide by height of wainscot, until required sheen, color and texture are achieved  
29 and approved by Architect.

- 30  
31 1. Apply stain and varnish on sample surfaces in accordance with the schedule or as  
32 specified. After finishes are accepted, the mock-up suite will be used as a basis for  
33 evaluation of stain and varnish during other finished work.

- 34  
35 E. All samples shall be produced by contractor's staff proposed to work on the project.

- 36  
37 F. Samples of stripping, cleaning, bleaching and staining materials with manufacturer product  
38 data for each.

39  
40 **1.5 QUALITY ASSURANCE**

- 41  
42 A. Provide stain and finish produced by the same manufacturers stated in the Products section.

- 43  
44 B. Coordination of Work: Review other applicable sections in which primers are provided to  
45 ensure compatibility of the total systems for various substrates. On request, furnish  
46 information on characteristics of finish materials to ensure use of compatible primers.

- 47  
48 1. Notify the Architect of problems anticipated using the materials specified.

- 49  
50 C. Material Quality: Provide the manufacturer's best quality stain and varnish material of the  
51 various coating types specified. Material containers not displaying manufacturer's product  
52 identification will not be acceptable.

- 53  
54 1. The objectives of wood refinishing and cleaning are to give wood surfaces a smooth,  
55 uniform appearance consistent with the original design intent, and to preserve the  
56 inherent patina. Splotches, streaks, runs, or any other kind of spotty appearance  
57 shall not be accepted. Too aggressive cleaning or sanding shall not be accepted.

- 58 2. Sample areas shall be prepared which shall form a standard for wood refinishing.

- 59 3. Products that comply with qualitative requirements of applicable Federal Specifications,  
60 yet differ in quantitative requirements, may be considered for use when acceptable to  
61 the Architect. Furnish material data and manufacturer's certificate of performance to

1 Architect for proposed substitutions.  
2  
3

- 4 D. Contractor Qualifications: Contractor performing work of this Section shall have no less than  
5 ten documented years of experience providing highest quality staining and varnishing work  
6 including blending of colors and touching-up or restoring ornamental wood on at least three  
7 similar sized and quality projects. Contractor's key staff on project shall each have a minimum  
8 of three years of experience in this trade including experience on at least two of three  
9 documented similar projects. Key staff shall be of sufficient number to accomplish required  
10 work within required project schedule.  
11

12  
13 **1.6 DELIVERY, STORAGE, AND HANDLING**  
14

- 15 A. Deliver materials to the job site in the manufacturer's original, unopened packages and  
16 containers bearing manufacturer's name and label and the following information:  
17  
18 1. Product name or title of material.  
19 2. Product description (generic classification or binder type).  
20 3. Federal Specification number, if applicable.  
21 4. Manufacturer's stock number and date of manufacture.  
22 5. Contents by volume, for pigment and vehicle constituents.  
23 6. Thinning instructions.  
24 7. Application instructions.  
25 8. Color name and number.  
26  
27 B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum  
28 ambient temperature of 45°F. Maintain containers used in storage in a clean condition, free of  
29 foreign materials and residue.  
30  
31 C. Do not store materials throughout building, but in designated area. Store flammable materials  
32 in metal safety containers.  
33  
34 D. Provide appropriate type and size fire extinguishers in place of storage.  
35  
36 E. Protect materials from freezing. Keep storage area neat and orderly. Remove application  
37 rags and waste from building daily. Take necessary measures to ensure that workers and  
38 work areas are protected from fire and health hazards resulting from handling, mixing, and  
39 application.  
40

41 **1.7 PROTECTION**  
42

- 43 A. Cover materials and surfaces, including floors, adjoining work in progress with clean drop  
44 cloths or canvas.  
45  
46 B. Remove hardware, accessories, plates, lighting fixtures and similar items or otherwise mask  
47 item for protection from staining and varnishing materials. Stain color and clear finishes will  
48 continue under any hardware or plates that are in place.  
49  
50 C. The contractor shall be responsible to provide the proper respiratory equipment, as necessary,  
51 for workers doing the staining and varnishing.  
52  
53 D. The contractor shall take reasonable precautions to contain materials and odors to areas of  
54 work.  
55

56 **1.8 JOB CONDITIONS**  
57

- 58 A. All staining and varnishing work shall be provided on site after installation of wood products  
59 requiring work of this Section except for backpriming.  
60  
61 B. Apply stain and varnish only when the temperature of surfaces to be finished and surrounding

1 air temperatures are between 50°F and 90°F.

- 2  
3 C. Do not apply stain or varnish when the relative humidity exceeds 85 percent, at temperatures  
4 less than 5°F above the dew point, or to damp or wet surfaces.  
5  
6 D. Contractor shall be responsible for providing adequate heat and humidity control in work  
7 space.  
8  
9

10 **PART 2 - PRODUCTS**

11  
12 **2.1 MATERIALS AND MANUFACTURERS**

- 13  
14 A. Manufacturers: Refer to subsections below.  
15  
16 B. Stripper:  
17  
18 1. Strippers: Nonvolatile, nonsolvent, low odor type product using products such as  
19 organic esters. Solvent-based; methylene chloride type strippers are not allowed.  
20  
21 2. Back to Nature Multi-Strip or equal as approved by Architect.  
22  
23 3. Rinse shall be mineral spirits or other materials as recommended by the stripper  
24 manufacturer.  
25  
26 C. Bleach: Not permitted.  
27  
28 D. Stain [**CCT-1**].  
29  
30 1. Existing Oak Wood: Old Masters Wiping Stain, Natural Walnut 12804.  
31  
32 2. Stain mix for woods receiving varnish shall be adjusted to compensate for color of  
33 varnish and submitted to Architect for approval.  
34  
35 E. Varnish [**CCT-2**]:  
36  
37 3. Type I Varnish: Graham Aqua Borne Ceramic-Ceremithane Satin tinted to match  
38 Amber Shellac.  
39  
40 4. Type II Varnish, Second Coat & Finish Coat: Graham Aqua Borne Ceramithane Catin  
41 finish.  
42  
43  
44 F. Filler/Sealer: As required.  
45  
46 G. Accessory Materials:  
47  
48 1. Solvent as recommended by Pratt and Lambert.  
49 2. Tack Cloths.  
50 3. Wood glue.  
51 4. Sandpaper: Maximum grit shall be "00".  
52

53 **PART 3 - EXECUTION**

54  
55 **3.1 EXAMINATION**

- 56  
57 A. Examine substrates and conditions under which staining and varnishing will be performed for  
58 compliance with requirements for application of materials. Do not begin application until  
59 unsatisfactory conditions have been corrected. Start of finishing will be construed as the  
60 Applicator's acceptance of surfaces and conditions within a particular area.  
61

1     **3.2     PREPARATION**

- 2
- 3     A.     General Procedures: Remove hardware and hardware accessories, plates, machined
- 4           surfaces, lighting fixtures, and similar items in place that are not to be finished or provide
- 5           surface-applied protection prior to beginning work. Remove these items if necessary for
- 6           complete finishing of the wood items. Following completion of staining and varnishing
- 7           operations in each space or area, have items reinstalled by workers skilled in the trades
- 8           involved.
- 9
- 10    B.     Surface Preparation of Wood: Clean and prepare surfaces to be finished in accordance with
- 11           the manufacturer's instructions for each particular substrate condition and as specified.
- 12
- 13           1.     Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits,
- 14           and sandpaper, as required. Sand surfaces exposed to view smooth and dust off.
- 15           2.     Back prime wood trim and casing receiving clear finishes prior to installation with spar
- 16           varnish compatible with materials and finishes listed in the Products section of this
- 17           specification. Include edges, ends and backsides of wood trim.
- 18           3.     Seal tops, bottoms, and cutouts of wood doors with a heavy coat of varnish or sealer
- 19           compatible with surface finishes prior to installation or hardware installation.
- 20
- 21    C.     Coordinate to have wood doors which are planned to be removed from existing openings, per
- 22           the drawings, to have tops, bottoms and edges finished.
- 23

24     **3.3     STRIPPING**

- 25
- 26    A.     Room 260 only, excluding Judge's Bench: Remove all existing finishes from wood doors,
- 27           windows, handrails and casing using specified remover and methods recommended by
- 28           remover manufacturer.
- 29
- 30    B.     Wash wood surfaces with mineral spirits and allow to dry.
- 31
- 32    C.     Historic wood outside Room 260, and Judge's Bench in Room 260: Sand lightly with
- 33           sandpaper and remove all dust with tackcloths.
- 34
- 35    D.     Fill minor holes, sand out scratches and gouges, and for doors as required by the Door
- 36           Schedule.
- 37

38

39     **3.4     STAINING AND VARNISHING**

- 40
- 41    A.     Stain and varnish wood after installation
- 42
- 43    B.     New and reused wood shall be stained to match samples submitted by contractor and
- 44           approved by Architect. Contractor shall carefully blend staining as required to match old and
- 45           new wood, and compensate for color differences in heartwood and sapwood and
- 46           inconsistencies in the color of the natural wood.
- 47
- 48    C.     Finish woodwork on edges, tops and bottoms in same manner as approved for faces.
- 49
- 50    D.     Stain all stripped wood where original stain is deteriorated or lost, and all new wood as follows:
- 51
- 52           1.     Apply one or more coats of stain as necessary to match approved samples and mock-
- 53           ups.
- 54           2.     Seal stained wood.
- 55
- 56    E.     Varnish.
- 57
- 58           1.     Varnish shall not be thinned.
- 59           2.     Do not apply in temperatures less than 70 degrees F.
- 60           3.     Apply evenly without runs, sags or brush marks.
- 61

1 **3.5 APPLICATION**  
2  
3

- 4 A. Apply finishes in accordance with manufacturer's directions. Use brush applicators and  
5 techniques best suited for wood material and type of finish material being applied.  
6  
7 B. Do not varnish over dirt, scale, grease, moisture, scuffed surfaces, or conditions detrimental to  
8 formation of a durable film.  
9  
10 1. The number of coats and film thickness required is the same regardless of the  
11 application method.  
12 2. Do not apply succeeding coats until the previous coat has cured as recommended by  
13 the manufacturer.  
14 3. Sand between applications where sanding is required to produce an even smooth  
15 surface in accordance with the manufacturer's directions and project requirements.  
16 4. Apply additional coats of final varnish until film is of uniform finish, and appearance.  
17 Give special attention to ensure that surfaces, including edges, corners, crevices,  
18 welds, and exposed fasteners, receive a dry film thickness equivalent to that of flat  
19 surfaces.  
20 5. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures,  
21 convector covers, covers for finned tube radiation, grilles, and similar components are  
22 in place. Extend coatings in these areas as required to maintain the system integrity  
23 and provide desired protection.  
24 6. Finish surfaces behind movable equipment and furniture same as similar exposed  
25 surfaces.  
26 7. Allow sufficient time between successive coats to permit proper drying. Do not recoat  
27 until previous coat has dried to where it feels firm, and does not deform or feel sticky  
28 under moderate thumb pressure and where application of another coat of finish does  
29 not cause lifting or loss of adhesion of the undercoat.  
30  
31 C. Completed Work: Match approved samples for color, texture, and coverage. Refinish  
32 unacceptable work.

33 **3.6 FIELD QUALITY CONTROL**  
34

- 35 A. The Owner reserves the right to invoke the following test procedure at any time and as often  
36 as the Owner deems necessary during the period when finishes are being applied:  
37  
38 1. The Owner will engage the services of an independent testing laboratory to sample the  
39 finish materials being used. Samples of materials delivered to the project will be taken,  
40 identified, sealed, and certified in the presence of the Contractor.  
41  
42 2. The testing laboratory will perform appropriate tests for the following characteristics as  
43 required by the Owner:  
44  
45 a. Quantitative materials analysis.  
46 b. Abrasion resistance.  
47 c. Apparent reflectivity.  
48 d. Flexibility.  
49 e. Washability.  
50 f. Absorption.  
51 g. Accelerated weathering.  
52 h. Accelerated yellowness.  
53  
54 3. If test results show material being used does not comply with specified requirements,  
55 the Contractor may be directed to stop work, remove noncomplying finish materials  
56 from job, pay for testing, refinish surfaces that were coated with rejected finishes.

57 **3.7 CLEANING**  
58

- 59 A. Cleanup: At the end of each work day, remove empty cans, rags, rubbish, and other discarded  
60 paint materials from the site.  
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- B. Upon completion of finishing, clean glass and stain-spattered surfaces. Remove spattered stain by washing and scraping, using care not to scratch or damage adjacent finished surfaces.
- C. Touch up varnish and stain after all other trades have completed their work in preparation for final acceptance of work.

**3.8 PROTECTION**

- A. Protect work of other trades, whether to be painted or not, against damage by this section. Correct damage by cleaning, repairing or replacing, and repainting, as acceptable to Architect and Owner Project representative.
- B. Provide "wet varnish" signs to protect newly applied finishes. Remove temporary protective wrappings provided by other subcontractors as part of this contract for protection of their work after completion of finishing work.
- C. Touch up and restore damaged or defaced finished surfaces at completion of project construction activities of other trades and in compliance with final punch list by Architect.

**3.9 SCHEDULE: REFER TO DRAWINGS FOR SPECIFIC AREAS OF SCOPE**

- A. Historic wood doors:
  - 1. One or more coats of CCT-1 wood stain as necessary to match approved sample.
  - 2. One coat of CCT-2 Type I varnish.
  - 3. One coat of CCT-2 Type II varnish and one coat 50% gloss/50% satin.
- B. Historic wood wainscot and/or paneling, Room 260 ceiling beams and other exposed framing members, Room 260 window trim:
  - 1. One or more coats of CCT-1 wood stain as approved to match approved sample.
  - 2. One coat of CCT-2 Type I varnish.
  - 4. Two coats of CCT-2 Type II varnish.

**END OF SECTION 09 93 00**

**SECTION 09 96 46**  
**INTUMESCENT PAINTING**

- 1
- 2
- 3 PART 1 – GENERAL
- 4 1.1 [RELATED DOCUMENTS](#)
- 5 1.2 [SUMMARY](#)
- 6 1.3 [ACTION SUBMITTALS](#)
- 7 1.4 [QUALITY ASSURANCE](#)
- 8 PART 2 – PRODUCTS
- 9 2.1 [MANUFACTURERS](#)
- 10 2.2 [INTUMESCENT PAINT MATERIALS, GENERAL \(SFRM-1\)](#)
- 11 PART 3 – EXECUTION
- 12 3.1 [EXAMINATION](#)
- 13 3.2 [PREPARATION](#)
- 14 3.3 [APPLICATION](#)

15 **PART 1 - GENERAL**

16 **1.1 RELATED DOCUMENTS**

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

19 **1.2 SUMMARY**

- 20 A. Section includes surface preparation and application of fire-retardant intumescent paint to interior items  
21 and surfaces.

22 **1.3 ACTION SUBMITTALS**

- 23 A. Product Data: For each type of product.
- 24 1. Include printout of current "MPI Approved Products List" for each product category specified, with  
25 the proposed product highlighted.
- 26 B. Sustainable Design Submittals:
- 27 1. Product Data: For paints and coatings, indicating VOC content.
  - 28 2. Laboratory Test Reports: For paints and coatings, indicating compliance with requirements for low-  
29 emitting materials.
- 30 C. Samples: For each type of coating system and each color and gloss of intumescent paint finish indicated.

31 **1.4 QUALITY ASSURANCE**

- 32 A. Mockups: Apply mockups of each paint system indicated to verify preliminary selections made under  
33 Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and  
34 execution.
- 35 1. Architect will select one surface to represent surfaces and conditions for application of each coating  
36 system.
    - 37 a. Wall and Ceiling Surfaces: Provide samples of at least 100 sq. ft..
    - 38 b. Other Items: Architect will designate items or areas required.
  - 39 2. Final approval of color selections will be based on mockups.
    - 40 a. If preliminary color selections are not approved, apply additional mockups of additional  
41 colors selected by Architect at no added cost to Owner.
- 42



1 **PART 2 - PRODUCTS**

2 **2.1 MANUFACTURERS**

- 3 A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that  
4 may be incorporated into the Work include, but are not limited to the following:
- 5 1. Diamond Vogel Paints.
  - 6 2. FireFree Coatings, Inc.
  - 7 3. Isolatech International
  - 8 4. PPG Architectural Coatings.
- 9 B. Basis-of-Design Products: Subject to compliance with requirements, provide products indicated in the  
10 Exterior Intumescent Painting Schedule and Interior Intumescent Painting Schedule or comparable product  
11 by one of the following:
- 12 1. Isolatech International.
- 13 C. Products: Subject to compliance with requirements, available products that may be incorporated into the  
14 Work include, but are not limited to products from Isolatech International CAFCO Spray Film WB-5.

15 **2.2 INTUMESCENT PAINT MATERIALS, GENERAL (SFRM-1)**

- 16 A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI  
17 Approved Products Lists."
- 18 B. Surface-Burning Characteristics of Fire-Retardant Systems: As tested according to ASTM E 84; testing by  
19 a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- 20 1. Flame-Spread Index: 5 or less.
  - 21 2. Smoke-Developed Index: 30 or less.
- 22 C. Material Compatibility:
- 23 1. Materials for use within each paint system shall be compatible with one another and substrates  
24 indicated, under conditions of service and application as demonstrated by manufacturer, based on  
25 testing and field experience.
  - 26 2. For each material or coat, products and spreading rates shall be as recommended in writing by  
27 intumescent paint manufacturer for use on substrate indicated. Comply with requirements for fire-  
28 retardant coating classification and surface-burning characteristics indicated.
- 29 D. VOC Content: For field applications that are inside the weatherproofing system, paints and coatings shall  
30 comply with VOC content limits of authorities having jurisdiction and the following VOC content limits:
- 31 1. Flat Paints and Coatings: 50 g/L.
  - 32 2. Nonflat Paints and Coatings: 150 g/L.
  - 33 3. Primers, Sealers, and Undercoaters: VOC not more than 200 g/L.
  - 34 4. Clear Wood Finishes, Varnishes: VOC not more than 350 g/L.
- 35 E. Colors and Gloss: As selected by Architect from manufacturer's full range.  
36

1 **PART 3 - EXECUTION**

2 **3.1 EXAMINATION**

- 3 A. Examine substrates and conditions, with Applicator present, for compliance with manufacturer's  
4 requirements for surface treatments, shop-primed surfaces, maximum moisture content, and other  
5 conditions affecting performance of the Work.  
6 B. Begin coating only when moisture content of wood substrate is 15 percent or less when measured with an  
7 electronic moisture meter.  
8 C. Verify suitability of substrates, including surface conditions, and compatibility with existing finishes and  
9 primers.  
10 D. Proceed with coating application only after unsatisfactory conditions have been corrected and surfaces are  
11 dry.

12 **3.2 PREPARATION**

- 13 A. Comply with manufacturer's written instructions and recommendations in the "MPI Architectural Painting  
14 Specification Manual" applicable to substrates and coating systems indicated.  
15 B. Remove hardware and hardware accessories, plates, machined surfaces, light fixtures, and similar items  
16 already installed that are not to be coated. If removal is impractical or impossible because of size or weight  
17 of item, provide surface-applied protection before surface preparation and coating.  
18 1. After completing coating operations, use workers skilled in the trades involved to reinstall items that  
19 were removed. Remove surface-applied protection if any.

20 **3.3 APPLICATION**

- 21 A. General: Apply intumescent paints according to manufacturer's written instructions and to comply with  
22 requirements for listing and labeling for surface-burning characteristics specified.  
23 1. Finish doors on faces with intumescent finish. Paint tops, bottoms, and side edges with fire-inert  
24 finish.

25 **END OF SECTION**

SECTION 10 11 00  
VISUAL DISPLAY UNITS

- 1
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- 3 PART 1 – GENERAL
- 4 1.1 [RELATED DOCUMENTS](#)
- 5 1.2 [SUMMARY](#)
- 6 1.3 [ACTION SUBMITTALS](#)
- 7 1.4 [CLOSEOUT SUBMITTALS](#)
- 8 1.5 [QUALITY ASSURANCE](#)
- 9 1.6 [DELIVERY, STORAGE, AND HANDLING](#)
- 10 1.7 [PROJECT CONDITIONS](#)
- 11 PART 2 – PRODUCTS
- 12 2.1 [MANUFACTURERS](#)
- 13 2.2 [GLASS MARKERBOARDS](#)
- 14 2.3 [TACKBOARDS](#)
- 15 PART 3 – EXECUTION
- 16 3.1 [EXAMINATION](#)
- 17 3.2 [PREPARATION](#)
- 18 3.3 [INSTALLATION](#)
- 19 3.4 [CLEANING AND PROTECTION](#)
- 20 3.5 [DEMONSTRATION](#)

21 **PART 1 - GENERAL**

22 **1.1 RELATED DOCUMENTS**

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

25 **1.2 SUMMARY**

- 26 A. Section Includes:
- 27 1. Glass marker boards (MKBD-1).

28 **1.3 ACTION SUBMITTALS**

- 29 A. Product Data: For each type of product.
- 30 1. Include construction details, material descriptions, dimensions of individual components and
- 31 profiles, finishes, and accessories for visual display units.
- 32 B. Shop Drawings: For visual display units.
- 33 1. Include plans, elevations, sections, details, and attachment to other work.
- 34 2. Show locations of panel joints.
- 35 C. Samples for Verification: For each type of visual display unit indicated.
- 36 1. Visual Display Panel: Not less than 8-1/2 by 11 inches, with glass facing indicated for final Work.
- 37 Include one panel for each type, color, and texture required.
- 38 2. Accessories: Full-size Sample of each type of accessory.
- 39 D. Product Schedule: For visual display units. Use same designations indicated on Drawings.

40 **1.4 CLOSEOUT SUBMITTALS**

- 41 A. Maintenance Data: For visual display units to include in maintenance manuals.

42 **1.5 QUALITY ASSURANCE**

- 43 A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by
- 44 manufacturer.

45 **1.6 DELIVERY, STORAGE, AND HANDLING**

- 46 A. Deliver factory-fabricated visual display units completely assembled in one piece. If dimensions exceed
- 47 maximum manufactured unit size, or if unit size is impracticable to ship in one piece, provide two or more
- 48 pieces with joints in locations indicated on approved Shop Drawings.
- 49

1 **1.7 PROJECT CONDITIONS**

- 2 A. Environmental Limitations: Do not deliver or install visual display units until spaces are enclosed and  
3 weathertight, wet-work in spaces is complete and dry, work above ceilings is complete, and temporary  
4 HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy  
5 levels during the remainder of the construction period.  
6 B. Field Measurements: Verify actual dimensions of construction contiguous with visual display units by field  
7 measurements before fabrication.  
8 1. Allow for trimming and fitting where taking field measurements before fabrication might delay the  
9 Work.

10 **PART 2 - PRODUCTS**

11 **2.1 MANUFACTURERS**

- 12 A. Source Limitations: Obtain each type of visual display unit from single source from a single manufacturer.

13 **2.2 GLASS MARKERBOARDS**

- 14 A. Basis-of-Design Product: Subject to compliance with requirements, provide Skyline Design; Vitracolor or  
15 comparable product by one of the following:  
16 1. Egan Visual Inc.  
17 2. Element Designs.  
18 B. Units: Refer to MKBD-1 on the Material ID List:  
19 1. Back Painted Magnetic Glass (Marker Boards). Mfr: Skyline Design. Product: Vitracolor.  
20 2. Color: As scheduled.  
21 3. Thickness: As scheduled.  
22 4. Glass: Low-iron, PPG Starphire tempered safety glass.  
23 5. Glass Markerboards: tempered glass markerboard, with smooth polished edge and corners as  
24 indicated. Color coated on back surface.  
25 C. Mounting: Stainless-steel standoffs, holding glass approximately 1 inch from wall surface; mounted  
26 through holes in markerboard or mounted in notches in standoffs at top and bottom edges of markerboard  
27 as scheduled or indicated on the drawings..  
28 D. Marker Tray: Glass, supported by stainless-steel clips.

29 **2.3 TACKBOARDS**

- 30 A. Metal Framed Tackboard (TACK-1): Linoleum tackboard panel on core with factory finished metal frame.  
31 1. Koroseal Wall-Talker Aluminum J-CapTrim, size indicated on Drawings.  
32 2. Metal Framed Tackboard: Uni-color linoleum cork self-healing tackbord with Koroseal Wall-Talker  
33 Aluminum J-CapTrim.  
34 3. Core: Uni-colored linoleum; raw materials that are used are of natural origin and include: linseed,  
35 oil, rosin binders, ground cork, and mineral fillers.  
36 4. Color and Pattern: As selected by Architect from full range of colors.

37 **PART 3 - EXECUTION**

38 **3.1 EXAMINATION**

- 39 A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation  
40 tolerances, surface conditions of wall, and other conditions affecting performance of the Work.  
41 B. Examine walls and partitions for proper preparation and backing for visual display units.  
42 C. Proceed with installation only after unsatisfactory conditions have been corrected.

43 **3.2 PREPARATION**

- 44 A. Comply with manufacturer's written instructions for surface preparation.  
45 B. Clean substrates of substances, such as dirt, mold, and mildew, that could impair the performance of and  
46 affect the smooth, finished surfaces of visual display boards.  
47 C. Prepare surfaces to achieve a smooth, dry, clean surface free of flaking, unsound coatings, cracks,  
48 defects, projections, depressions, and substances that will impair bond between visual display units and  
49 wall surfaces.



**SECTION 10 12 00**  
**DISPLAY CASES**

- 1
- 2
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- 4 1.1 [RELATED DOCUMENTS](#)
- 5 1.2 [SUMMARY](#)
- 6 1.3 [DEFINITIONS](#)
- 7 1.4 [ACTION SUBMITTALS](#)
- 8 1.5 [CLOSEOUT SUBMITTALS](#)
- 9 1.6 [PROJECT CONDITIONS](#)
- 10 PART 2 – PRODUCTS
- 11 2.1 [MANUFACTURERS](#)
- 12 2.2 [PERFORMANCE REQUIREMENTS](#)
- 13 2.3 [DISPLAY CASE \(DISPLAY-1\)](#)
- 14 2.4 [MATERIALS](#)
- 15 2.5 [FABRICATION](#)
- 16 2.6 [GENERAL FINISH REQUIREMENTS](#)
- 17 2.7 [ALUMINUM FINISHES](#)
- 18 PART 3 – EXECUTION
- 19 3.1 [EXAMINATION](#)
- 20 3.2 [INSTALLATION](#)
- 21 3.3 [ADJUSTING AND CLEANING](#)

22 **PART 1 - GENERAL**

23 **1.1 RELATED DOCUMENTS**

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

26 **1.2 SUMMARY**

- 27 A. Section Includes:
- 28 1. Display cases.
- 29 B. Related Requirements:
- 30 1. Section 10 11 00 "Visual Display Units" for "tackboards".

31 **1.3 DEFINITIONS**

- 32 A. Display Case: Glazed cabinet with tackboard panel back surface and adjustable shelves.

33 **1.4 ACTION SUBMITTALS**

- 34 A. Product Data: For each type of product.
- 35 1. Include construction details, material descriptions, dimensions of individual components and profiles,
- 36 and finishes for display cases. Include furnished specialties and accessories.
- 37 B. LEED Submittals:
- 38 1. Laboratory Test Reports for Credit IEQ 4.1: For adhesives, documentation indicating that products
- 39 comply with the testing and product requirements of the California Department of Public Health's
- 40 (formerly, the California Department of Health Services) "Standard Method for the Testing and
- 41 Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental
- 42 Chambers."
- 43 C. Shop Drawings: For display cases.
- 44 1. Include plans, elevations, sections, and attachment details.
- 45 2. Show location of seams and joints in tackboard panels.
- 46 3. Include sections of typical trim members.

47 **1.5 CLOSEOUT SUBMITTALS**

- 48 A. Maintenance Data: For display cases to include in maintenance manuals.
- 49

1 **1.6 PROJECT CONDITIONS**

- 2 A. Environmental Limitations: Do not deliver or install display cases for indoor installations until spaces are  
3 enclosed and weathertight, wet-work in spaces is complete and dry, work above ceilings is complete, and  
4 temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at  
5 occupancy levels during the remainder of the construction period.

6 **PART 2 - PRODUCTS**

7 **2.1 MANUFACTURERS**

- 8 A. Source Limitations: Obtain display cases from single source from single manufacturer.

9 **2.2 PERFORMANCE REQUIREMENTS**

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

14 **2.3 DISPLAY CASE (DISPLAY-1)**

- 15 A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may  
16 be incorporated into the Work include, but are not limited to the following:  
17 1. C.R. Laurence Company (CRL)  
18 2. A-1 Visual Systems.  
19 3. Architectural School Products Ltd.  
20 4. Claridge Products and Equipment, Inc.  
21 B. Surface-Mounted Display Case: Factory-fabricated display case; with finished interior, and glazed doors at  
22 front.  
23 1. Construction: Extruded-aluminum top, bottom, and side panels.  
24 2. Aluminum Finish: Color anodic. Satin.  
25 a. Color: As selected by Architect from manufacturer's full range.  
26 3. Display Case Base: No base, for wall mounting.  
27 C. Glazed Hinged Doors: Tempered glass; set in frame matching cabinet material and finish. Equip each door  
28 with full-height continuous hinge and cylinder lock with two keys.  
29 1. Thickness: Not less than 5 mm thick.  
30 2. Number of Doors: One.  
31 D. Back Panel: Plastic-Impregnated-Cork Tackboard Panel: 1/8-inch-thick, plastic-impregnated-cork sheet  
32 factory laminated to 3/8-inch-thick fiberboard backing.  
33 E. Size: See Materials Tag List.

34 **2.4 MATERIALS**

- 35 A. Fiberboard: ASTM C 208.  
36 B. Plastic-Impregnated-Cork Sheet: Seamless, homogeneous, self-sealing sheet consisting of granulated cork,  
37 linseed oil, resin binders, and dry pigments that are mixed and calendared onto burlap backing; with  
38 washable vinyl finish and integral color throughout.  
39 C. Aluminum Tubing: ASTM B 429/B 429M, Alloy 6063.  
40 D. Clear Tempered Glass: ASTM C 1048, Kind FT, Condition A, Type I, Class 1, Quality Q3, with exposed  
41 edges seamed before tempering.  
42 E. Fasteners: Provide screws, bolts, and other fastening devices made from same material as items being  
43 fastened, except provide hot-dip galvanized, stainless-steel, or aluminum fasteners for exterior applications.  
44 Provide types, sizes, and lengths to suit installation conditions. Use security fasteners where exposed to  
45 view.  
46 F. Adhesives: Manufacturer's standard product that complies with the testing and product requirements of the  
47 California Department of Public Health's (formerly, the California Department of Health Services') "Standard  
48 Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using  
49 Environmental Chambers."  
50

1 **2.5 FABRICATION**

- 2 A. Fabricate display cases to requirements indicated for dimensions, design, and thickness and finish of  
3 materials.  
4 B. Use metals and shapes of thickness and reinforcing required to produce flat surfaces, and to impart strength  
5 for size, design, and application indicated.  
6 C. Fabricate cabinets and door frames with reinforced corners, mitered to a hairline fit, with no exposed  
7 fasteners.  
8 D. Fabricate shelf standards plumb and at heights to align shelf brackets for level shelves.

9 **2.6 GENERAL FINISH REQUIREMENTS**

- 10 A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations  
11 for applying and designating finishes.  
12 B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary  
13 protective covering before shipping.  
14 C. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in  
15 appearance of adjoining components are acceptable if they are within the range of approved Samples and  
16 are assembled or installed to minimize contrast.

17 **2.7 ALUMINUM FINISHES**

- 18 A. Color Anodic Finish: AAMA 611, AA-M12C22A32/A34, Class II, 0.010 mm or thicker.

19 **PART 3 - EXECUTION**

20 **3.1 EXAMINATION**

- 21 A. Examine walls, with Installer present, for compliance with requirements for installation tolerances, surface  
22 conditions of wall, and other conditions affecting performance of the Work.  
23 B. Examine walls and partitions for proper backing for display cases.  
24 C. Proceed with installation only after unsatisfactory conditions have been corrected.

25 **3.2 INSTALLATION**

- 26 A. General: Install units in locations and at mounting heights indicated on Drawings, or if not indicated, at  
27 heights indicated below. Keep perimeter lines straight, level, and plumb. Provide grounds, clips, backing  
28 materials, adhesives, brackets, anchors, trim, and accessories necessary for complete installation.  
29 1. Mounting Height: 72 inches above finished floor to top of cabinet.  
30 B. Surface-Mounted Display Cases: Attach units to wall surfaces with concealed clips, hangers, or grounds  
31 fastened at not more than 16 inches o.c. Secure tops and bottoms of display cases to walls.  
32 C. Comply with requirements specified elsewhere for connecting illuminated display cases.

33 **3.3 ADJUSTING AND CLEANING**

- 34 A. Adjust doors to operate smoothly without warp or bind and so contact points meet accurately. Lubricate  
35 operating hardware as recommended by manufacturer.  
36 B. Touch up factory-applied finishes to restore damaged areas.

37 **END OF SECTION**



SECTION 10 21 13.15

STAINLESS-STEEL TOILET COMPARTMENTS

- 1
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- 5 1.2 [SUMMARY](#)
- 6 1.3 [ACTION SUBMITTALS](#)
- 7 1.4 [INFORMATIONAL SUBMITTALS](#)
- 8 1.5 [CLOSEOUT SUBMITTALS](#)
- 9 PART 2 – PRODUCTS
- 10 2.1 [PERFORMANCE REQUIREMENTS](#)
- 11 2.2 [STAINLESS-STEEL TOILET COMPARTMENTS](#)
- 12 2.3 [HARDWARE AND ACCESSORIES](#)
- 13 2.4 [FABRICATION](#)
- 14 PART 3 – EXECUTION
- 15 3.1 [INSTALLATION](#)
- 16 3.2 [ADJUSTING](#)

17 **PART 1 - GENERAL**

18 **1.1 RELATED DOCUMENTS**

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

21 **1.2 SUMMARY**

- 22 A. Section includes stainless-steel toilet compartments configured as toilet enclosures and urinal screens.

23 **1.3 ACTION SUBMITTALS**

- 24 A. Product Data: For each type of product.
- 25 B. Sustainable Design Submittals:
  - 26 1. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and
  - 27 cost.
- 28 C. Shop Drawings: For toilet compartments. Include plans, elevations, sections, details, and attachment details.
- 29 D. Samples for each type of toilet compartment material indicated.

30 **1.4 INFORMATIONAL SUBMITTALS**

- 31 A. Product certificates.

32 **1.5 CLOSEOUT SUBMITTALS**

- 33 A. Maintenance data.
- 34

1 **PART 2 - PRODUCTS**

2 **2.1 PERFORMANCE REQUIREMENTS**

- 3 A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled  
4 content not less than 25 percent.  
5 B. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation  
6 Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities for toilet  
7 compartments designated as accessible.

8 **2.2 STAINLESS-STEEL TOILET COMPARTMENTS**

- 9 A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:  
10 1. All American Metal Corp.  
11 2. American Sanitary Partition Corporation.  
12 3. Bradley Corporation.  
13 4. General Partitions Mfg. Corp.  
14 5. Global Partitions; ASI Group.  
15 6. Hadrian Manufacturing Inc.  
16 7. Metpar Corp.  
17 B. Toilet-Enclosure Style: Ceiling hung (TOIL-1).  
18 C. Shower-Entry Door.  
19 D. Urinal-Screen Style: Wall hung with integral flanges (TOIL-2).  
20 E. Door, Panel, and Pilaster Construction: Seamless, metal facing sheets pressure laminated to core material;  
21 with continuous, interlocking molding strip or lapped-and-formed edge closures; corners secured by welding  
22 or clips and exposed welds ground smooth. Provide with no-sightline system. Exposed surfaces shall be  
23 free of pitting, seam marks, roller marks, stains, discolorations, telegraphing of core material, or other  
24 imperfections.  
25 1. Core Material: Manufacturer's standard sound-deadening honeycomb of resin-impregnated kraft  
26 paper in thickness required to provide finished thickness of 1 inch for doors and panels and 1-1/4  
27 inches for pilasters.  
28 2. Grab-Bar Reinforcement: Provide concealed internal reinforcement for grab bars mounted on units  
29 of size and material adequate for panel to withstand applied downward load on grab bar of at least  
30 250 lbf, when tested according to ASTM F 446, without deformation of panel.  
31 3. Tapping Reinforcement: Provide concealed reinforcement for tapping (threading) at locations where  
32 machine screws are used for attaching items to units.  
33 F. Urinal-Screen Construction:  
34 1. Integral-Flange, Wall-Hung Urinal Screen: Similar to panel construction, with integral full-height  
35 flanges for wall attachment, and maximum 1-1/4 inches thick.  
36 G. Facing Sheets and Closures: Stainless-steel sheet of nominal thicknesses as follows:  
37 1. Panels: Manufacturer's standard thickness, but not less than 0.031 inch.  
38 2. Doors: Manufacturer's standard thickness, but not less than 0.031 inch.  
39 3. Integral-Flange, Wall-Hung Urinal Screens: Manufacturer's standard thickness, but not less than  
40 0.031 inch.  
41 H. Brackets (Fittings):  
42 1. Full-Height (Continuous) Type: Manufacturer's standard design; stainless steel.  
43 I. Stainless-Steel Finish: No. 4 bright, directional polish on exposed faces. Protect exposed surfaces from  
44 damage by application of strippable, temporary protective covering before shipment.  
45



SECTION 10 21 16.19  
SHOWER COMPARTMENTS

- 1  
2  
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11 2.2 [SOLID-POLYMER COMPARTMENTS \(SHOWER-1\)](#)  
12 2.3 [SHOWER RECEPTORS \(SHOWER-2\)](#)  
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15 PART 3 – EXECUTION  
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17 3.2 [ADJUSTING](#)

18 **PART 1 - GENERAL**

19 **1.1 RELATED DOCUMENTS**

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

22 **1.2 SUMMARY**

- 23 A. Section Includes:  
24 1. Solid-polymer compartments.  
25 2. Shower receptors  
26 3. Solid polymer shower door.

27 **1.3 ACTION SUBMITTALS**

- 28 A. Product Data: For each type of product.  
29 B. Sustainable Design Submittals:  
30 1. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and  
31 cost.  
32 C. Shop Drawings: For shower and dressing compartments.  
33 1. Include plans, elevations, sections, and attachment details.  
34 D. Samples: For each exposed product and for each color and texture specified.

35 **1.4 INFORMATIONAL SUBMITTALS**

- 36 A. Product certificates.

37 **1.5 CLOSEOUT SUBMITTALS**

- 38 A. Maintenance data.

39 **PART 2 - PRODUCTS**

40 **2.1 PERFORMANCE REQUIREMENTS**

- 41 A. Surface-Burning Characteristics: Comply with ASTM E 84 or UL 723; testing by a qualified testing agency.  
42 Identify products with appropriate markings of applicable testing agency.  
43 1. Flame-Spread Index: 25 or less.  
44 2. Smoke-Developed Index: 25 or less.  
45 B. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less  
46 than 20 percent.  
47 C. Accessibility Standard: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers  
48 Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities for shower and dressing  
49 compartments designated as accessible.

- 1 **2.2 SOLID-POLYMER COMPARTMENTS (SHOWER-1)**
- 2 A. Manufacturers: Subject to compliance with requirements, provide products by the following:
- 3 1. DuPont: Corian 1/4 inch thick Wall Panels.
- 4 B. Configuration: Shower compartment as indicated on Drawings. Provide radiused inside corners per
- 5 Manufacturer's standards.
- 6 C. Enclosure Style: wall anchored
- 7 D. Panel and Pilaster Construction: Solid polymer panel material, not less than 1/4 inch thick, seamless, with
- 8 eased edges and with homogenous color and pattern throughout thickness of material.
- 9 1. Integral Hinges: Configure doors and pilasters to receive integral hinges.
- 10 2. Heat-Sink Strip: Manufacturer's standard, continuous, stainless-steel strip fastened to exposed
- 11 bottom edges of solid-polymer components to hinder malicious combustion.
- 12 3. Color and Pattern: as selected by Architect from manufacturer's full range.
- 13 E. Brackets (Fittings):
- 14 1. Full-Height (Continuous) Type: Manufacturer's standard design; solid polymer matching the panels.
- 15 **2.3 SHOWER RECEPTORS (SHOWER-2)**
- 16 A. Basis of Design (no substitutions): Acorn Engineering Company: Terrazzo ADA Shower Base, Model
- 17 **SBADA-36-3F.**
- 18 B. General: Manufacturer's standard, prefabricated, terrazzo receptor complete with integral drain.
- 19 1. Provide each unit with a ramped entrance surface for accessible compartments.
- 20 2. Drain Strainer: Manufacturer's standard; removable.
- 21 3. Drain Gasket: Manufacturer's standard gasket sized to fit waste pipe.
- 22 C. Finish: Manufacturer's standard finish on exposed surfaces, as selected by Architect from manufacturer's
- 23 full range and with slip-resistant floor surface texture
- 24 **2.4 ACCESSORIES**
- 25 A. Door Hardware and Accessories: Manufacturer's standard design, heavy-duty, operating hardware and
- 26 accessories. Mount to panels with through-bolts.
- 27 1. Material: Stainless steel.
- 28 2. Hinges: Manufacturer's standard, paired, self-closing type that can be adjusted to hold doors open
- 29 at any angle up to 90 degrees, allowing emergency access by lifting door.
- 30 3. Latch and Keeper: Manufacturer's standard, surface-mounted latch unit designed for emergency
- 31 access and with combination rubber-faced door strike and keeper. Provide units that comply with
- 32 regulatory requirements for accessibility at each compartment, accessible or not.
- 33 4. Clothing Hooks: Manufacturer's standard clothing hooks in each dressing compartment; include one
- 34 combination hook and rubber-tipped bumper at inswinging doors, sized to prevent door from hitting
- 35 wall panel or compartment-mounted accessories.
- 36 5. Door Bumper: Manufacturer's standard, rubber-tipped bumper at outswinging doors.
- 37 6. Door Pull: Manufacturer's standard unit at outswinging doors that complies with regulatory
- 38 requirements for accessibility. Provide units on both sides of doors at compartments designated as
- 39 accessible.
- 40 B. Headrail with Hooks: Manufacturer's standard, continuous, extruded-aluminum headrail or cap with curtain
- 41 hooks running in concealed track; with antigrip profile; in manufacturer's standard finish.
- 42 C. Curtain Rod with Hooks: Manufacturer's standard, 1-inch-diameter, stainless-steel curtain rod with matching
- 43 hooks.
- 44 D. Curtain: Flame-resistant, polyester-reinforced vinyl fabric that is stain resistant, self-sanitizing, antistatic,
- 45 antimicrobial, and launderable to a temperature of not less than 90 deg F.
- 46 1. Flame Resistance: Passes NFPA 701 tests when tested by a testing and inspecting agency
- 47 acceptable to authorities having jurisdiction.
- 48 2. Labeling: Identify fabrics with appropriate markings of applicable testing and inspecting agency.
- 49 3. Length: Where curtain extends to a floor surface, size so that bottom hem clears finished floor by not
- 50 more than 1 inch and not less than 1/2 inch above floor surface. Where curtains extend to a shower-
- 51 receptor curb, size so that bottom hem hangs above curb line and clears curb line by not more than
- 52 1/2 inch.
- 53 4. Color and Pattern: As selected by Architect from manufacturer's full range.
- 54 E. Soap Holder: Surface-mounted, seamless stainless-steel soap dish.
- 55 F. Seats: Manufacturer's standard, wall-mounted benches.
- 56 1. Material: Solid phenolic.
- 57 2. Operation: Folding.
- 58 3. Finish: As selected by Architect from manufacturer's full range.

- 1 G. Anchorages and Fasteners: Manufacturer's standard, exposed fasteners of stainless steel, chrome-plated  
2 steel, or solid brass, finished to match the items they are securing; with theft-resistant-type heads. Provide  
3 sex-type bolts for through-bolt applications.

4 **2.5 FABRICATION**

- 5 A. Overhead-Braced Compartments: Manufacturer's standard, corrosion-resistant supports, leveling method,  
6 and anchors at pilasters and walls to suit floor and wall conditions. Provide shoes at pilasters to conceal  
7 supports and leveling method.  
8 B. Floor-and-Ceiling-Anchored Compartments: Manufacturer's standard, corrosion-resistant anchoring  
9 assemblies at pilasters and walls, with leveling adjustment at tops and bottoms of pilasters. Provide shoes  
10 and sleeves (caps) at pilasters to conceal anchorage.  
11 C. Door Sizes and Swings: Unless otherwise indicated, provide 24-inch-wide, inswinging doors for standard  
12 shower and dressing compartments, and 36-inch-wide, outswinging doors with a minimum 32-inch-wide,  
13 clear opening for compartments designated as accessible.

14 **PART 3 - EXECUTION**

15 **3.1 INSTALLATION**

- 16 A. General: Comply with manufacturer's written installation instructions. Install compartments rigid, straight,  
17 level, and plumb. Secure compartments in position with manufacturer's recommended anchoring devices.  
18 1. Clearances for Dressing Compartments: Maximum 1/2 inch between pilasters and panels; 1 inch  
19 between panels and walls.  
20 2. Stirrup Brackets for Dressing Compartments: Secure panels to walls and to pilasters with no fewer  
21 than three brackets attached at midpoint and near top and bottom of panel.  
22 a. Locate wall brackets so holes for wall anchors occur in masonry or tile joints.  
23 b. Align brackets at pilasters with brackets at walls.  
24 3. Full-Height (Continuous) Brackets for Dressing Compartments: Secure panels to walls and to  
25 pilasters with full-height brackets.  
26 a. Locate bracket fasteners so holes for wall anchors occur in masonry or tile joints.  
27 b. Align brackets at pilasters with brackets at walls.  
28 B. Curtains: Install curtains to specified length, and verify that they hang vertically without stress points or  
29 diagonal folds.  
30 C. Shower Receptors: Install prefabricated shower receptors with drain gasket compression fit to OD of waste  
31 pipe.

32 **3.2 ADJUSTING**

- 33 A. Curtain Adjustment: After hanging curtains, test and adjust each track or rod to produce unencumbered,  
34 smooth operation. Steam and dress down curtains as required to produce crease- and wrinkle-free  
35 installation. Remove and replace curtains that are stained or soiled or that have stress points or diagonal  
36 folds.  
37 B. Hardware Adjustment: Adjust and lubricate hardware according to hardware manufacturer's written  
38 instructions for proper operation. Set hinges on inswinging doors to hold doors open approximately 30  
39 degrees from closed position when unlatched. Set hinges on outswinging doors to return doors to fully closed  
40 position.

41 **END OF SECTION**

SECTION 10 28 00

TOILET, BATH, AND LAUNDRY ACCESSORIES

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- 10 PART 2 – PRODUCTS
- 11 2.1 [PERFORMANCE REQUIREMENTS](#)
- 12 2.2 [PUBLIC-USE WASHROOM ACCESSORIES](#)
- 13 2.3 [PUBLIC-USE SHOWER ROOM ACCESSORIES](#)
- 14 2.4 [WARM-AIR DRYERS](#)
- 15 2.5 [CHILDCARE ACCESSORIES](#)
- 16 2.6 [UNDERLAVATORY GUARDS](#)
- 17 2.7 [CUSTODIAL ACCESSORIES](#)
- 18 2.8 [AUTOMATED EXTERNAL DEFIBRILLATOR \(AED\) CABINET](#)
- 19 2.9 [FABRICATION](#)
- 20 PART 3 – EXECUTION
- 21 3.1 [INSTALLATION](#)

22 **PART 1 - GENERAL**

23 **1.1 RELATED DOCUMENTS**

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

26 **1.2 SUMMARY**

- 27 A. Section Includes:
  - 28 1. Public-use washroom accessories.
  - 29 2. Public-use shower room accessories.
  - 30 3. Private-use bathroom accessories.
  - 31 4. Warm-air dryers.
  - 32 5. Childcare accessories.
  - 33 6. Underlavatory guards
  - 34 7. Kitchenette accessories.
  - 35 8. Custodial accessories.
  - 36 9. Automated external defibrillator (AED) cabinet.

37 **1.3 ACTION SUBMITTALS**

- 38 A. Product Data: For each type of product.
- 39 B. Samples: Full size, for each exposed product and for each finish specified.

40 **1.4 INFORMATIONAL SUBMITTALS**

- 41 A. Sample warranty.

42 **1.5 CLOSEOUT SUBMITTALS**

- 43 A. Maintenance data.

44 **1.6 WARRANTY**

- 45 A. Manufacturer's Special Warranty for Mirrors: Manufacturer agrees to repair or replace mirrors that fail in
- 46 materials or workmanship within specified warranty period.
- 47 1. Warranty Period: 15 years from date of Substantial Completion.

1 **PART 2 - PRODUCTS**

2 **2.1 PERFORMANCE REQUIREMENTS**

- 3 A. Provide similar style by same manufacturer in rooms with multiple accessories.  
4 B. Manufacturers: Subject to compliance with requirements, provide products, where manufacturer not listed,  
5 by the following:  
6 1. American Specialties, Inc.  
7 2. Bobrick Washroom Equipment, Inc. (Basis of Design)  
8 3. Bradley Corporation.  
9 4. Tubular Specialties Manufacturing, Inc.  
10 C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified  
11 testing agency, and marked for intended location and application.

12 **2.2 PUBLIC-USE WASHROOM ACCESSORIES**

- 13 A. Toilet Tissue (Roll) Dispenser **TA-04**: See Materials List for product reference.  
14 1. Description: Triple-roll dispenser  
15 2. Mounting: Surface mounted.  
16 3. Operation: Noncontrol delivery with theft-resistant spindle.  
17 B. Manual Paper Towel (Roll) Dispenser **TA-05 (for kitchenettes)**: See Materials List for product reference.  
18 1. Mounting: Surface mounted.  
19 2. Minimum Capacity: 8-inch-wide, 8" diameter.  
20 3. Material and Finish: Type 304 stainless steel.  
21 4. Lockset: Manufacturer's standard type.  
22 C. Waste Receptacle **TA-07**: See Materials List for product reference.  
23 1. Mounting: free standing.  
24 2. Minimum Capacity: 16 Gallon: 16" diameter, 30" high.  
25 3. Material and Finish: smudge-free brushed stainless steel..  
26 D. Liquid-Soap Dispenser **TA-11**: See Materials List for product reference.  
27 1. Description: Designed for dispensing antibacterial soap in liquid or lotion form.  
28 2. Mounting: Surface mounted above sinks.  
29 3. Capacity: 1200 ml  
30 4. Materials: ABS Plastic, Color: Nickel Finish.  
31 5. Lockset: Tumbler type.  
32 6. Refill Indicator: Window type.  
33 E. Grab Bar **TA-12**:  
34 1. Bobrick  
35 2. Mounting: Flanges with concealed fasteners.  
36 3. Material: Stainless steel, 0.05 inch thick.  
37 a. Finish: Smooth, No. 4 finish (satin).  
38 4. Outside Diameter: 1-1/2 inches.  
39 5. Configuration and Length: As indicated on Drawings  
40 F. Sanitary-Napkin Disposal Unit **TA-14**  
41 1. Bobrick  
42 2. Mounting: Partition mounted, dual access  
43 3. Door or Cover: Self-closing, disposal-opening cover and hinged face panel with tumbler lockset.  
44 4. Receptacle: Removable.  
45 5. Material and Finish: Stainless steel, No. 4 finish (satin)  
46 G. Seat-Cover Dispenser **TA-15**:  
47 1. Mounting: Surface mounted.  
48 2. Minimum Capacity: 250 seat covers.  
49 3. Exposed Material and Finish: Stainless steel, No. 4 finish (satin).  
50 4. Lockset: Tumbler type.  
51 H. Mirror Unit **TA-17**:  
52 1. Frame: Stainless-steel channel.  
53 a. Corners: Welded and ground smooth.  
54 2. Integral Shelf: 5 inches deep.  
55 3. Hangers: Produce rigid, tamper- and theft-resistant installation, using method indicated below.  
56 a. One-piece, galvanized-steel, wall-hanger device with spring-action locking mechanism to hold  
57 mirror unit in position with no exposed screws or bolts.  
58 b. Wall bracket of galvanized steel, equipped with concealed locking devices requiring a special  
59 tool to remove.  
60 4. Size: As indicated on Drawings.



- 1 I. Coat / Robe Hook **TA-19:**  
2 1. Bobrick  
3 2. Description: Single-prong unit.  
4 3. Material and Finish: One-piece brass casting with satin nickel-plated finish to match stainless steel.
- 5 **2.3 PUBLIC-USE SHOWER ROOM ACCESSORIES**  
6 A. Folding Shower Seat **TA-21:**  
7 1. Configuration: L-shaped seat, designed for wheelchair access.  
8 2. Seat: Stainless steel, No. 4 finish (satin); 0.05-inch minimum nominal thickness; with single-piece,  
9 pan-type construction and edge seams welded and ground smooth.  
10 3. Mounting Mechanism: Stainless steel, No. 4 finish (satin).  
11 4. Dimensions:  
12 B. Towel Rack **TA-18:**  
13 1. Description: Surface-mounted, guest-towel unit with approximately 1/4-inch-diameter wire rings  
14 welded to upright wire bracket.  
15 2. Capacity: Four sets of bath towels.  
16 3. Nominal Height: [21 inches.  
17 4. Material and Finish: Polished chrome-plated zinc alloy (zamac).
- 18 **2.4 WARM-AIR DRYERS**  
19 A. Warm-Air Dryer **TA-23:**  
20 1. Manufacturers: Subject to compliance with requirements, provide products by the following:  
21 a. Excel Dryer Inc: XLERATOReco Hand Dryer.  
22 2. Description: Standard-speed, warm-air hand dryer.  
23 3. Mounting: Surface mounted.  
24 4. Operation: Electronic-sensor activated with timed power cut-off switch.  
25 a. Operation Time: 12 seconds.  
26 5. Cover Material and Finish: Stainless steel, brushed.  
27 6. Electrical Requirements: 110-120 V, 13 A, 425 Watts to 530 Watts.
- 28 **2.5 CHILDCARE ACCESSORIES**  
29 A. Diaper-Changing Station **TA-24:**  
30 1. Description: Horizontal unit that opens by folding down from stored position and with child-protection  
31 strap.  
32 a. Engineered to support minimum of 250-lb static load when opened.  
33 2. Mounting: Surface mounted, with unit projecting not more than 4 inches from wall when closed.  
34 3. Operation: By pneumatic shock-absorbing mechanism.  
35 4. Material and Finish: HDPE with plastic-laminate insert in color selected by Architect.  
36 5. Liner Dispenser: Built in.
- 37 **2.6 UNDERLAVATORY GUARDS**  
38 A. Underlavatory Guard **TA-25:** See Materials List for product reference.  
39 1. Description: Insulating pipe covering for supply and drain piping assemblies that prevents direct  
40 contact with and burns from piping; allow service access without removing coverings.  
41 2. Material and Finish: Antimicrobial, molded plastic, white.
- 42 **2.7 CUSTODIAL ACCESSORIES**  
43 A. Utility Shelf **TA-31:**  
44 1. Description: With exposed edges turned down not less than 1/2 inch and supported by two triangular  
45 brackets welded to shelf underside.  
46 2. Size: 16 inches long by 6 inches deep.  
47 3. Material and Finish: Not less than nominal 0.05-inch-thick stainless steel, No. 4 finish (satin).  
48 B. Mop and Broom Holder **TA-30:**  
49 1. Description: Unit with shelf, hooks, holders, and rod suspended beneath shelf.  
50 2. Length: 36 inches.  
51 3. Hooks: Four.  
52 4. Mop/Broom Holders: Three, spring-loaded, rubber hat, cam type.  
53 5. Material and Finish: Stainless steel, No. 4 finish (satin).  
54 a. Shelf: Not less than nominal 0.05-inch-thick stainless steel.  
55 b. Rod: Approximately 1/4-inch-diameter stainless steel.  
56

- 1 **2.8 AUTOMATED EXTERNAL DEFIBRILLATOR (AED) CABINET**  
2 A. Construction: Painted steel cabinet with glass window door. Pull friction latch with audible and visual alarm  
3 that sounds on opening or tampering. Back printed graphics of "AED" on the door glass with "Emergency  
4 Defibrillator" on the cabinet face.  
5 B. Type: Surface mount and semi-recessed. Provide remote strobe where indicated for semi-recessed  
6 applications.  
7 C. Inside Dimensions: 14.125 inches square x 7 inches deep minimum.  
8 D. Acceptable Manufacturers: Allied Medical Products, Cardiac Science, ZOLL Medical.

- 9 **2.9 FABRICATION**  
10 A. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide  
11 minimum of six keys to Owner's representative.

12 **PART 3 - EXECUTION**

- 13 **3.1 INSTALLATION**  
14 A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate  
15 indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations  
16 and at heights indicated.  
17 B. Grab Bars: Install to withstand a downward load of at least 250 lbf, when tested according to ASTM F 446.

18 **END OF SECTION**

**SECTION 10 44 16  
FIRE EXTINGUISHERS**

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13 2.2 [PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS](#)  
14 2.3 [MOUNTING BRACKETS](#)  
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16 3.1 [INSTALLATION](#)

17 **PART 1 - GENERAL**

18 **1.1 RELATED DOCUMENTS**

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

21 **1.2 SUMMARY**

- 22 A. Section includes portable, hand-carried fire extinguishers.

23 **1.3 ACTION SUBMITTALS**

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

25 **1.4 INFORMATIONAL SUBMITTALS**

- 26 A. Warranty: Sample of special warranty.

27 **1.5 CLOSEOUT SUBMITTALS**

- 28 A. Operation and maintenance data.

29 **1.6 COORDINATION**

- 30 A. Coordinate type and capacity of fire extinguishers with fire-protection cabinets to ensure fit and function.

31 **1.7 WARRANTY**

- 32 A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire  
33 extinguishers that fail in materials or workmanship within specified warranty period.  
34 1. Warranty Period: **Six** years from date of Substantial Completion.  
35

1 **PART 2 - PRODUCTS**

2 **2.1 PERFORMANCE REQUIREMENTS**

- 3 A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire  
4 Extinguishers."  
5 B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency  
6 acceptable to authorities having jurisdiction.

7 **2.2 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS**

- 8 A. Fire Extinguishers: Type, size, and capacity for each mounting bracket indicated.  
9 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products  
10 that may be incorporated into the Work include, but are not limited to the following:  
11 a. Amerex Corporation.  
12 b. Ansul Incorporated; Tyco International.  
13 c. JL Industries, Inc.; a division of the Activar Construction Products Group.  
14 d. Kidde Residential and Commercial Division.  
15 2. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B, and bar  
16 coding for documenting fire-extinguisher location, inspections, maintenance, and recharging.  
17 B. Multipurpose Dry-Chemical Type (FEX-1): UL-rated 2A-20B nominal capacity, with monoammonium  
18 phosphate-based dry chemical in manufacturer's standard enameled container.

19 **2.3 MOUNTING BRACKETS**

- 20 A. Mounting Brackets: Manufacturer's standard galvanized steel, designed to secure fire extinguisher to wall  
21 or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated finish.  
22 B. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and  
23 location. Locate as indicated by Architect.  
24 1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter  
25 decals applied to mounting surface.  
26 a. Orientation: Vertical

27 **PART 3 - EXECUTION**

28 **3.1 INSTALLATION**

- 29 A. Examine fire extinguishers for proper charging and tagging.  
30 1. Remove and replace damaged, defective, or undercharged fire extinguishers.  
31 B. Install fire extinguishers and mounting brackets in locations indicated and in compliance with requirements  
32 of authorities having jurisdiction.  
33 1. Mounting Brackets: 54 inches above finished floor to top of fire extinguisher.  
34 C. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

35 **END OF SECTION**

SECTION 10 51 13  
LOCKERS

1  
2  
3 PART 1 – GENERAL  
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11 2.1 [PERFORMANCE REQUIREMENTS](#)  
12 2.2 [PLASTIC LAMINATE LOCKERS \(LOCKER-2\)](#)  
13 2.3 [SOLID PHENOLIC LOCKERS \(LOCKER-1\)](#)  
14 PART 3 – EXECUTION  
15 3.1 [INSTALLATION](#)

16 **PART 1 - GENERAL**

17 **1.1 RELATED DOCUMENTS**

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

20 **1.2 SUMMARY**

- 21 A. Section Includes:  
22 1. Welded corridor lockers.  
23 2. Phenolic shower room lockers.  
24 3. Locker benches.

25 **1.3 ACTION SUBMITTALS**

- 26 A. Product data.  
27 B. Sustainable Design Submittals:  
28 1. Product Data: For composite wood products, indicating that product contains no urea formaldehyde.  
29 2. Laboratory Test Reports: For composite wood products, indicating compliance with requirements for  
30 low-emitting materials.  
31 C. Shop Drawings: Include plans, elevations, sections, details, attachments to other work, and locker  
32 identification system and numbering sequence.  
33 D. Samples: For each color specified.

34 **1.4 INFORMATIONAL SUBMITTALS**

- 35 A. Sample warranties.

36 **1.5 CLOSEOUT SUBMITTALS**

- 37 A. Maintenance data.

38 **1.6 WARRANTY**

- 39 A. Special Warranty: Manufacturer agrees to repair or replace components of metal lockers that fail in materials  
40 or workmanship, excluding finish, within specified warranty period.  
41 1. Warranty Period for Welded Metal Lockers: 10 years from date of Substantial Completion.

42 **PART 2 - PRODUCTS**

43 **2.1 PERFORMANCE REQUIREMENTS**

- 44 A. Accessibility Requirements: For lockers indicated to be accessible, comply with applicable provisions in the  
45 U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and  
46 ICC A117.1.

1 **2.2 PLASTIC LAMINATE LOCKERS (LOCKER-2)**

- 2 A. Manufacturers:
- 3 1. Plastic laminate clad lockers shall be as manufactured by Hollman Inc.
- 4 2. Other manufacturers as approved by Architect.
- 5 B. Materials:
- 6 1. Locker Frame: Tops, sides, and back shall be constructed of 5/8 inch high density thermo-fused
- 7 melamine.
- 8 a. Expansion / contraction within +/- 1/16 inch per locker.
- 9 2. Available Locker Models: Refer to Drawings.
- 10 a. Single tier, Model A: 1-Top Shelf, 1-Coat Rod, 1-Coat Hook
- 11 b. Double tier, Model B: 1-Coat Rod, 1-Coat Hook
- 12 c. Triple tier, Model C: 2- Coat Hooks
- 13 d. Four tier, Model D.
- 14 e. Five tier, Model E.
- 15 f. Six tier, Model F.
- 16 3. Visible Edges: Sealed with a 1.5 millimeter PVC edge banding to closely match locker doors
- 17 4. Locker Doors:
- 18 a. Laminate: 5/8 inch high-industrial grade particle board core with .030 inch vertical grade high
- 19 pressure Class II-B fire retardant plastic laminate.
- 20 1) Matching laminate applied to interior & exterior door face.
- 21 2) Door edges sealed with eased edge 1.5 mm PVC edge banding to closely match
- 22 laminate.
- 23 5. Standard hardware:
- 24 a. Number disk, 1-1/2 inches diameter flush mounted disc with 3/8 inch high contrast digits. US
- 25 Block 1L font.
- 26 b. Coat Rod, 1 inch diameter recessed rod.
- 27 c. Coat Hook(s), 2-prong metal hooks.
- 28 d. Hinges shall be nickel finished, concealed, heavy duty European steel allowing 110 degree
- 29 door opening with a limited lifetime warranty.
- 30 1) 4 hinges per door 60 inches high and over.
- 31 2) 3 hinges per door 36 inches to 59 inches high.
- 32 3) 2 hinges per door 35 inches high and under.
- 33 6. Locks: Centered vertically in door & spaced horizontally per lock type.
- 34 7. Venting: 12 millimeter openings between door and top and bottom of locker and dividers on multiple
- 35 opening frames provide continuous natural air flow.
- 36 C. Fabrication:
- 37 1. Locker shall be fabricated using doweled and glued & nailed assembly process.
- 38 2. Fabricate lockers square, rigid and without warp, with the finished faces flat and free of scratches and
- 39 chips.
- 40 3. Machine all parts and attachment holes accurately and without chips.

41 **2.3 SOLID PHENOLIC LOCKERS (LOCKER-1)**

- 42 A. Manufacturers:
- 43 1. Solid Phenolic Lockers, and Locker Benches shall be Hollman Series PH6000.
- 44 2. Other manufacturers as approved by Architect.
- 45 B. Materials:
- 46 1. Material shall be Solid Phenolic with a High Pressure Melamine matte finish surface made as an
- 47 integral part of the core material. Laminated surfaces are not acceptable. Surface and edges
- 48 shall be non-porous and shall not support fungus or bacteria.
- 49 a. Provide material which has been selected for uniform color, surface flatness and smoothness.
- 50 Exposed surfaces which exhibit discolorations, pitting, seam marks, roller marks, stains,
- 51 telegraphing of core material, or other imperfections on finished units are not acceptable.
- 52 Defects such as chipping along edges and corners are unacceptable.
- 53 b. Columbia Solid Phenolic shall meet or exceed all requirements for Class B Flame Spread
- 54 Rating and Smoke Developed calculated according to ASTM E84, and shall carry a Class
- 55 B Fire Rating Certification. Class B Fire Rating Certification shall be in the name of the Locker
- 56 Manufacturer and shall be less than six (6) months old. Materials shall contribute to LEED®
- 57 Certification credits. MR 4.1, 4.2, 5.1 & 5.2, and EQ 4.
- 58 2. Material Thicknesses:

- 1 a. Doors, Slope Tops, End Panels, and Toe Kick Plates – Minimum .50 inch (13 mm) Finished  
2 Thickness.
- 3 b. Locker Uni-Box®, Tops, Bottoms, and Shelves – Minimum .375" (10 mm) Finished Thick-  
4 ness. Sides and Locker Backs – Minimum .3125" (8 mm) Finished Thickness.
- 5 c. Locker Pedestal Benches – Minimum .75" (19 mm) Finished Thickness.
- 6 d. Locker Bench Tops – Minimum .75" (19 mm) Finished Thickness.
- 7 3. Colors: Solid Surface White Quartz.
- 8 4. Locker Doors: Locker Door shall be the full width of the Locker Uni-Box® and shall be frameless,  
9 allowing access to the entire width of the Locker. Framed Doors are unacceptable. Perimeter ven-  
10 tilation shall provide superior ventilation properties to traditional framed doors. Doors shall be at-  
11 tached to the Hinge with Stainless Steel Theft Proof Torx Head with Pin fasteners.
- 12 5. Locker Body: Locker Body shall incorporate the Uni-Box® Locker Construction to allow for multiple  
13 Locker configurations within the same Locker Body. The Locker Body shall be white in color. The  
14 Uni-Box® shall incorporate mortise and tenon construction and shall be mechanically fastened  
15 together with Stainless Steel fasteners. Locker Shelves shall be mortised into side walls of the  
16 Uni-Box® at location determined by Architect. Relocation of Shelves in the field shall be possible  
17 without the need for special tools or welders. The Hinge shall be attached to the Uni-Box® with  
18 Stainless Steel Theft Proof Torx Head with Pin Bolts. Lockers shall arrive at construction site fully  
19 assembled.
- 20 6. Slope Tops, End Panels, and Toe Kick Plates: Shall be manufactured of the same color, thickness  
21 and material as the Locker Doors.
  
- 22 C. Hardware
- 23 1. Locker Hinges: Hinges shall be concealed and shall be made of 14 Gauge Type 304 Stainless  
24 Steel and have a Satin finish. Hinge shall have five (5) knuckles and shall allow door to open 90°.
- 25 2. Locker Hasp Bar: Hasp shall be fabricated of 11 Gauge Type 304 Stainless Steel with a Satin Fin-  
26 ish. All edges shall be polished and smooth. Hasp shall be attached to the Locker Body with two  
27 (2) Stainless Steel Theft Proof Torx Head with Pin, Through Bolts. Hasp shall extend through a  
28 slot in the face of the Locker Door and the Locker Number Plate. Locker Hasp Bar is to be used  
29 with padlocks (padlocks are not included).
- 30 3. Coat Hooks: Coat Hooks shall be fabricated of 11 Gauge Type 304 Stainless Steel with a Satin  
31 Finish. All edges shall be polished and smooth. Coat Hooks shall be attached to the Locker Body  
32 with Stainless Steel Theft Proof Torx Head with Pin fasteners or Through Bolts. Provide three (3)  
33 Coat Hooks for Single Tier Lockers and three (3) for Double Tier and "Z" Lockers. Plastic and alu-  
34 minium Coat Hooks are unacceptable.
- 35 4. Number Plates: Provide a Number Plate for each Door or opening, in the sequence as indicated  
36 on the drawings. Number Plate shall be engraved from the back side to prevent the accumulation  
37 of dirt and grime.
- 38 5. Provide base mounted Lockers. Refer to Drawings for custom phenolic integral base and  
39 bench provided by locker manufacturer.
  
- 40 D. Fabrication
- 41 1. General: Provide factory pre-assembled Locker units. Lockers shall be complete with all hardware  
42 and accessories listed above. Knock down units are unacceptable.
- 43 2. End Panels: Provide End Panels as required to complete the installation of the Lockers.

44 **PART 3 - EXECUTION**

45 **3.1 INSTALLATION**

- 46 A. General: Install lockers level, plumb, and true; shim as required, using concealed shims.
- 47 1. Anchor locker runs at ends and at intervals recommended by manufacturer, but not more than 36  
48 inches o.c. Using concealed fasteners, install anchors through backup reinforcing plates, channels,  
49 or blocking as required to prevent metal distortion.
- 50 2. Anchor single rows of metal lockers to walls near top.
- 51 3. Anchor back-to-back metal lockers to floor.
- 52 B. Lockers: Connect groups together with standard fasteners, with no exposed fasteners on face frames.
- 53

- 1 C. Trim: Fit exposed connections of trim, fillers, and closures accurately together to form tight, hairline joints,
- 2 with concealed fasteners and splice plates.
- 3 1. Attach recess trim to recessed metal lockers with concealed clips.
- 4 2. Attach filler panels with concealed fasteners.
- 5 3. Attach sloping-top units to metal lockers, with closures at exposed ends.
- 6 D. Fixed Locker Benches: Provide benches in material and quantity as indicated on the Drawings.

7 **END OF SECTION**



SECTION 12 24 13  
ROLLER WINDOW SHADES

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3 PART 1 – GENERAL  
4 1.1 [RELATED DOCUMENTS](#)  
5 1.2 [SUMMARY](#)  
6 1.3 [ACTION SUBMITTALS](#)  
7 1.4 [INFORMATIONAL SUBMITTALS](#)  
8 1.5 [CLOSEOUT SUBMITTALS](#)  
9 1.6 [QUALITY ASSURANCE](#)  
10 PART 2 – PRODUCTS  
11 2.1 [MANUFACTURERS](#)  
12 2.2 [ROLLER SHADES](#)  
13 2.3 [ROLLER SHADES \(SHADE-1\)](#)  
14 2.4 [SHADEBAND MATERIALS](#)  
15 2.5 [ROLLER-SHADE FABRICATION](#)  
16 PART 3 – EXECUTION  
17 3.1 [ROLLER-SHADE INSTALLATION](#)

18 **PART 1 - GENERAL**

19 **1.1 RELATED DOCUMENTS**

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

22 **1.2 SUMMARY**

- 23 A. Section includes manually operated roller shades.

24 **1.3 ACTION SUBMITTALS**

- 25 A. Product Data: For each type of product.  
26 1. Include styles, material descriptions, construction details, dimensions of individual components and  
27 profiles, features, finishes, and operating instructions for roller shades.  
28 B. Shop Drawings: Show fabrication and installation details for roller shades, including shadeband materials,  
29 their orientation to rollers, and their seam and batten locations.  
30 C. Samples: For each exposed product and for each color and texture specified.  
31 D. Roller-Shade Schedule: Use same designations indicated on Drawings.

32 **1.4 INFORMATIONAL SUBMITTALS**

- 33 A. Product certificates.  
34 B. Product test reports.

35 **1.5 CLOSEOUT SUBMITTALS**

- 36 A. Maintenance data.

37 **1.6 QUALITY ASSURANCE**

- 38 A. Installer Qualifications: Fabricator of products.  
39 B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic  
40 effects, and to set quality standards for materials and execution.  
41 1. Approval of mockups does not constitute approval of deviations from the Contract Documents  
42 contained in mockups unless Architect specifically approves such deviations in writing.  
43 2. Subject to compliance with requirements, approved mockups may become part of the completed  
44 Work if undisturbed at time of Substantial Completion.  
45

1 **PART 2 - PRODUCTS**

2 **2.1 MANUFACTURERS**

- 3 A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:  
4 1. Basis of Design: Springs Window Fashions as marketed as MechoShade Systems, Inc.  
5 2. Lutron Electronics Co., Inc.  
6 3. Nysan Solar Control Inc.; a Hunter Douglas company.

7 **2.2 ROLLER SHADES**

- 8 A. Chain-and-Clutch Operating Mechanisms: With continuous-loop bead chain and clutch that stops shade  
9 movement when bead chain is released; permanently adjusted and lubricated.  
10 1. Bead Chains: Nickel-plated metal.  
11 a. Loop Length: Full length of roller shade.  
12 b. Limit Stops: Provide upper and lower ball stops.  
13 c. Chain-Retainer Type: Clip, jamb mount.  
14 2. Spring Lift-Assist Mechanisms: Manufacturer's standard for balancing roller-shade weight and lifting  
15 heavy roller shades.  
16 a. Provide for shadebands that weigh more than 10 lb or for shades as recommended by  
17 manufacturer, whichever criteria are more stringent.

18 **2.3 ROLLER SHADES [SHADE-1]**

- 19 A. Manual Operating Mechanisms: Manufacturer's complete system and accessories suitable for conditions  
20 indicated, recommended by manufacturer for use with shade indicated, and as required for reliable  
21 operation without malfunction.  
22 B. Rollers: Corrosion-resistant steel or extruded-aluminum tubes of diameters and wall thicknesses required  
23 to accommodate operating mechanisms and weights and widths of shadebands indicated without  
24 deflection. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to  
25 facilitate removal of shadebands for service.  
26 1. Roller Drive-End Location: Right side of inside face of shade.  
27 2. Direction of Shadeband Roll: Regular, from back of roller.  
28 3. Shadeband-to-Roller Attachment: Manufacturer's standard method.  
29 C. Shadeband Retention System: Manufacturer's standard system for guiding shadeband through range of  
30 travel and holding shadeband taut with edges of shadeband supported by side channels or angles.  
31 D. Mounting Hardware: Corrosion resistant and compatible with operating mechanism, installation  
32 accessories, and mounting location and conditions indicated.  
33 E. Shadebands:  
34 1. Shadeband Material: Light-filtering fabric.  
35 2. Shadeband Bottom (Hem) Bar: Manufacturer's standard for operating mechanism indicated.  
36 a. Color and Finish of Exposed Bottom Bar: As selected by Architect from manufacturer's full  
37 range.  
38 F. Installation Accessories:  
39 1. Exposed Headboxes and Bottom Boxes: Rectangular, extruded-aluminum enclosure including front  
40 fascia, top and back covers, endcaps, and removable closures.  
41 a. Height: Manufacturer's standard height required to enclose roller and shadeband when  
42 shade is fully open, but not less than height indicated on Drawings.  
43 2. Channels or Angles: Manufacturer's standard design for operating mechanism indicated and  
44 shadeband take-up and support.  
45 3. Installation Accessories Color and Finish: As selected from manufacturer's full range.  
46



SECTION 12 36 61  
SIMULATED STONE COUNTERTOPS

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2  
3 PART 1 – GENERAL  
4 1.1 [RELATED DOCUMENTS](#)  
5 1.2 [SUMMARY](#)  
6 1.3 [ACTION SUBMITTALS](#)  
7 1.4 [QUALITY ASSURANCE](#)  
8 1.5 [PROJECT CONDITIONS](#)  
9 1.6 [COORDINATION](#)  
10 PART 2 – PRODUCTS  
11 2.1 [SOLID-SURFACE-MATERIAL COUNTERTOPS \(SSF-1 & SSF-3\)](#)  
12 2.2 [QUARTZ AGGLOMERATE COUNTERTOPS \(SSF-2\)](#)  
13 2.3 [COUNTERTOP MATERIALS](#)  
14 PART 3 – EXECUTION  
15 3.1 [INSTALLATION](#)

16 **PART 1 - GENERAL**

17 **1.1 RELATED DOCUMENTS**

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

20 **1.2 SUMMARY**

- 21 A. Section Includes:  
22 1. Solid-surface-material countertops and backsplashes.  
23 2. Quartz agglomerate countertops and backsplashes.

24 **1.3 ACTION SUBMITTALS**

- 25 A. Product Data: For countertop materials.  
26 B. Sustainable Design Submittals:  
27 1. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content  
28 and cost.  
29 2. Product Data: For adhesives, indicating that product contains no urea formaldehyde.  
30 3. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting  
31 materials.  
32 4. Product Data: For composite wood products, indicating that product contains no urea  
33 formaldehyde.  
34 5. Laboratory Test Reports: For composite wood products, indicating compliance with requirements  
35 for low-emitting materials.  
36 C. Shop Drawings: For countertops. Show materials, finishes, edge and backsplash profiles, methods of  
37 joining, and cutouts for plumbing fixtures.  
38 D. Samples: For each type of material exposed to view.

39 **1.4 QUALITY ASSURANCE**

- 40 A. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-  
41 accredited certification body.  
42 B. Vendor Qualifications: A vendor that is certified for chain of custody by an FSC-accredited certification  
43 body.

44 **1.5 PROJECT CONDITIONS**

- 45 A. Field Measurements: Verify dimensions of countertops by field measurements after base cabinets are  
46 installed but before countertop fabrication is complete.

47 **1.6 COORDINATION**

- 48 A. Coordinate locations of utilities that will penetrate countertops or backsplashes.

1 **PART 2 - PRODUCTS**

2 **2.1 SOLID-SURFACE-MATERIAL COUNTERTOPS (SSF-1 & SSF-3)**

- 3 A. Configuration: Provide countertops with the following front and backsplash style:
- 4 1. Front: Straight, slightly eased at top
  - 5 2. Backsplash: Straight, slightly eased at corner.
  - 6 3. Endsplash: Matching backsplash
- 7 B. Countertops: 1/2-inch-with front edge built up with same material].
- 8 1. SSF-3: Formica Classics – Luna Sand 757
  - 9 2. SSF-1: Formica Classics – Luna Concrete 781
- 10 C. Backsplashes: 1/2-inch-thick, solid surface material.

11 **2.2 QUARTZ AGGLOMERATE COUNTERTOPS (SSF-2)**

- 12 A. Configuration: Provide countertops with the following front and backsplash style:
- 13 1. Front: Refer to Drawings.
  - 14 2. Backsplash: Refer to Drawings.
  - 15 3. Endsplash: Refer to Drawings.
- 16 B. Countertops: 3/4-inch thick, quartz agglomerate with front edge built up with same material.
- 17 C. Backsplashes: 3/4-inch-thick, quartz agglomerate.
- 18 D. Material: Silestone – Niebla.

19 **2.3 COUNTERTOP MATERIALS**

- 20 A. Adhesives: Use adhesives that meet the testing and product requirements of the California Department of  
21 Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions  
22 from Indoor Sources Using Environmental Chambers."
- 23 B. Solid Surface Material: Homogeneous solid sheets of filled plastic resin complying with ANSI SS1.
- 24 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products  
25 that may be incorporated into the Work include, but are not limited to, the following:
    - 26 a. E. I. du Pont de Nemours and Company.
    - 27 b. Formica Corporation.
    - 28 c. LG Chemical, Ltd.
    - 29 d. Silestone by Cosentino
    - 30 e. Wilsonart International.
  - 31 2. Colors and Patterns: As selected by Architect from manufacturer's full range.
- 32 C. Quartz Agglomerate: Solid sheets consisting of quartz aggregates bound together with a matrix of filled  
33 plastic resin and complying with the "Physical Characteristics of Materials" Article of ANSI SS1.
- 34 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products  
35 that may be incorporated into the Work include, but are not limited to, the following:
    - 36 a. Cosentino USA. (Silestone)
  - 37 2. Colors and Patterns: Match Architect's samples.
    - 38 a. SSF-2: Silestone Niebla

39 **PART 3 - EXECUTION**

40 **3.1 INSTALLATION**

- 41 A. Install countertops level to a tolerance of 1/8 inch in 8 feet (3 mm in 2.4 m).
- 42 B. Fasten countertops by screwing through corner blocks of base units into underside of countertop. Align  
43 adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with  
44 manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean  
45 entire surface.

46 **END OF SECTION**

SECTION 12 48 13  
ENTRANCE FLOOR MATS AND FRAMES

- 1  
2  
3 PART 1 – GENERAL  
4 1.1 [RELATED DOCUMENTS](#)  
5 1.2 [SUMMARY](#)  
6 1.3 [ACTION SUBMITTALS](#)  
7 1.4 [CLOSEOUT SUBMITTALS](#)  
8 PART 2 – PRODUCTS  
9 2.1 [ENTRANCE FLOOR MATS AND FRAMES, GENERAL](#)  
10 2.2 [ROLL-UP RAIL MATS](#)  
11 2.4 [FRAMES](#)  
12 2.5 [FABRICATION](#)  
13 PART 3 – EXECUTION  
14 3.1 [INSTALLATION](#)  
15 3.2 [PROTECTION](#)

16 **PART 1 - GENERAL**

17 **1.1 RELATED DOCUMENTS**

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

20 **1.2 SUMMARY**

- 21 A. Section Includes:  
22 1. Roll-up rail mats with recessed frames.

23 **1.3 ACTION SUBMITTALS**

- 24 A. Product Data: For each type of product.  
25 B. Shop Drawings:  
26 1. Items penetrating floor mats and frames, including door control devices.  
27 2. Divisions between mat sections.  
28 3. Perimeter floor moldings.  
29 4. Custom Graphics: Scale drawing indicating colors.  
30 C. Samples: For each floor mat, tread rail, and frame member.

31 **1.4 CLOSEOUT SUBMITTALS**

- 32 A. Maintenance data.

33 **PART 2 - PRODUCTS**

34 **2.1 ENTRANCE FLOOR MATS AND FRAMES, GENERAL**

- 35 A. Regulatory Requirements: Comply with applicable provisions in **ICC A117.1** and local requirements.

36 **2.2 ROLL-UP RAIL MATS**

- 37 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products  
38 that may be incorporated into the Work include, but are not limited to the following:  
39 a. Basis of Design: JL Industries: Activar JL-600 series roll-up grating, 3/4" deep, clear  
40 anodized aluminum frame JL-AA.  
41 b. Ronick Matting Systems: Peditred.  
42 c. Balco: FMR recessed Roll-Up. .  
43 d. Pawling: EM-70 Seies.  
44

- 1 B. Roll-up, Aluminum-Rail Hinged Mats: Extruded-aluminum tread rails 1-1/2 inches wide by 3/4 inch thick,  
2 sitting on continuous vinyl cushions.  
3 1. Tread Inserts: carpet.  
4 2. Colors, Textures, and Patterns of Inserts: Refer to Material Tag List.  
5 3. Rail Color: Clear anodized.  
6 4. Hinges: Plastic or Aluminum.  
7 5. Mat Size: As indicated.

8 **2.3 FRAMES**

- 9 A. Recessed Frames: ASTM B 221. Manufacturer's standard extrusion.  
10 1. Color: Clear anodized.

11 **2.4 FABRICATION**

- 12 A. Floor Mats: Shop fabricate units to greatest extent possible in sizes indicated. Unless otherwise indicated,  
13 provide single unit for each mat installation; do not exceed manufacturer's recommended maximum sizes  
14 for units that are removed for maintenance and cleaning. Where joints in mats are necessary, space  
15 symmetrically and away from normal traffic lanes. Miter corner joints in framing elements with hairline  
16 joints or provide prefabricated corner units without joints.  
17 B. Coat concealed surfaces of aluminum frames that contact cementitious material with manufacturer's  
18 standard protective coating.

19 **PART 3 - EXECUTION**

20 **3.1 INSTALLATION**

- 21 A. Install recessed mat frames to comply with manufacturer's written instructions. Set mat tops at height  
22 recommended by manufacturer for most effective cleaning action; coordinate tops of mat surfaces with  
23 bottoms of doors that swing across mats to provide clearance between door and mat.  
24 B. Install surface-type units to comply with manufacturer's written instructions at locations indicated;  
25 coordinate with entrance locations and traffic patterns.

26 **3.2 PROTECTION**

- 27 A. After completing frame installation and concrete work, provide temporary filler of plywood or fiberboard in  
28 recesses and cover frames with plywood protective flooring. Maintain protection until construction traffic  
29 has ended and Project is near Substantial Completion.

30 **END OF SECTION**

**SECTION 12 93 00  
SITE FURNISHINGS**

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- PART 1 – GENERAL
- 1.1 RELATED DOCUMENTS
- 1.2 SUMMARY
- 1.3 ACTION SUBMITTALS
- 1.4 INFORMATIONAL SUBMITTALS
- 1.5 CLOSEOUT SUBMITTALS
- 1.6 QUALITY ASSURANCE
- PART 2 – PRODUCTS
- 2.1 BICYCLE RACKS
- 2.2 GENERAL FINISH REQUIREMENTS
- PART 3 – EXECUTION
- 3.1 EXAMINATION
- 3.2 INSTALLATION, GENERAL

**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. Bicycle racks.
- B. Related Requirements:
  - Section 32 "Portland Cement Concrete Paving" for coordination with site concrete flatwork.

**1.3 ACTION SUBMITTALS**

- A. Product Data: For each type of product, including physical characteristics such as shape, dimension, capacity and finish for each type of site furnishings.
- B. Shop Drawings: Provide shop drawings for each type of site furnishing indicating installation details.
- C. LEED Submittals:
  - 1. Product Data for Credit MR 4.1 and Credit MR 4.2: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
- D. Samples: For each exposed product and for each color and texture specified.
- E. Samples for Verification: For each type of exposed finish, not less than 6-inch- long linear components and 4-inch-square sheet components.
- F. Product Schedule: For site furnishings. Use same designations indicated on Drawings.

**1.4 INFORMATIONAL SUBMITTALS**

- A. Material Certificates: For site furnishings.

**1.5 CLOSEOUT SUBMITTALS**

- A. Maintenance Data: For site furnishings to include in maintenance manuals. Include recommended methods for repairing damage to the finish.

**1.6 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: A firm experienced in manufacturing site furnishings similar to those required for this project and with a record of successful in-service performance.
- B. Source Limitations: Obtain each color, finish, shape and type of site furnishing from a single source with resources to provide components of consistent quality in appearance and physical properties.

**PART 2 - PRODUCTS**

**2.1 BICYCLE RACKS**

- A. Description: Steel bike rack with the following dimensional characteristics:



- 1 1. Center beam: 3" OD, 7 GA tube
- 2 2. Ears: 1.25" OD, 11 GA tube
- 3 3. Feet: 1.4" x 3/16" x 24" channels
- 4 B. Basis of Design: "Campus Rack" by Dero Bike Rack Co., 1-888-337-6729, [www.dero.com](http://www.dero.com)
- 5 C. Model(s): S6 and S4; refer to Drawings for quantities and locations.
- 6 D. Finish: Thermoplastic Coating
- 7 E. Color: Signal Black, RAL9004
- 8 F. Mounting: Surface (flange) ground mount for each rack as indicated in manufacturer's standard
- 9 specifications and detail drawings.
- 10 G. Hardware: Provide Grade 316 stainless steel, tamper-proof anchoring hardware in sizes and quantities
- 11 indicated by manufacturer's standard specifications and detail drawings.
- 12 H. Installation: Install and anchor to concrete pavements per manufacturer's standard specifications and
- 13 detail drawings.
- 14

15 **2.2 GENERAL FINISH REQUIREMENTS**

- 16 A. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in
- 17 appearance of adjoining components are acceptable if they are within the range of approved Samples and
- 18 are assembled or installed to minimize contrast.
- 19

20  
21 **PART 3 - EXECUTION**

22  
23 **3.1 EXAMINATION**

- 24 A. Examine areas and conditions, with Installer present, for compliance with requirements for correct and
- 25 level finished grade, mounting surfaces, installation tolerances, and other conditions affecting performance
- 26 of the Work.
- 27 B. Proceed with installation only after unsatisfactory conditions have been corrected.
- 28

29 **3.2 INSTALLATION, GENERAL**

- 30 A. Comply with manufacturer's written installation instructions unless more stringent requirements are
- 31 indicated. Complete field assembly of site furnishings where required.
- 32 B. Unless otherwise indicated, install site furnishings after landscaping and paving have been completed.
- 33 C. Install site furnishings level, plumb, true, and securely anchored at locations indicated on Drawings.
- 34 D. Clean all site furnishings after installation and inspect for damage. Document any damage to installed
- 35 furnishings and provide documentation to Owner; repair damage per manufacturer's recommendations OR
- 36 be responsible for a full replacement of any site furnishings with damage that exceeds small repairs or
- 37 touch-ups as determined by the Owner.
- 38

39  
40 **END OF SECTION**

SECTION 12 93 00.10  
BICYCLE RACKS

- 1  
2  
3 PART 1 – GENERAL  
4 1.1 [RELATED DOCUMENTS](#)  
5 1.2 [SUMMARY](#)  
6 1.3 [ACTION SUBMITTALS](#)  
7 1.4 [CLOSEOUT SUBMITTALS](#)  
8 PART 2 – PRODUCTS  
9 2.1 [BICYCLE RACKS \(RACK-1\)](#)  
10 2.2 [IRON FINISHES](#)  
11 PART 3 – EXECUTION  
12 3.1 [INSTALLATION](#)

13 **PART 1 - GENERAL**

14 **1.1 RELATED DOCUMENTS**

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

17 **1.2 SUMMARY**

- 18 A. Section includes bicycle racks.

19 **1.3 ACTION SUBMITTALS**

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

21 **1.4 CLOSEOUT SUBMITTALS**

- 22 A. Maintenance data.

23 **PART 2 - PRODUCTS**

24 **2.1 BICYCLE RACKS (RACK-1)**

- 25 A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may  
26 be incorporated into the Work include, but are not limited to the following:  
27 1. Ground Control Systems; Side Stage Free Standing Vertical Rack System.  
28 B. Bicycle Rack Construction:  
29 1. Frame: Galvanized steel.  
30 a. Pipe and Tubing.  
31 2. Style: Double-side hanging.  
32 a. Capacity: Designed to accommodate no fewer than 10 bicycles.  
33 3. Accessories: Polyvinyl sleeve at hanger ends  
34 4. Installation Method: Free Standing.  
35 C. Steel Finish: Galvanized Black powder coat finish

36 **2.2 IRON FINISHES**

- 37 A. Baked-Enamel, Powder-Coat Finish: Manufacturer's standard, baked, polyester, powder-coat finish  
38 complying with finish manufacturer's written instructions for surface preparation, including pretreatment,  
39 application, baking, and minimum dry film thickness.  
40

1 **PART 3 - EXECUTION**

2 **3.1 INSTALLATION**

- 3 A. Comply with manufacturer's written installation instructions unless more stringent requirements are  
4 indicated. Complete field assembly of site furnishings where required.  
5 B. Unless otherwise indicated, install site furnishings after landscaping and paving have been completed.  
6 C. Install site furnishings level, plumb, true, and securely anchored at locations indicated on Drawings.

7 **END OF SECTION**

SECTION 14 21 00  
ELECTRIC TRACTION ELEVATORS

- 1  
2  
3 PART 1 – GENERAL  
4 1.1 [SUMMARY](#)  
5 1.2 [RELATED WORK REQUIRED BY OTHER SECTIONS OF THE CONTRACT](#)  
6 1.3 [APPLICABLE CODES](#)  
7 1.4 [SUBMITTALS](#)  
8 1.5 [DELIVERY, STORAGE, AND HANDLING](#)  
9 1.6 [WARRANTY](#)  
10 PART 2 – PRODUCTS  
11 2.1 [ELEVATORS](#)  
12 2.2 [CAR ENCLOSURE](#)  
13 2.3 [HOISTWAY ENTRANCES](#)  
14 2.4 [COUNTERWEIGHT](#)  
15 PART 3 – EXECUTION  
16 3.1 [INSTALLATION](#)  
17 3.2 [CLEANING AND PROTECTION](#)

18 **PART 1 - GENERAL**

19 **1.1 SUMMARY**

- 20 A. Section includes change in power supply by others and new car enclosure finishes for one existing electric  
21 traction passenger elevator, State Registration No 15877. This section will indicate the extent of the  
22 renovations.

23 **1.2 RELATED WORK REQUIRED BY OTHER SECTIONS OF THE CONTRACT**

- 24 A. Electrical service:  
25 1. Provide a drawing showing the proposed location of a new 3 phase transformer in the existing  
26 machine room and the clearances to other equipment, for review by the Elevator Contractor.  
27 2. Furnish and install a new 3 phase transformer to supply power of the required voltage and current.  
28 3. New transformer to supply 230 VAC directly to the disconnecting means for the existing elevator  
29 controller.  
30 4. Verify existing voltage to controller which shall be identical to the new secondary voltage supplied  
31 to the disconnecting means.  
32 B. Painting:  
33 1. Refinishing and painting of the existing hoistway entrance frame and door panels at each landing.  
34 2. Refinishing and painting of the underside of the car ceiling (canopy).

35 **1.3 APPLICABLE CODES**

- 36 A. Elevator system design and installation shall comply with all applicable safety codes, including but not  
37 limited to the following, or subsequent code editions in effect as of date of contract signature.  
38 1. ASME A17.1-2013 Safety Code for Elevators and Escalators  
39 2. NFPA 70-2011 National Electric Code  
40 3. Wisconsin Administrative Code Chapter SPS 318 effective 9/1/2014  
41 4. Madison Chapter 40 Conveyance Code  
42 B. Elevator Contractor shall apply for any permits necessary for work under this Section, obtain all installer  
43 and contractor licenses, perform all required alteration acceptance tests, and pay all City, State, and Local  
44 fees.

45 **1.4 SUBMITTALS**

- 46 A. Product Data:  
47 1. Cleaning and care instructions for new stainless steel wall panel finishes  
48 2. Cleaning and care instructions for existing satin stainless steel car front finishes  
49 3. Recommended cleaning products and instructions for use  
50 4. Identify products that may damage finishes and should not be used  
51 5. Color chart for new protection pads  
52 B. Shop Drawings:  
53 1. Car enclosure renovations  
54 2. Color rendering of car enclosure with new finishes  
55 C. Samples:  
56 1. Car wall panel finishes, where requested

- 1 **1.5 DELIVERY, STORAGE, AND HANDLING**  
2 A. Deliver materials to installation site in manufacturer's original packaging. Handle products in accordance  
3 with manufacturer's instructions. Store in dry, secure location, protected against direct sunlight and  
4 excessive heat. Protect finished surfaces.
- 5 **1.6 WARRANTY**  
6 A. The equipment installed shall be warranted by Contractor against defects in materials and workmanship  
7 for a period of 12 months starting on the date of final acceptance by Owner. Warranty shall include  
8 correction of defective material or workmanship to the satisfaction of the Owner and Consultant.  
9 B. Defective is defined to include, but is not limited to: failure of new equipment or components, finishes  
10 showing unusual deterioration or aging of materials or finishes, and other unusual, unexpected, or  
11 unsatisfactory conditions.

12 **PART 2 - PRODUCTS**

13 **2.1 ELEVATORS**

- 14 A. Existing Elevator Description:  
15 1. Elevator Number(s): 1  
16 2. Type: Geared electric passenger  
17 3. Rated load: 2000 lbs  
18 4. Rated speed: 200 FPM  
19 5. Net Travel: Approx 45'0"  
20 6. Landings: 4 in line from LL-\*1-2-3  
21 7. Opening size: 4'0"w x 7'0"h  
22 8. Opening type: Two-speed side opening left hand  
23 B. Existing Equipment Manufacturer  
24 1. Traction machine: Hollister-Whitney - No 44  
25 2. Controls: Motion Control Engineering – Motion 4000  
26 3. Door operator equipment: GAL Manufacturing  
27 4. Signal fixtures: Innovation Industries  
28 5. Car enclosure finishes: SnapCab (job no 4516 11/2010)

29 **2.2 CAR ENCLOSURE**

- 30 A. General: Provide pre-engineered elevator interior finish system including the following:  
31 B. Side and rear wall panels  
32 1. Description: Interlocking panel system comprised of removable horizontal wall panels  
33 with interlocking joints, toe kicks, top caps with sight and vent guards, panel binders at  
34 exposed panel edges near doors and corner/flat reveals.  
35 2. Panel model: Industrial 1 with 4-5 rows and 5WL textured stainless steel finish.  
36 3. Rigidized textured stainless steel, 20 gauge. Assembly to be Class B or better fire rated as per  
37 ASTM E 84.  
38 C. Toe Kick and Toe Kick Binder  
39 1. Integral concealed ventilation gap for interlocking panels.  
40 2. Satin No. 4 finish 20 gauge stainless steel toe kick with anodized mill finish aluminum  
41 binder (new or existing if in mutually agreeable condition).  
42 D. Top Cap: Anodized mill finish aluminum top cap with integrated pad hook channel.  
43 E. Handrails  
44 1. Flat bar type with returned ends on side and rear walls  
45 2. 3/8" thick x 2" (polish and reuse existing handrails)  
46 F. Corner and Flat Reveals: Stainless steel, 20 gauge, No. 4 satin finish.  
47 G. Panel Binders: At exposed panel edges near door jambs with anodized mill finish aluminum.  
48 H. Protection pads.  
49 1. Vinyl protection pads for cab walls and front return.  
50 2. Integral pre-attached pad hooks that lock into integrated pad hook channel in new top  
51 cap.  
52 3. Two complete sets protection pads in standard color selected by Owner.  
53 I. Ceiling and lighting: Retain existing  
54 J. Cab ventilation: Replace. Man-D-Tec MVS-14. Two speeds (300 cfm for high, 250 cfm for low). Man-D-  
55 Tec and Quality Elevator fan manufacturers are acceptable.  
56

- 1 K. Door panels:  
2 1. Rigidized textured stainless steel, 20 gauge  
3 2. Doors shall be of hollow metal construction with vertical internal channel reinforcements, reinforced  
4 and drilled to accept the door operator equipment, and flush construction on front and rear sides.  
5 3. The car enclosure side of the panels shall be clad in textured stainless steel with 5WL, with the  
6 cladding wrapped around the leading edge of the car door panels. Exposed fasteners on the car  
7 side or edges of the panels are not acceptable.  
8 4. Panel thickness shall be designed to promote sufficient clearance between panels and returns so  
9 that the new finishes are not scratched.  
10 L. Car Floor Finish: Rubber Sheet Flooring (Grey): Noraplan Sentica, Color 6521 Sunday Paper.  
11 M. Car sill: Retain existing  
12 N. Car front equipment:  
13 1. Satin stainless steel return panel, entrance columns, and transom: Retain existing.  
14 a. SS-1: Refer to Material Tag Index.  
15 2. Car operating panel: Retain existing.

16 **2.3 HOISTWAY ENTRANCES**

- 17 A. Elevator entrance frames and door panels  
18 1. Retain existing.  
19 2. Refinishing and painting by other than the elevator contractor

20 **2.4 COUNTERWEIGHT**

- 21 A. Elevator car shall be suitably counter-balanced by adjusting the quantity of existing and/or new  
22 counterweight fillers to a 40-45% ratio per industry standards.  
23 B. A preliminary estimate by SnapCab calculates the net increase in cab panel weight as 111 lbs.

24 **PART 3 - EXECUTION**

25 **3.1 INSTALLATION**

- 26 A. Prepare surfaces using the methods recommended by the manufacturer in printed installation instructions  
27 for achieving the best result for the substrate under the project conditions.  
28 B. Shim existing sheet steel car enclosure to properly align new wall panels prior to fastening in place.  
29 C. Install flooring over secure prepared subfloor per floor manufacturer's requirements.

30 **3.2 CLEANING AND PROTECTION**

- 31 A. Clean exposed surfaces per manufacturer's instructions.  
32 B. Protect elevator finishes, fixtures and equipment from damage.

33 **END OF SECTION**