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			Cut CMU	3.3.2.1	G													
			Detail Drawings	3.4.1.1	G													
			SD-03 Product Data															
			Hot Weather Procedures	1.5.1	G													
			Cold Weather Procedures	1.5.2	G													
			Cement	2.2.2.2.1	G													
			Cementitious Materials	2.4.1.1	G													
			SD-05 Design Data															
			Masonry Compressive Strength	2.1.2	G													

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		04 20 00	Fire-Rated Concrete Masonry Units	2.2.2.3														
			SD-06 Test Reports															
			Fire-Rated Concrete Masonry Units	2.2.2.3														
			Field Testing of Mortar	3.6.1.1														
			Field Testing of Grout	3.6.1.2														
			Prism Tests	3.6.1.3														
			SD-07 Certificates															
			Concrete Masonry Units (CMU)	2.2.2.2														
			Cementitious Materials	2.4.1.1														
			Admixtures for Masonry Mortar	2.4.1.3														
			Admixtures for Grout	2.4.2.2														
			Anchors, Ties, and Bar Positioners	2.6.2														
			Joint Reinforcement	2.6.3														
			SD-08 Manufacturer's Instructions															
			Admixtures for Masonry Mortar	2.4.1.3														
			Admixtures for Grout	2.4.2.2														
			SD-10 Operation and Maintenance Data															
			Take-Back Program	3.7														
		05 12 00	SD-02 Shop Drawings															
			Structural Steel Repair Drawing	1.3.1	G													
			Structural Steel Repair Drawing	1.3.1	G													

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																		(g)
		05 12 00	Fiber Reinforced Polymer (FRP) Repair Drawings including installation procedure	1.3.1.1	G													
			SD-03 Product Data															
			Carbon Fiber fabric	2.2.4.1	G													
			Glass fiber fabric	2.2.4.2	G													
			Epoxy adhesive	2.2.4.3	G													
			Fumed silica repair mortar	2.2.4.4	G													
			Welding electrodes and rods	2.3.1														
			SD-06 Test Reports															
			Weld Inspection Reports	3.5.2.3	G													
			Existing structural steel inspection reports	3.5.2.2	G													
			SD-07 Certificates															
			Steel	2.2														
			Existing structural steel inspector certification	1.3.2.4	G													
			FRP Installer Certification	1.3.2.3	G													
			Welding inspection procedures and qualifications	1.3.2.2	G													
			Welding procedures and qualifications	1.3.2.1														
			Welding electrodes and rods	2.3.1														
		05 50 13	SD-02 Shop Drawings															
			Floor gratings	2.3	G													
			angles and plates	2.4	G													

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		05 50 13	Draft curtain angle;	2.5	G														
			Hangar door insulated translucent panel support frame;	2.6	G														
			SD-03 Product Data																
			Floor gratings	2.3	G														
			SD-06 Test Reports																
			Floor Grating Proof Test;	3.7.1	G														
		07 21 13	SD-03 Product Data																
			Manufacturer's Standard Details	1.3	G														
			Block or Board Insulation	2.2	G														
			Vapor Retarder	2.3	G														
			Pressure Sensitive Tape	2.4	G														
			Protection Board or Coatings	1.4	G														
			Accessories	2.6	G														
			SD-07 Certificates																
			Block or Board Insulation	2.2	G														
			Vapor Retarder	2.3	G														
			Protection Board or Coating	2.5	G														
			Protection Board or Coating	3.4.2	G														
			Special Warranties	1.7	G														
			Special Warranties	1.7	G														
			SD-08 Manufacturer's Instructions																
			Block or Board Insulation	2.2															
			Adhesive	2.6.1															
			SD-11 Closeout Submittals																

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		07 21 13	Volatile Organic Compound (VOC) Content	2.1.1	S														
			Recycled Content	2.1.2	S														
		07 21 16	SD-03 Product Data																
			Blanket Insulation	2.2															
			Vapor Retarder	2.4															
			Pressure Sensitive Tape	2.5															
			Accessories	2.6															
			SD-08 Manufacturer's Instructions																
			Insulation	3.3.1															
			SD-11 Closeout Submittals																
			Recycled Content for Insulation Materials	2.1.1	S														
			Reduce Volatile Organic Compounds (VOC)	2.1.2	S														
		07 22 00	SD-02 Shop Drawings																
			Insulation Board Layout	1.3	G														
			Verification of Existing Conditions	1.3	G														
			SD-03 Product Data																
			Insulation	2.1	G														
			Protection Board	1.4	G														
			Fasteners	2.4	G														
			Asphalt	2.3.3	G														
			SD-07 Certificates																
			Installer Qualifications	1.6	G														

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																		(g)
		07 22 00	Certificates Of Compliance For Felt Materials	1.6	G													
			SD-08 Manufacturer's Instructions															
			Fasteners	2.4	G													
			Insulation	2.1	G													
		07 42 13	SD-01 Preconstruction Submittals															
			Qualification of Manufacturer	1.5.3	G													
			Qualification of Installation Contractor	1.5.4	G													
			Qualification of Welders	1.5.4.1	G													
			Warranty	1.8	G													
			SD-02 Shop Drawings															
			Installation Drawings	1.5.1.1	G													
			SD-03 Product Data															
			Wall Panels	2.2.1	G													
			Factory Color Finish	2.2.2														
			Closure Materials	1.5.5														
			Pressure Sensitive Tape	2.5.4.4														
			Sealants and Caulking	2.5.4.1														
			Galvanizing Repair Paint	1.5.3.1														
			Enamel Repair Paint	1.5.3.1														
			Accessories	1.5.5														
			Accessories	2.5														
			SD-04 Samples															
			Wall Panels	2.2.1	G													
			Fasteners	1.5.3.1	G													

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		07 42 13	Metal Closure Strips	2.5.3	G														
			SD-05 Design Data																
			Wind load design analysis	1.5.1.2	G														
			SD-06 Test Reports																
			Leakage Tests	3.7.2	G														
			Wind Load Tests	1.3.2	G														
			Coating	2.2.2.6	G														
			Chalking	2.2.2.6	G														
			Seismic Tests	1.3.2	G														
			SD-07 Certificates																
			Coil Stock	1.5.3.1	G														
			Fasteners	1.5.3.1	G														
			Galvanizing Repair Paint	1.5.3.1	G														
			Enamel Repair Paint	1.5.3.1	G														
			SD-08 Manufacturer's Instructions																
			Installation	3.3	G														
			SD-09 Manufacturer's Field Reports																
			Manufacturer's Field Reports	3.8.1	G														
			SD-11 Closeout Submittals																
			Warranty	1.8	G														
			Maintenance Instructions	1.5.6	G														
			20 year 'No Dollar Limit' warranty for labor and material	1.8.1															
		07 42 63	SD-01 Preconstruction Submittals																
			Qualification of Manufacturer	1.5.3															

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		07 42 63	Qualification of Installer	1.5.4													
			Qualifications for Welding Work	1.5.4.1													
			SD-02 Shop Drawings														
			Fabrication and Installation drawings	1.5.1													
			Wall Panel Assemblies	1.5.1													
			Flashing and Accessories	1.5.1													
			Anchorage Systems	1.5.1													
			SD-03 Product Data														
			sustainable acquisition	1.5.1													
			Manufacturer's catalog data	1.5.1													
			Factory Color Finish	1.5.1													
			Sub-girts and Formed Shapes	1.5.1													
			Closure Materials	1.5.1													
			Insulation	1.5.1													
			Pressure Sensitive Tape	1.5.1													
			Sealants and Caulking	2.4.4.1													
			Accessories	1.5.1													
			SD-04 Samples														
			Wall Panel Assemblies	1.5.1													
			Fasteners	1.5.1													
			Metal Closure Strips	1.5.1													
			Insulation	1.5.1													
			manufacturer's color charts and chips	1.5.1													
			SD-05 Design Data														

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																		(g)
		07 42 63	wind design analysis	1.5.1														
			SD-06 Test Reports															
			Leakage Tests	3.7.2														
			wind load tests	1.3.2														
			seismic tests	1.3.2														
			Factory Color Finish	1.5.1														
			SD-07 Certificates															
			Fasteners	1.5.1														
			Qualification of Manufacturer	1.5.3														
			Qualification of Installer	1.5.4														
			wall system assembly wind load and fire rating classification listings	1.5.1														
			SD-08 Manufacturer's Instructions															
			Installation of Wall panels	1.5.1														
			SD-11 Closeout Submittals															
			Instructions	1.5.1														
			Material Safety Data Sheets	1.5.1														
			20 year 'No-Dollar-Limit' warranty	1.5.1														
		07 52 00	SD-02 Shop Drawings															
			Roof plan	1.4.4	G													
			SD-03 Product Data															
			Modified Bitumen Sheets	2.1	G													
			Asphalt	2.3														
			Cold-Applied Membrane	2.4	G													
			Adhesive															
			Primer	2.6	G													

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																		(g)
		07 52 00	Modified Bitumen Roof Cement	2.7	G													
			Fasteners And Plates	2.8	G													
			Warranty	1.8	G													
			SD-07 Certificates															
			Qualification of Manufacturer	1.4.1														
			Qualification of Applicator	1.4.2														
			Wind Uplift Resistance	1.4.3	G													
			SD-08 Manufacturer's Instructions															
			Modified Bitumen Membrane	3.3.4	G													
			Application															
			Flashing	3.3.5	G													
			Temperature Limitations for	3.2.2.1														
			Asphalt															
			Torches	3.2.1.3														
			Cold Adhesive Applied Modified	3.3.2.1	G													
			Bitumen Membrane															
			Primer	2.6														
			Coating Application	3.3.7.2	G													
			Cold Weather Installation	1.6	G													
			SD-11 Closeout Submittals															
			Warranty	1.8														
			Information Card	3.8														
			Instructions To Government	3.7														
			Personnel															
		07 81 00	SD-03 Product Data															
			Fireproofing Material	3.3	G													

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		07 81 00	SD-04 Samples																
			Spray-Applied Fireproofing	2.1	G														
			SD-06 Test Reports																
			Fire Resistance Rating	1.2.2	G														
			Field Tests	3.6	G														
			Evaluation Reports	1.2.3	G														
			SD-07 Certificates																
			Installer Qualifications	1.4.1	G														
			Surface Preparation Report	3.1	G														
			Manufacturer's Inspection Report	3.5.2	G														
		07 84 00	SD-02 Shop Drawings																
			Firestopping System	2.1	G														
			SD-03 Product Data																
			Firestopping Materials	2.2	G														
			SD-06 Test Reports																
			Inspection	3.3	G														
			SD-07 Certificates																
			Inspector Qualifications	1.5.2															
			Firestopping Materials	2.2															
			Installer Qualifications	1.5.1	G														
		07 92 00	SD-03 Product Data																
			Sealants	2.1															
			Primers	2.2															
			Bond breakers	2.3															
			Backstops	2.4															
			SD-07 Certificates																

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		07 92 00	Sealant	3.3.6														
		08 11 13	SD-02 Shop Drawings															
			Doors	2.1	G													
			Doors	2.1	G													
			Frames	2.4	G													
			Frames	2.4	G													
			Accessories	2.2														
			Weatherstripping	2.5														
			SD-03 Product Data															
			Doors	2.1	G													
			Frames	2.4	G													
			Accessories	2.2														
			Weatherstripping	2.5														
		08 34 16.10	SD-02 Shop Drawings															
			Hangar doors	2.1	G													
			SD-05 Design Data															
			Hangar doors	2.1	G													
			SD-10 Operation and Maintenance Data															
			Hangar doors	2.1	G													
		08 60 45	SD-02 Shop Drawings															
			Shop Drawings	3.2	G													
			SD-03 Product Data															
			Translucent Panels	2.1	G													
			Warranty	1.6														
			SD-06 Test Reports															

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		08 60 45	Test Reports	2.1														
			SD-07 Certificates															
			Systems	2.4														
			Qualifications	1.4														
		08 71 00	SD-02 Shop Drawings															
			Hardware schedule	1.3	G													
			Keying system	2.2.6														
			SD-03 Product Data															
			Hardware items	2.2	G													
			SD-08 Manufacturer's Instructions															
			Installation	3.1														
			SD-10 Operation and Maintenance															
			Data															
			Hardware Schedule	1.3	G													
			SD-11 Closeout Submittals															
			Key Bitting	1.4														
		08 81 00	SD-03 Product Data															
			Insulating Glass	1.6.1														
			Glazing Accessories	1.3														
			SD-04 Samples															
			Glazing Compound	2.3.2														
			Tape	2.3.6														
			Sealant	2.3.3.1														
			SD-08 Manufacturer's Instructions															
			Setting and Sealing Materials	2.3														
			Glass Setting	3.2														

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		09 29 00	SD-03 Product Data															
			Accessories	2.1.6														
			Gypsum Board	2.1.1														
			Adhesives	2.1.4														
			Joint Treatment Materials	2.1.2														
			Local/Regional Materials	1.5.1														
			Environmental Data	1.5.2														
			SD-07 Certificates															
			Asbestos Free Materials	2.1	G													
			SD-08 Manufacturer's Instructions															
			Material Safety Data Sheets	2.1														
			SD-10 Operation and Maintenance Data															
			Manufacturer maintenance instructions	2.1														
			Waste Management	3.7														
			SD-11 Closeout Submittals															
			Local/Regional Materials	1.5.1														
			Gypsum Board	2.1.1														
			Adhesives	2.1.4														
		09 51 00	SD-02 Shop Drawings															
			Approved Detail Drawings	1.2														
			SD-04 Samples															
			Acoustical Units	2.1														
			Acoustic Ceiling Tiles	2.1.1														
			SD-07 Certificates															

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		09 51 00	Acoustical Units	2.1															
			Acoustic Ceiling Tiles	2.1.1															
		09 67 23.16	SD-04 Samples																
			Joint Sealant	1.3.1.1	G														
			Joint Sealant	1.3.2.3	G														
			Epoxy Mortar Flooring System	1.3.1.2	G														
			Epoxy Mortar Flooring System	1.3.2.4	G														
			Epoxy Mortar Flooring System	1.3.3.2	G														
			White Aluminum Oxide Non-Skid Grit	2.3	G														
			SD-06 Test Reports																
			Joint Sealant	1.3.1.1	G														
			Joint Sealant	1.3.2.3	G														
			Epoxy Mortar Flooring System	1.3.1.2	G														
			Epoxy Mortar Flooring System	1.3.2.4	G														
			Epoxy Mortar Flooring System	1.3.3.2	G														
			Primer	1.3.1.3	G														
			Grout Coat	1.3.1.4	G														
			Urethane Topcoat	1.3.1.5	G														
			White Aluminum Oxide Non-Skid Grit	2.3	G														
			Patch Test Demonstration	1.7	G														
			Daily Inspection Report	1.3.1.6	G														
			Adhesion Testing	3.12.3	G														
			SD-07 Certificates																
			Work Plan	1.3.2.1	G														

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		09 67 23.16	Flooring System Applicator	1.3.2.2	G														
			Qualifications																
			Joint Sealant	1.3.1.1	G														
			Joint Sealant	1.3.2.3	G														
			Epoxy Mortar Flooring System	1.3.1.2	G														
			Epoxy Mortar Flooring System	1.3.2.4	G														
			Epoxy Mortar Flooring System	1.3.3.2	G														
			Warranty	1.3.2.5	G														
			SD-08 Manufacturer's Instructions																
			Joint Sealant	1.3.1.1	G														
			Joint Sealant	1.3.2.3	G														
			Epoxy Mortar Flooring System	1.3.1.2	G														
			Epoxy Mortar Flooring System	1.3.2.4	G														
			Epoxy Mortar Flooring System	1.3.3.2	G														
			Water-Based Alkaline Degreaser	1.3.3.3	G														
			SD-11 Closeout Submittals																
			Inspection Logbook	3.12.2.2	G														
		09 90 00	SD-02 Shop Drawings																
			Piping identification stencil	3.10															
			SD-03 Product Data																
			Environmental Data	1.8.2.1.1															
			Materials	2.1															
			Coating	2.1	G														
			Coating	2.1	G														

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		09 90 00	Manufacturer's Technical Data Sheets	2.1														
			Sealant	3.3.5														
			SD-04 Samples															
			Color	1.9.1	G													
			Textured Wall Coating System	1.4.2	G													
			Sample Textured Wall Coating System Mock-Up	1.4.3	G													
			SD-07 Certificates															
			Applicator's qualifications	1.3														
			Qualification Testing	1.4.1.2	G													
			SD-08 Manufacturer's Instructions															
			Application instructions	3.4.1														
			Mixing	3.7.2														
			Manufacturer's Material Safety Data Sheets	1.7.2														
		09 97 13.27	SD-05 Design Data															
			Containment System	1.4.4.1														
			SD-06 Test Reports															
			Joint Sealant Qualification Test Reports	1.4.5.1														
			Coatings Qualification Test Reports	1.4.5.2														
			Metallic Abrasive Qualification Test Reports	1.4.5.3														
			Coating Sample Test Reports	3.2.3														

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		09 97 13.27	Abrasive Sample Test Reports	3.2.4														
			Inspection Report Forms	3.9.2.2														
			Daily Inspection Reports	3.9.2.3														
			Recycled Metallic Abrasive Field Test Reports (Daily and Weekly)	1.4.5.4														
			SD-07 Certificates															
			Contract Errors, Omissions, and Other Discrepancies	1.4.1														
			Corrective Action Procedures	1.4.2.1														
			Coating Work Plan	1.4.3	G													
			Qualifications of Certified Industrial Hygienist (CIH)	1.4.6.1														
			Qualifications Of Individuals Performing Abrasive Blasting	1.4.6.5														
			Qualifications of Certified Protective Coatings Specialist (PCS)	1.4.6.2														
			Qualifications of Coating Inspection Company	1.4.6.3														
			Qualifications of QC Specialist Coating Inspector	1.4.6.4														
			Qualifications of Testing Laboratory for Coatings	1.4.6.6														
			Qualifications of Testing Laboratory for Abrasive	1.4.6.7														

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		09 97 13.27	Qualifications of Coating Contractors	1.4.6.8													
			Joint Sealant Materials	1.4.6.9													
			Coating Materials	1.4.6.10													
			Coating System Component Compatibility	1.4.6.11													
			Non-metallic Abrasive	1.4.6.12													
			Metallic Abrasive	1.4.6.13													
			SD-08 Manufacturer's Instructions														
			Joint Sealant Instructions	1.5.1													
			Coating System Instructions	1.5.2													
			SD-11 Closeout Submittals														
			Disposal of Used Abrasive	3.6.6													
			Inspection Logbook	3.9.2.4	G												
		21 13 13.00 20	SD-02 Shop Drawings														
			Shop Drawings	1.5.2	G												
			SD-03 Product Data														
			Pipe	2.2.1	G												
			Fittings	2.2.1	G												
			Riser check valves	2.2.6	G												
			Valves	2.2.4	G												
			Sprinklers	2.2.3	G												
			Pipe hangers and supports	2.2.5	G												
			Sprinkler Alarm Switches	2.3.1	G												
			Fire department connections	2.2.7	G												
			Mechanical couplings	2.2.1	G												

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		21 13 13.00 20	Expansion Tank	2.2.8	G													
			Hose Valve Manifold Test Header	2.5	G													
			SD-05 Design Data															
			Hydraulic Calculations	1.3	G													
			Expansion Tank Calculations	1.3.8	G													
			SD-06 Test Reports															
			request to schedule Preliminary Tests	3.6	G													
			Preliminary Test Report	3.6	G													
			request to schedule Final Acceptance Test	3.7	G													
			Final Acceptance Test Report	3.7	G													
			SD-07 Certificates															
			Inspection by Fire Protection Engineer	3.1	G													
			Fire Protection Engineer	1.5.1	G													
			Sprinkler System Installer	1.5.2	G													
			SD-10 Operation and Maintenance Data															
			Operating and Maintenance Instructions	3.8														
			Operating and Maintenance Instructions	3.8														
			SD-11 Closeout Submittals															
			As-built drawings	3.7														
			On-site training	3.8														

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		21 13 20.00 20	SD-02 Shop Drawings															
			Fire extinguishing system	1.3.1.1	G													
			SD-03 Product Data															
			Pipe, fittings, and mechanical couplings	2.7.1	G													
			Flow Control valves	2.1.1	G													
			Valves	2.7.6	G													
			Grate nozzles	2.5	G													
			Pipe hangers and supports	2.7.4	G													
			Pressure switch	2.9	G													
			Fire department inlet connections	2.7.11	G													
			AFFF concentrate storage tanks	2.4.2	G													
			Proportioning equipment	2.4	G													
			AFFF concentrate	2.3	G													
			Strainers	2.7.3	G													
			Seismic Bracing	2.7.5	G													
			Surge Tank	2.6	G													
			Surrogate Concentrate	2.3.2	G													
			Hose Valve Manifold Test Header	2.7.12	G													
			SD-05 Design Data															
			Hydraulic calculations	1.3.1.2	G													
			Pressure discharge graphs or tables	1.3.1.2	G													
			Seismic Bracing	2.7.5	G													
			SD-06 Test Reports															
			Request for Discharge Permit	3.5.2.2	G													

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																		(g)
		21 13 20.00 20	Preliminary tests	3.5.1	G													
			Acceptance tests	3.5.2	G													
			SD-07 Certificates															
			Qualifications of installer	1.5.1	G													
			AFFF containment and disposal plan	1.3.1.3	G													
			SD-10 Operation and Maintenance Data															
			Flow control valves	2.1.1	G													
			Proportioning equipment	2.4	G													
			AFFF concentrate storage tanks	2.4.2	G													
			Grate nozzles	2.5	G													
			fire extinguishing system	1.3.1.1	G													
			SD-11 Closeout Submittals															
			As-built drawings for the fire extinguishing system	1.3.1.4	G													
		22 00 00	SD-06 Test Reports															
			Tests, Flushing and Disinfection	3.4														
			SD-07 Certificates															
			Materials and Equipment	1.3														
		23 00 00	SD-02 Shop Drawings															
			Detail Drawings	1.4.5	G													
			SD-03 Product Data															
			Duct Connectors	2.10.1.1														
			Low Leakage Air Dampers	2.14	G													
			Air Handling Units	2.12	G													

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		23 00 00	Diagrams	1.2.1.2	G												
			SD-06 Test Reports														
			Performance Tests	3.10	G												
			SD-08 Manufacturer's Instructions														
			Manufacturer's Installation Instructions	3.3													
			Operation and Maintenance Training	3.12.2													
			SD-10 Operation and Maintenance Data														
			Operation and Maintenance Manuals	3.12.1	G												
			Air Handling Units	2.12	G												
			SD-11 Closeout Submittals														
			Energy Efficient Equipment	2.1.1	S												
			Reduce Volatile Organic Compounds (VOC)	2.1.2	S												
			Indoor Air Quality During Construction	3.1	S												
			Ozone Depleting Substances for Refrigerants	2.1.3	S												
		23 05 15	SD-01 Preconstruction Submittals														
			Material, Equipment, and Fixture Lists	1.2	G												
			SD-02 Shop Drawings														
			Record Drawings	1.2	G												

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		23 05 15	Connection Diagrams	1.2	G												
			Coordination Drawings	1.2	G												
			Fabrication Drawings	1.2	G												
			Installation Drawings	3.1	G												
			SD-03 Product Data														
			Pipe and Fittings	2.1	G												
			Piping Specialties	2.2	G												
			Valves	2.3	G												
			Miscellaneous Materials	2.4	G												
			Supporting Elements	2.5	G												
			Equipment Foundation Data	1.2	G												
			SD-04 Samples														
			Manufacturer's Standard Color Charts	1.2	G												
			SD-05 Design Data														
			Pipe and Fittings	2.1	G												
			Piping Specialties	2.2	G												
			Valves	2.3	G												
			SD-06 Test Reports														
			Hydrostatic Tests	3.1	G												
			Air Tests	3.1	G												
			Valve-Operating Tests	3.1	G												
			Non-Destructive Electric Tests	3.1	G												
			System Operation Tests	3.1	G												
			SD-07 Certificates														

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		23 05 15	Record of Satisfactory Field Operation	1.4.2	G													
			List of Qualified Permanent Service Organizations	1.4.3	G													
			Listing of Product Installations	1.2	G													
			Records of Existing Conditions	1.2	G													
			Temperature Ratings	3.1	G													
			SD-10 Operation and Maintenance Data															
			Operation and Maintenance Manuals	3.8	G													
		23 05 93	SD-01 Preconstruction Submittals															
			Records of Existing Conditions	1.3	G													
			Records of Existing Conditions	1.3.3	G													
			TAB Firm	1.5.4.1	G													
			TAB team assistants	1.2	G													
			TAB team engineer	1.2	G													
			TAB Specialist	1.5.4.2	G													
			TAB team field leader	1.2	G													
			SD-02 Shop Drawings															
			TAB Schematic Drawings and Report Forms	1.3.3	G													
			SD-03 Product Data															
			Equipment and Performance Data	1.3	G													
			TAB Related HVAC Submittals	1.5.4.4	G													

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																		(g)
		23 05 93	TAB Procedures	1.5.2	G													
			Calibration	1.5.2	G													
			Systems Readiness Check	1.3.3	G													
			TAB Execution	1.5.5	G													
			SD-06 Test Reports															
			TAB Work Execution Schedule	3.7	G													
			TAB Procedures Summary	3.7	G													
			Design review report	1.3.3	G													
			Design review report	1.7.2.1	G													
			Design review report	3.7	G													
			TAB report for Season 1	1.5.6.1	G													
			TAB report for Season 2	1.5.6.1	G													
			SD-07 Certificates															
			Independent TAB agency and personnel qualifications	1.5.1	G													
			Independent TAB agency and personnel qualifications	1.5.1	G													
			Advance Notice of TAB Field Work	3.7	G													
			Completed Pre-TAB Work Checklist	3.7														
			TAB Firm	1.5.4.1	G													
			TAB Submittal and Work Schedule	1.7.1	G													
			Design review report	1.3.3	G													
			Design review report	1.7.2.1	G													

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		23 05 93	Design review report	3.7	G														
			Pre-field TAB engineering report	1.7.2.2	G														
		23 07 00	SD-02 Shop Drawings																
			MICA Plates	3.2.2.4	G														
			Pipe Insulation Systems	2.4															
			Pipe Insulation Systems	3.2															
			Duct Insulation Systems	3.3															
			SD-03 Product Data																
			Pipe Insulation Systems	2.4	G														
			Pipe Insulation Systems	3.2	G														
			Duct Insulation Systems	3.3	G														
			SD-04 Samples																
			Display Samples	3.1.1	G														
			SD-08 Manufacturer's Instructions																
			Pipe Insulation Systems	2.4	G														
			Pipe Insulation Systems	3.2	G														
			Duct Insulation Systems	3.3	G														
			SD-11 Closeout Submittals																
			Reduce Volatile Organic Compounds (VOC)	2.1.1	S														
			Recycled Content	2.1.2	S														
		23 09 23.13 20	SD-02 Shop Drawings																
			Control System Drawings Title Sheet	1.4.1.1	G														
			List of I/O Points	1.4.1.2	G														
			Control System Components List	1.4.1.3	G														

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		23 09 23.13 20	Control System Schematics	1.4.1.4	G													
			HVAC Equipment Electrical Ladder Diagrams	1.4.1.5	G													
			Component Wiring Diagrams	1.4.1.6	G													
			Terminal Strip Diagrams	1.4.1.7	G													
			BACnet Communication Architecture Schematic	1.4.1.8	G													
			SD-03 Product Data															
			Direct Digital Controllers	2.1.2	G													
			BACnet Gateways	2.1.2.12	G													
			BACnet Discovery Tool	2.1.6	G													
			BACnet Operator Workstation Software	2.1.5	G													
			BACnet Operator Workstation	2.1.4	G													
			Sensors and Input Hardware	2.2	G													
			Output Hardware	2.3	G													
			Surge and Transient Protection	2.4.2	G													
			Indicators	2.6	G													
			SD-05 Design Data															
			Performance Verification Testing Plan	3.4.2	G													
			Pre-Performance Verification Testing Checklist	3.4.4	G													
			SD-06 Test Reports															
			Performance Verification Testing Report	3.4.11	G													

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						SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/	DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER			ACTION CODE	DATE OF ACTION
		23 09 23.13 20	SD-07 Certificates															
			Contractor's Qualifications	1.6.6	G													
			SD-09 Manufacturer's Field Reports															
			Pre-PVT Checklist	3.4.1	G													
			SD-10 Operation and Maintenance Data															
			BACnet Direct Digital Control Systems	1.4	G													
			Controls System Operators Manuals	3.3	G													
			SD-11 Closeout Submittals															
			Training Documentation	3.5.1	G													
		23 81 00.00 20	SD-02 Shop Drawings															
			Field-Assembled Refrigerant Piping	2.4.2														
			Control System Wiring Diagrams	1.3.2														
			SD-03 Product Data															
			Packaged Terminal Units	2.2														
			Refrigerant	1.4														
			Refrigerant Piping and Accessories	2.4														
			SD-06 Test Reports															
			Salt-Spray Tests	2.6.1														
			Start-Up and Initial Operational Tests	3.8.3														

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		23 81 00.00 20	SD-08 Manufacturer's Instructions														
			Packaged Terminal Units	2.2													
			Refrigerant Piping and Accessories	2.4													
			SD-10 Operation and Maintenance Data														
			Packaged Terminal Units	2.2													
			SD-11 Closeout Submittals														
			Posted Operating Instructions	1.3.4													
			Energy Efficient Equipment for Unitary Air Conditioning Equipment	2.1.1	S												
			Ozone Depleting Substances	2.1.2	S												
			Indoor Air Quality During Construction	3.1.1	S												
		23 82 00.00 20	SD-03 Product Data														
			Unit Heaters	2.2	G												
			SD-05 Design Data														
			Suspension and bracing of unit heaters	3.1.1	G												
			SD-10 Operation and Maintenance Data														
			Unit Heaters	2.2													
			SD-11 Closeout Submittals														
			Energy Efficient Equipment for Heating and Cooling Units	2.1.1	S												
		26 20 00	SD-02 Shop Drawings														

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		26 20 00	Panelboards	2.11	G												
			Transformers	2.13	G												
			Wireways	2.23	G												
			SD-03 Product Data														
			Receptacles	2.10	G												
			Circuit breakers	2.11.3	G												
			Switches	2.8	G												
			Transformers	2.13	G												
			Enclosed circuit breakers	2.12	G												
			Motor controllers	2.14	G												
			Manual motor starters	2.15	G												
			SD-06 Test Reports														
			600-volt wiring test	3.4.2	G												
			Grounding system test	3.4.5	G												
			Transformer tests	3.4.3	G												
			Ground-fault receptacle test	3.4.4	G												
			SD-07 Certificates														
			Fuses	2.9	G												
			SD-09 Manufacturer's Field Reports														
			Transformer factory tests	2.25.1													
			SD-10 Operation and Maintenance Data														
			Electrical Systems	1.5.1	G												
		26 29 23	SD-02 Shop Drawings														
			Schematic diagrams	1.5.1	G												

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		26 29 23	Interconnecting diagrams	1.5.2	G												
			Installation drawings	1.5.3	G												
			SD-03 Product Data														
			Variable frequency drives	2.1	G												
			Wires and cables	2.3													
			Equipment schedule	1.5.4													
			SD-06 Test Reports														
			VFD Test	3.2.1													
			Performance Verification Tests	3.2.2													
			Endurance Test	3.2.3													
			SD-08 Manufacturer's Instructions														
			Installation instructions	1.5.5													
			SD-09 Manufacturer's Field Reports														
			VFD Factory Test Plan	2.5.1	G												
			Factory test results	1.5.6													
			SD-10 Operation and Maintenance Data														
			Variable frequency drives	2.1													
		26 35 43	SD-03 Product Data														
			Aircraft power cable assembly	2.2	G												
			SD-06 Test Reports														
			Work Plan	1.4.1	G												
			Performance Test Plan	1.4.2	G												
			SD-09 Manufacturer's Field Reports														

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		26 35 43	Initial Inspection and Tests	3.2.3	G													
			Performance Tests	1.4.3	G													
			Performance Tests	3.2.4	G													
			Training Syllabus	3.3.1	G													
			SD-10 Operation and Maintenance Data															
			Frequency converter	2.1	G													
			Preliminary Operation and Maintenance Manuals	1.5.1.1	G													
		28 05 26.00 40	SD-03 Product Data															
			Grounding Systems	1.3	G													
			Ground Wires	2.1.1	G													
			Connectors and Fasteners	2.1.2	G													
			Bonding Materials	3.2.2	G													
			SD-06 Test Reports															
			Continuity Isolation Test	3.3.1	G													
			SD-08 Manufacturer's Instructions															
			Grounding Systems	1.3	G													
		28 31 76	SD-02 Shop Drawings															
			Nameplates	2.1.2	G													
			Instructions	2.13.10	G													
			Wiring Diagrams	3.2.1	G													
			System Layout	1.2.1	G													
			System Operation	2.3	G													
			Notification Appliances	2.17	G													
			Amplifiers	2.14	G													

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		28 31 76	SD-03 Product Data																
			Technical Data And Computer Software	1.6	G														
			Fire Alarm Control Unit and Mass Notification Control Unit (FMCP)	2.13	G														
			Terminal cabinets	3.2.2	G														
			Manual stations	2.16	G														
			Transmitters	2.20	G														
			Batteries	2.12.1	G														
			Batteries	2.24.2.1	G														
			Battery chargers	2.12.2	G														
			Battery chargers	2.24.2.2	G														
			Smoke sensors	2.10	G														
			Notification appliances	2.17	G														
			Addressable interface devices	2.7	G														
			Amplifiers	2.14	G														
			Tone generators	2.14	G														
			Digitalized voice generators	2.14	G														
			Radio transmitter and interface panels	2.20.1	G														
			Rotating Beacons	2.24.8.1	G														
			Notification appliance booster panels	2.21	G														
			Waves Panel	2.19	G														
			Abort Stations	2.24.4	G														
			Manual Release Stations	2.24.3	G														

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						SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/	DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER			ACTION CODE	DATE OF ACTION
		28 31 76	HVAC Shutdown Buttons	2.24.5	G													
			Temperature Sensor	2.23	G													
			Water Sensor	2.22	G													
			Pressure Switch	2.24.8.2	G													
			LCD, LED Display Unit (VDU)	2.15	G													
			SD-05 Design Data															
			Battery power	2.12.1.2	G													
			Battery chargers	2.12.2	G													
			Battery chargers	2.24.2.2	G													
			SD-06 Test Reports															
			Field Quality Control	3.7														
			Testing Procedures	3.7.1	G													
			Smoke sensor testing	2.10.3	G													
			IR Detectors	3.1.3	G													
			IR Detector Coverage	3.1.3	G													
			Releasing Panel Test Report	3.1.2	G													
			SD-07 Certificates															
			Installer	1.7.1.4														
			Formal Inspection and Tests	3.7.2.2														
			Final Testing	3.7.2.3														
			SD-09 Manufacturer's Field Reports															
			System Operation	2.3	G													
			Fire Alarm/Mass Notification System	1.7.2.2														

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		28 31 76	SD-10 Operation and Maintenance Data															
			Operation and Maintenance (O&M) Instructions	3.10	G													
			Instruction of Government Employees	3.8	G													
			SD-11 Closeout Submittals															
			As-Built Drawings	3.7.2.4														
		31 00 00	SD-01 Preconstruction Submittals															
			Shoring	3.5	G													
			Dewatering Work Plan	1.4.3	G													
			SD-03 Product Data															
			Utilization of Excavated Materials	3.9	G													
			Rock Excavation	1.4.1.2														
			Opening of any Excavation or Borrow Pit	3.4														
			Shoulder Construction	3.15														
			SD-06 Test Reports															
			Testing	3.18														
			Borrow Site Testing	2.1														
			SD-07 Certificates															
			Testing	3.18														
		31 05 19	SD-03 Product Data															
			Thread	2.1.2														
			Manufacturing Quality Control	2.2														
			Sampling and Testing															

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		31 05 19	SD-04 Samples																
			Quality Assurance Samples and Tests	3.1															
			SD-07 Certificates																
			Geotextile	2.1.1															
		31 23 00.00 20	SD-01 Preconstruction Submittals																
			Dewatering work plan	1.7.2															
			Shoring And Sheeting Plan	1.7.1															
			SD-06 Test Reports																
			Borrow Site Testing	1.6	G														
			Fill and backfill	3.14.2.1															
			Select material	3.14.2.2															
			Porous fill	3.14.2.3															
			Density tests	3.14.2.4															
			Moisture Content Tests	3.14.2.5															
		31 32 11	SD-02 Shop Drawings																
			Layout	3.2.2															
			Obstructions Below Ground	3.2.4															
			Seed Establishment Period	2.5.12.1															
			Maintenance Record	3.6															
			SD-03 Product Data																
			Geosynthetic Binders	2.2.2															
			Synthetic Grid Systems	2.6.1															
			Articulating Cellular Concrete	2.8															
			Block Systems																
			Equipment	1.1															

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		31 32 11	Finished Grade	3.1.1														
			Erosion Control Blankets	2.5														
			SD-04 Samples															
			Geosynthetic binders	2.2.2														
			Mulch	2.3														
			Hydraulic mulch	2.3.10														
			Geotextile fabrics	2.4														
			Erosion control blankets	2.5														
			Synthetic grid systems	2.6.1														
			Articulating Cellular Concrete	2.8														
			Block Systems															
			SD-06 Test Reports															
			Geosynthetic Binders	2.2.2														
			Hydraulic Mulch	2.3.10														
			Geotextile Fabrics	2.4														
			Erosion Control Blankets	2.5														
			Synthetic Grid Systems	2.6.1														
			Articulating Cellular Concrete	2.8														
			Block Systems															
			Compressive Strength Testing	2.8														
			Sand	2.7														
			Gravel	2.7														
			SD-07 Certificates															
			Fill Material	3.3.12.1														
			Mulch	2.3														
			Hydraulic Mulch	2.3.10														

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		31 32 11	Geotextile Fabrics	2.4													
			Geosynthetic Binders	2.2.2													
			Synthetic Soil Binders	2.2.1													
			Installer's Qualification	1.5.1													
			Recycled Plastic	2.1													
			Seed	2.5.12													
			Asphalt Adhesive	2.3.8													
			Tackifier	2.3.11													
			Wood By-Products	2.3.6													
			Wood Cellulose Fiber	2.3.3													
			SD-10 Operation and Maintenance Data														
			Maintenance Instructions	3.6.2													
		32 11 16	SD-03 Product Data														
			Equipment	1.3													
			SD-06 Test Reports														
			Sampling and Testing	1.5													
			Field Density Tests	1.5.2.4													
		32 11 24	SD-06 Test Reports														
			Gradation	3.8.2.1													
			Gradation	3.8.2.1													
			Density	3.8.2.3													
			Density	3.8.2.3													
			Smoothness	3.8.2.2													
			Thickness	3.8.2.5													
		32 12 16	SD-03 Product Data														

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		32 12 16	Mix Design	2.4	G														
			Quality Control	3.10	G														
			Material Acceptance	3.11	G														
			SD-04 Samples																
			Asphalt Cement Binder	2.3															
			Aggregates	2.2															
			SD-06 Test Reports																
			Aggregates	2.2	G														
			QC Monitoring	3.10.3.10															
			SD-07 Certificates																
			Asphalt Cement Binder	2.3	G														
			Testing Laboratory	3.6															
		32 16 13	SD-03 Product Data																
			Concrete	2.1															
			SD-06 Test Reports																
			Field Quality Control	3.8															
		32 17 23.00 20	SD-03 Product Data																
			Reflective media for roads and streets	2.1.2															
			Paints for roads and streets	2.1.1															
			High Build Acrylic Coating (HBAC)	2.1.6	G														
			Thermoplastic compound	2.1.3															
			Thermoplastic compound	3.2.2.3															
			Raised Pavement Markers	2.1.5															
			Equipment	1.5	G														

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		32 17 23.00 20	SD-06 Test Reports														
			Reflective media for roads and streets	2.1.2													
			Paints for roads and streets	2.1.1													
			High Build Acrylic Coating (HBAC)	2.1.6	G												
			Thermoplastic compound	2.1.3													
			Thermoplastic compound	3.2.2.3													
			Raised Pavement Markers	2.1.5													
			SD-07 Certificates														
			Reflective media for roads and streets	2.1.2													
			Paints for roads and streets	2.1.1													
			Volatile Organic Compound	3.5.2													
			Thermoplastic compound	2.1.3													
			Thermoplastic compound	3.2.2.3													
			Construction equipment list	1.5													
			SD-08 Manufacturer's Instructions														
			Paints for roads and streets	2.1.1													
			Thermoplastic compound	2.1.3													
			Thermoplastic compound	3.2.2.3													
		32 31 13	SD-02 Shop Drawings														
			Fence Assembly	1.3													
			Location of Gate, Corner, End, and Pull Posts	3.15.1													
			Gate Assembly	1.3													

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ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH	GOVT CLASSIFICATION	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION		APPROVING AUTHORITY				MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS		
						SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/	DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER			ACTION CODE	DATE OF ACTION
		32 31 13	Erection/Installation Drawings	1.3														
			SD-03 Product Data															
			Fence Assembly	1.3														
			Gate Assembly	1.3														
			Recycled Material Content	2.1														
			Zinc Coating	2.2														
			PVC Coating	1.5.1														
			Fabric	2.3														
			Stretcher Bars	2.11														
			Concrete	2.16														
			SD-04 Samples															
			Fabric	2.3														
			Line Posts	2.5														
			Sleeves	2.7														
			Top Rail	2.8														
			Tension Wire	2.10														
			Stretcher Bars	2.11														
			Wire Ties	2.15														
			SD-07 Certificates															
			Certificates of Compliance	1.5.2														
			SD-08 Manufacturer's Instructions															
			Fence Assembly	1.3														
			Gate Assembly	1.3														
			Hardware Assembly	1.3														
			Accessories	1.3														
		32 92 19	SD-03 Product Data															

SUBMITTAL REGISTER

CONTRACT NO.
N40085-15-D-003

TITLE AND LOCATION
Hangar 111 Fire Protection & Structural Repairs

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH	GOVT CLASSIFICATION	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION		APPROVING AUTHORITY				MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS		
						SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/	DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER			ACTION CODE	DATE OF ACTION
		32 92 19	Wood cellulose fiber mulch	2.5.3														
			Fertilizer	2.4														
			SD-06 Test Reports															
			Topsoil composition tests	2.2.3														
			SD-07 Certificates															
			seed	2.1														
			SD-08 Manufacturer's Instructions															
			Erosion Control Materials	2.7														
		32 92 23	SD-03 Product Data															
			Fertilizer	2.4														
			SD-06 Test Reports															
			Topsoil composition tests	2.2.3														
			SD-07 Certificates															
			sods	2.1														
		33 11 00	SD-02 Shop Drawings															
			Fire Department Control Pit	2.3														
			SD-03 Product Data															
			Piping Materials	2.1.1														
			Water distribution main	2.1														
			Water service line	2.2														
			Indicator posts	2.1.2.6														
			Corporation stops	2.2.2.1														
			Valve boxes	2.1.2.7														
			Valve boxes	2.2.2.12														
			SD-06 Test Reports															
			Disinfection	2.2.2.17	G													

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						SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/	DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE		DATE OF ACTION	MAILED TO CONTR/	DATE RCD FRM APPR AUTH
		33 11 00	SD-07 Certificates																
			Water distribution main	2.1															
			Water service line	2.2															
			lining	2.1.1.1															
			lining	2.1.1.1															
			lining	2.1.1.2															
			lining	2.1.1.2															
			Displacement Type Meters	2.2.2.14															
			Compound Type Meters	2.2.2.15															
			SD-08 Manufacturer's Instructions																
			Delivery, storage, and handling	1.4															
			Installation	3.1.1															
		33 30 00	SD-01 Preconstruction Submittals																
			Existing Conditions	1.6															
			SD-02 Shop Drawings																
			Drawings	1.4.2															
			Precast concrete manhole	2.3.1															
			Metal items	2.3.4															
			Frames, covers, and gratings	2.3.4.1															
			Aff Tank	2.5															
			Environmental Panel	2.7															
			Manual Oil Interceptor	2.8															
			Sump Pump	2.9															
			SD-03 Product Data																
			Pipeline materials	2.1															
			SD-06 Test Reports																

SUBMITTAL REGISTER

CONTRACT NO.
N40085-15-D-003

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Hangar 111 Fire Protection & Structural Repairs

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						SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/	DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER			ACTION CODE	DATE OF ACTION
		33 30 00	Reports	2.4														
			SD-07 Certificates															
			Portland Cement	2.2.2														
		33 40 00	SD-03 Product Data															
			Placing Pipe	3.3														
			SD-04 Samples															
			Pipe for Culverts and Storm Drains	2.1														
			SD-07 Certificates															
			Resin Certification	2.1.1														
			Pipeline Testing	3.7														
			Hydrostatic Test on Watertight Joints	2.6														
			Determination of Density	3.6.5														
			Frame and Cover for Gratings	2.3.7														
		33 60 01	SD-02 Shop Drawings															
			Detail Drawings	1.3.1	G													
			SD-03 Product Data															
			Piping and Fittings	2.4														
			Valves	2.5														
			Insulation	2.8.2														
			Expansion Joints	2.10														
			SD-04 Samples															
			Insulated Sections	1.3.2	G													
			SD-10 Operation and Maintenance Data															

SECTION 07 42 63

FABRICATED WALL PANEL ASSEMBLIES

05/11

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN ARCHITECTURAL MANUFACTURERS ASSOCIATION (AAMA)

AAMA 501.1 (2005) Standard Test Method for Water Penetration of Windows, Curtain Walls and Doors Using Dynamic Pressure

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC 341 (2010) Seismic Provisions for Structural Steel Buildings

AMERICAN IRON AND STEEL INSTITUTE (AISI)

AISI S100 (2012) North American Specification for the Design of Cold-Formed Steel Structural Members

AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)

ASCE 7 (2010; Errata 2011; Supp 1 2013) Minimum Design Loads for Buildings and Other Structures

AMERICAN WELDING SOCIETY (AWS)

AWS A5.1/A5.1M (2012) Specification for Carbon Steel Electrodes for Shielded Metal Arc Welding

AWS D1.1/D1.1M (2015) Structural Welding Code - Steel

AWS D1.2/D1.2M (2014) Structural Welding Code - Aluminum

ASTM INTERNATIONAL (ASTM)

ASTM A1008/A1008M (2015) Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardened

ASTM A123/A123M (2013) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

ASTM A36/A36M (2014) Standard Specification for Carbon

Structural Steel

ASTM A463/A463M	(2010; R 2015) Standard Specification for Steel Sheet, Aluminum-Coated, by the Hot-Dip Process
ASTM A606/A606M	(2009a) Standard Specification for Steel Sheet and Strip, High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, with Improved Atmospheric Corrosion Resistance
ASTM A653/A653M	(2015) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A755/A755M	(2015) Standard Specification for Steel Sheet, Metallic Coated by the Hot-Dip Process and Prepainted by the Coil-Coating Process for Exterior Exposed Building Products
ASTM A780/A780M	(2009; R 2015) Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
ASTM A924/A924M	(2014) Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
ASTM B117	(2011) Standard Practice for Operating Salt Spray (Fog) Apparatus
ASTM C273/C273M	(2011) Shear Properties of Sandwich Core Materials
ASTM C553	(2013) Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications
ASTM C612	(2014) Mineral Fiber Block and Board Thermal Insulation
ASTM C920	(2014a) Standard Specification for Elastomeric Joint Sealants
ASTM D1056	(2014) Standard Specification for Flexible Cellular Materials - Sponge or Expanded Rubber
ASTM D1308	(2013) Effect of Household Chemicals on Clear and Pigmented Organic Finishes
ASTM D1621	(2010) Compressive Properties of Rigid Cellular Plastics
ASTM D1622/D1622M	(2014) Apparent Density of Rigid Cellular Plastics

ASTM D1667	(2005; R 2011) Flexible Cellular Materials - Poly (Vinyl Chloride) Foam (Closed-Cell)
ASTM D2244	(2015a) Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates
ASTM D2247	(2011) Testing Water Resistance of Coatings in 100% Relative Humidity
ASTM D2794	(1993; R 2010) Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)
ASTM D3363	(2005; E 2011; R 2011; E 2012) Film Hardness by Pencil Test
ASTM D4214	(2007; R 2015) Standard Test Method for Evaluating the Degree of Chalking of Exterior Paint Films
ASTM D522/D522M	(2014) Mandrel Bend Test of Attached Organic Coatings
ASTM D523	(2014) Standard Test Method for Specular Gloss
ASTM D6226	(2010) Standard Test Method for Open Cell Content of Rigid Cellular Plastics
ASTM D714	(2002; R 2009) Evaluating Degree of Blistering of Paints
ASTM D822	(2001; R 2006) Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings
ASTM D968	(2015) Abrasion Resistance of Organic Coatings by Falling Abrasive
ASTM E1592	(2005; R 2012) Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference
ASTM E283	(2004; R 2012) Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
ASTM E331	(2000; R 2009) Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference
ASTM E84	(2015b) Standard Test Method for Surface Burning Characteristics of Building Materials
ASTM G152	(2013) Operating Open Flame Carbon Arc

Light Apparatus for Exposure of
Nonmetallic Materials

ASTM G153 (2013) Operating Enclosed Carbon Arc Light
Apparatus for Exposure of Nonmetallic
Materials

METAL BUILDING MANUFACTURERS ASSOCIATION (MBMA)

MBMA MBSM (2002) Metal Building Systems Manual

NATIONAL ASSOCIATION OF ARCHITECTURAL METAL MANUFACTURERS (NAAMM)

NAAMM AMP 500 (2006) Metal Finishes Manual

SHEET METAL AND AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION
(SMACNA)

SMACNA 1793 (2012) Architectural Sheet Metal Manual,
7th Edition

UNDERWRITERS LABORATORIES (UL)

UL 580 (2006; Reprint Oct 2013) Tests for Uplift
Resistance of Roof Assemblies

UL Bld Mat Dir (2012) Building Materials Directory

1.2 DEFINITIONS

Fabricated Wall Panel Assembly: Metal wall and liner panels, attachment system components, miscellaneous metal framing, thermal insulation, and accessories shop fabricated or field assembled for a complete weather-tight wall system.

1.3 DESCRIPTION OF FABRICATED WALL PANEL ASSEMBLY SYSTEM

Factory color finished, metal wall panel system with fastener attachment to match existing. Panel profile must match existing. Interior finish of panel assembly to match existing.

1.3.1 Metal Wall Panel General Performance

Comply with performance requirements, conforming to AISI S100, without failure due to defective manufacture, fabrication, installation, or other defects in construction. Wall panels and accessory components must conform to the following standards:

ASTM A1008/A1008M
ASTM A123/A123M
ASTM A36/A36M
ASTM A653/A653M
ASTM A463/A463M for aluminum coated steel sheet
ASTM A606/A606M
ASTM A755/A755M for metallic coated steel sheet for exterior coil pre-painted applications.
ASTM A780/A780M for repair of damage or uncoated areas of hot-dipped galvanized coating.
ASTM A924/A924M for metallic coated steel sheet

ASTM C273/C273M
ASTM D522/D522M for applied coatings
UL Bld Mat Dir

1.3.2 Structural Performance

Maximum calculated fiber stress must not exceed the allowable value in the AISI or AA manuals; a one third overstress for wind is allowed. Midspan deflection under maximum design loads is limited to L/180. Contract drawings show the design wind loads and the extent and general assembly details of the metal siding. Contractor must provide design for members and connections not shown on the drawings. Siding panels and accessories must be the products of the same manufacturer.

Provide metal wall panel assemblies complying with the load and stress requirements in accordance with ASTM E1592. Wind Load force due to wind action governs the design for panels.

Wall systems and attachments are to resist the wind loads as determined by UL 580 and ASCE 7 in the geographic area where the construction will take place, in pounds per square foot. Submit five copies of wind load tests and seismic tests to the Contracting Officer.

Provide metal wall panel assembly for seismic conditions complying with the applicable requirements of AISC 341.

1.3.3 Air Infiltration

Air leakage must conform to the limits through the wall assembly area when tested according to ASTM E283.

1.3.4 Water Penetration Under Static Pressure

No water penetration when tested according to ASTM E331.

1.3.5 Water Penetration Under Dynamic Pressure

No evidence of water leakage when tested according to AAMA 501.1.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submittals with an "S" are for inclusion in the Sustainability Notebook, in conformance to Section 01 33 29 SUSTAINABILITY REPORTING. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Qualification of Manufacturer
Qualification of Installer
Qualifications for Welding Work

SD-02 Shop Drawings

Fabrication and Installation drawings for the following items are to indicate completely dimensioned structural frame and erection

layouts, openings in the wall, special framing details, and construction details at corners, building intersections and flashing, location and type of mastic and metal filler strips.

Wall Panel Assemblies
Flashing and Accessories
Anchorage Systems

SD-03 Product Data

Submit Manufacturer's data indicating percentage of recycle material in wall panels to verify sustainable acquisition compliance.

Submit Manufacturer's catalog data for the following items:

Factory Color Finish
Sub-girts and Formed Shapes
Closure Materials
Insulation
Pressure Sensitive Tape
Sealants and Caulking
Accessories

SD-04 Samples

Submit as required each of the following samples:

Wall Panel Assemblies, 12 inches long by actual panel width
Fasteners
Metal Closure Strips, 10 inches long of each type
Insulation, approximately 8 by 11 inches

Submit manufacturer's color charts and chips, approximately 4 by 4 inches, showing full range of colors, textures and patterns available for wall panels with factory applied finishes.

SD-05 Design Data

wind design analysis

SD-06 Test Reports

Submit test reports for the following in accordance with the referenced articles in this section.

Leakage Tests
wind load tests
seismic tests

Coatings and base metals of metal wall type of test as specified in paragraphs entitled, "Steel Sheet Materials," and in various referenced standards in this section.

Factory Color Finish Performance Requirements

SD-07 Certificates

Submit certificates for the following items showing conformance

with referenced standards contained in this section:

Fasteners

Provide evidence that products used within this specification are manufactured in the United States.

Qualification of Manufacturer

Certify that the manufacturer of the metal wall panel system meets requirements specified under paragraph entitled "Qualification of Manufacturer."

Qualification of Installer

Certify that the applicator meets requirements specified under paragraph entitled "Qualification of Installation Contractor."

Submit the wall system assembly wind load and fire rating classification listings.

SD-08 Manufacturer's Instructions

Installation of Wall panels

Include detailed application instructions and standard manufacturer drawings altered as required by these specifications. Explicitly identify in writing, differences between manufacturer's instructions and the specified requirements.

SD-11 Closeout Submittals

Instructions To:

Government and/or Contractor Personnel

Include copies of Material Safety Data Sheets for maintenance/repair materials.

Submit 20 year "No-Dollar-Limit" warranty for labor and materials.

1.5 QUALITY ASSURANCE

1.5.1 Pre-Installation Conference

After submittals are received and approved but before wall panel and insulation work, including associated work, is performed, the Contracting Officer will hold a pre-siding conference to review the following:

- a. The drawings, including Fabrication and Installation drawings, showing complete Wall Panel Assemblies, and specifications.
Include details for the following for review:

flashing and accessories
anchorage systems
manufacturer's catalog data
Factory Color Finish

Submit manufacturer's color charts and chips, approximately 4 by 4 inches, showing full range of colors, textures and patterns available for wall panels with factory applied finishes.

Sub-girts and Formed Shapes
Closure Materials, including metal closure strips.
Insulation
Pressure Sensitive Tape
Accessories
Fasteners

- b. Finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
- c. Methods and procedures related to metal wall panel installation, including manufacturer's written instructions for Installation of Wall panels, and verification of wall system assembly wind load and fire rating classification listings.
- d. Support conditions for compliance with requirements, including alignment between and attachment to structural members. Provide details of wind design analysis including wind speed, exposure category, co-efficient, importance factor, designates type of facility, negative pressures for each zone, methods and requirements of attachment. Wind design analysis to include wall plan delineating dimensions and attachment patterns for each zone. Wind design analysis to be prepared and sealed by Licensed Project Engineer in the geographic area where the construction will take place.
- e. Flashing, special siding details, wall penetrations, openings, and condition of other construction that will affect metal wall panels.
- f. Governing regulations and requirements for insurance, certificates, tests and inspections if applicable. Include certification for sustainable acquisition and wall system assembly wind load and fire rating classification. Safety plan review must include applicable Material Safety Data Sheets.
- g. Temporary protection requirements for metal wall panel assembly during and after installation.
- h. Wall panel observation and repair procedures after metal wall panel installation.
- i. Sample 20 year "No-Dollar-Limit" warranty.

1.5.2 Manufacturer's Technical Representative

The representative must have authorization from manufacturer to approve field changes and be thoroughly familiar with the products and installations in the geographical area where construction will take place.

1.5.3 Qualification of Manufacturer

Metal wall panel system manufacturer must have:

- a. A minimum of five (5) years experience in manufacturing metal wall system and accessory products.
- b. Provide engineering services by an authorized engineer; currently licensed in the geographical area where construction will take place,

having a minimum of four (4) years experience as an engineer knowledgeable in wind load design analysis, protocols and procedures for the MBMA MBSM; ASCE 7, and ASTM E1592.

- c. Provide certified engineering calculations using the products submitted for:

Wind load requirements in accordance with FM Wind Design Guide and ASCE 7.

1.5.4 Qualification of Installer

The installation contractor must be approved and certified by the wall panel manufacturer prior to beginning the installation of the metal wall system.

1.5.4.1 Qualifications for Welding Work

Welding procedures must conform to AWS A5.1/A5.1M, AWS D1.1/D1.1M for steel or AWS D1.2/D1.2M for aluminum.

1.5.5 Single Source

Obtain each type of metal wall and liner panels, clips, closures and other accessories from the standard products of the single source from a single manufacturer to operate as a complete system for the intended use.

1.5.6 Surface-Burning Characteristics

Provide metal wall panels having insulation core material with the following surface-burning characteristics as determined by testing identical products according to ASTM E84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

- a. Flame-Spread Index: 25 or less.
- b. Smoke-Developed Index: 450 or less.

1.5.7 Fabrication

Fabricate and finish metal wall panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes and as necessary to fulfill indicated performance requirements. Comply with indicated profiles and with dimensional and structural requirements.

Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

Fabricate metal wall panel side laps with factory-installed captive gaskets or separator strips that provide a tight seal and prevent metal-to-metal contact, in a manner that will seal weather-tight and minimize noise from movements within panel assembly.

1.5.7.1 Sheet Metal Accessories

Fabricate flashing and trim to comply with recommendations in SMACNA 1793 that apply to the design, dimensions, metal, and other characteristics of item indicated:

- a. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
- b. End Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
- c. Sealed Joints: Form non-expansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.
- d. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
- e. Fabricate cleats and attachment devices of size and metal thickness recommended by SMACNA or by metal wall panel manufacturer for application, but not less than thickness of metal being secured.

1.5.8 Finishes

Comply with NAAMM AMP 500 for recommendations for applying and designating finishes.

Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

1.6 DELIVERY, HANDLING, AND STORAGE

Deliver and package components, sheets, metal wall panels, and other manufactured items so as not to be damaged or deformed and protected during transportation and handling.

Unload, store, and erect metal wall panels in a manner to prevent bending, warping, twisting, and surface damage.

Stack and store metal wall panels horizontally on platforms or pallets, covered with suitable weather-tight and ventilated covering to ensure dryness, with positive slope for drainage of water. Do not store metal wall panels in contact with other materials that might cause staining, denting, or other surface damage.

Retain strippable protective covering on metal wall panel for period of metal wall panel installation.

Protect foam-plastic insulation as follows:

- a. Do not expose to sunlight, except to extent necessary for period of installation and concealment.
- b. Protect against ignition at all times. Do not deliver foam-plastic insulation materials to Project site before installation time.

Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

1.7 PROJECT CONDITIONS

Weather Limitations: Proceed with installation preparation only when existing and forecasted weather conditions permit Work to proceed without water entering into existing walling system or building.

Field Measurements: Verify locations of wall framing and opening dimensions by field measurements before metal wall panel fabrication and indicate measurements on Shop Drawings.

1.8 WARRANTY

Furnish manufacturer's no-dollar-limit warranty for the metal wall panel system. The warranty period is to be no less than twenty (20) years from the date of Government acceptance of the work. The warranty is to be issued directly to the Government. The warranty is to provide that if within the warranty period the metal wall panel system shows evidence of corrosion, perforation, rupture or excess weathering due to deterioration of the wall panel system resulting from defective materials and correction of the defective workmanship is to be the responsibility of the metal wall panel system manufacturer. Repairs that become necessary because of defective materials and workmanship while metal wall panel system is under warranty are to be performed within 24 hours after notification, unless additional time is approved by the Contracting Officer. Failure to perform repairs within 24 hours of notification will constitute grounds for having emergency repairs performed by others and not void the warranty.

PART 2 PRODUCTS

2.1 PANEL MATERIALS

2.1.1 Foam-Insulation Core Wall Panel

Provide factory-formed aluminum wall panel assembly fabricated from two sheets of metal with modified polyisocyanurate or polyurethane foam insulation core board during fabrication with joints between panels designed to form weather-tight seals. Include accessories required for weather-tight installation.

- a. Closed-Cell Content: 90 percent when tested according to ASTM D6226.
- b. Density: 2.0 to 2.6 lb/cu. ft. when tested according to ASTM D1622/D1622M.
- c. Compressive Strength: Minimum 20 psi when tested according to ASTM D1621.
- d. Shear Strength: 26 psi when tested according to ASTM C273/C273M.

2.1.2 Insulated Panel Construction

Shop fabricate or field assemble insulated panel construction with specified exterior and interior aluminum sheet in accordance with manufacturer's printed instructions.

Insulation to be glass-fiber conforming to ASTM C553 and ASTM C612 of thickness and density as required for the geographical area where construction will take place. Glass-Fiber and Mineral-Wool-Fiber are materials listed in the EPA's Comprehensive Procurement Guidelines (CPG) (

<http://www.epa.gov/cpg/>).

Insulation fasteners to be adhesively attached, plate welded to projecting spindle anchors; capable of holding insulation of thickness indicated, secured in position with self-locking washer and complying with the following requirements:

- a. Plate: Perforated galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
- b. Spindle: Copper-coated, low carbon steel; fully annealed; 0.105 inch in diameter; length to suit depth of insulation indicated.
- c. Insulation-Retaining Washers: Self-locking washers formed from 0.016 inch thick galvanized steel sheet, with beveled edge for increased stiffness, sized as required to hold insulation securely in place, but not less than 1-1/2 inches square or in diameter.
- d. Anchor adhesive to be a product with demonstrated capability to bond insulation anchors securely to substrates indicated without damaging insulation, fasteners, and substrates.

2.1.3 Finish

All panels are to receive a factory-applied Kynar 500/Hylar 5000 finish consisting of a baked-on top-coat with a manufacturer's recommended prime coat conforming to the following:

- a. Metal Preparation: All metal is to have the surfaces carefully prepared for painting on a continuous process coil coating line by alkali cleaning, hot water rinsing, application of chemical conversion coating, cold water rinsing, sealing with acid rinse, and thorough drying.
- b. Prime Coating: A base coat of epoxy paint, specifically formulated to interact with the top-coat, is to be applied to the prepared surfaces by roll coating to a dry film thickness of 0.20 plus 0.05 mils. This prime coat must be oven cured prior to application of finish coat.
- c. Exterior Finish Coating: Apply the finish coating over the primer by roll coating to dry film thickness of 0.80 plus 5 mils (3.80 plus 0.50 mils for Vinyl Plastisol) for a total dry film thickness of 1.00 plus 0.10 mils (4.00 plus 0.10 mils for Vinyl Plastisol). This finish coat must be oven-cured.
- d. Interior Finish Coating: Apply a wash-coat on the reverse side over the primer by roll coating to a dry film thickness of 0.30 plus 0.05 mils for a total dry film thickness of 0.50 plus 0.10 mils. The wash-coat must be oven-cured.
- e. Color: The exterior finish chosen from the manufacturer's standard color chart.
- f. Physical Properties: Coating must conform to the industry and manufacturer's standard performance criteria as listed by the following certified test reports:

Chalking:	ASTM D4214
Color Change and Conformity:	ASTM D2244
Weatherometer:	ASTM G152, ASTM G153 and ASTM D822
Humidity:	ASTM D2247 and ASTM D714
Salt Spray:	ASTM B117
Chemical Pollution:	ASTM D1308
Gloss at 60:	ASTM D523
Pencil Hardness:	ASTM D3363
Reverse Impact:	ASTM D2794
Flexibility:	ASTM D522/D522M
Abrasion:	ASTM D968
Flame Spread:	ASTM E84

2.2 MISCELLANEOUS METAL FRAMING

2.2.1 General

Cold-formed metallic-coated steel sheet conforming to ASTM A653/A653M and unless otherwise indicated.

2.2.2 Fasteners for Miscellaneous Metal Framing

Type, material, corrosion resistance, size and sufficient length to penetrate the supporting member a minimum of 1 inch with other properties required to fasten miscellaneous metal framing members to substrates in accordance with the wall panel manufacturer's and ASCE 7 requirements.

2.3 FASTENERS

2.3.1 General

Type, material, corrosion resistance, size and sufficient length to penetrate the supporting member a minimum of 1 inch with other properties required to fasten miscellaneous metal framing members to substrates in accordance with the wall panel manufacturer's and ASCE 7 requirements.

2.3.2 Exposed Fasteners

Fasteners for wall panels to be corrosion resistant coated steel, aluminum, stainless steel, or nylon capped steel compatible with the sheet panel or flashing and of a type and size recommended by the manufacturer to meet the performance requirements and design loads. Fasteners for

accessories to be the manufacturer's standard. Provide an integral metal washer matching the color of attached material with compressible sealing EPDM gasket approximately 3/32 inches thick.

2.3.3 Screws

Screws to be corrosion resistant coated steel, aluminum and/or stainless steel being the type and size recommended by the manufacturer to meet the performance requirements.

2.3.4 Rivets

Rivets to be closed-end type, corrosion resistant coated steel, aluminum or stainless steel where watertight connections are required.

2.3.5 Attachment Clips

Fabricate clips from steel hot-dipped galvanized in accordance with ASTM A653/A653M, or Series 300 stainless steel. Size, shape, thickness and capacity as required meeting the insulation thickness and design load criteria specified.

2.4 ACCESSORIES

2.4.1 General

All accessories to be compatible with the metal wall panels. Sheet metal flashing, trim, metal closure strips, caps and similar metal accessories must not be less than the minimum thickness specified for the wall panels. Exposed metal accessories/finishes to match the panels furnished, except as otherwise indicated. Molded foam rib, ridge and other closure strips to be non-absorbent closed-cell or solid-cell synthetic rubber or pre-molded neoprene to match configuration of the panels.

2.4.2 Rubber Closure Strips

Closed-cell, expanded cellular rubber conforming to ASTM D1056 and ASTM D1667; extruded or molded to the configuration of the specified wall panel and in lengths supplied by the wall panel manufacturer.

2.4.3 Metal Closure Strips

Factory fabricated aluminum closure strips to be the same gauge, color, finish and profile of the specified wall panel.

2.4.4 Joint Sealants

2.4.4.1 Sealants and Caulking

Sealants are to be an approved gun type for use in hand- or air-pressure caulking guns at temperatures above 40 degrees F (or frost-free application at temperatures above 10 degrees F) with minimum solid content of 85 percent of the total volume. Sealant is to dry with a tough, durable surface skin which permits it to remain soft and pliable underneath, providing a weather-tight joint. No migratory staining is permitted on painted or unpainted metal, stone, glass, vinyl, or wood.

Prime all joints to receive sealants with a compatible one-component or two-component primer as recommended by the wall panel manufacturer.

2.4.4.2 Shop-Applied

Sealant for shop-applied caulking must be an approved gun grade, non-sag one component polysulfide or silicone conforming to ASTM C920, Type II, and with a curing time to ensure the sealant's plasticity at the time of field erection.

2.4.4.3 Field-Applied

Sealant for field-applied caulking must be an approved gun grade, non-sag one component polysulfide or two-component polyurethane with an initial maximum Shore A durometer hardness of 25, and conforming to ASTM C920, Type II. Color to match panel colors.

2.4.4.4 Tape Sealant

Pressure sensitive, 100 percent solid with a release paper backing; permanently elastic, non-sagging, non-toxic and non-staining as approved by the wall panel manufacturer.

2.5 SHEET METAL FLASHING AND TRIM

2.5.1 Fabrication

Shop fabricate sheet metal flashing and trim where practicable to comply with recommendations in SMACNA 1793 that apply to design, dimensions, metal, and other characteristics of item indicated. Obtain field measurements for accurate fit before shop fabrication.

Fabricate sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.

2.6 REPAIR OF FINISH PROTECTION

Repair paint for color finish enameled wall panel must be compatible paint of the same formula and color as the specified finish furnished by the wall panel manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal wall panel supports, and other conditions affecting performance of the Work.

B. Examine primary and secondary wall framing to verify that rafters, purlins, angles, channels, and other structural panel support members and anchorages have been installed within alignment tolerances required by metal wall panel manufacturer, UL, ASTM, ASCE 7 and as required for the geographical area where construction will take place.

C. Examine solid wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal wall panel manufacturer.

D. Examine roughing-in for components and systems penetrating metal wall

panels to verify actual locations of penetrations relative to seam locations of metal wall panels before metal wall panel installation.

E. Submit to the Contracting Officer a written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

F. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrates of substances harmful to insulation, including removing projections capable of interfering with insulation attachment.

B. Miscellaneous Framing: Install sub-purlins, girts, angles, furring, and other miscellaneous wall panel support members and anchorage according to metal wall panel manufacturer's written instructions.

3.3 WALL PANEL INSTALLATION

Provide metal wall panels of full length from sill to eave as indicated, unless otherwise indicated or restricted by shipping limitations. Anchor metal wall panels and other components of the Work securely in place, with provisions for thermal and structural movement in accordance with MBMA Metal Building Systems Manual.

a. Aluminum Wall Panels: Use aluminum or stainless-steel fasteners for exterior surfaces and aluminum or galvanized steel fasteners for interior surfaces.

b. Anchor Clips: Anchor metal wall panels and other components of the Work securely in place, using manufacturer's approved fasteners according to manufacturer's written instructions.

c. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by metal wall panel manufacturer.

d. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal wall panel assemblies. Provide types of gaskets, fillers, and sealants indicated or, if not indicated, types recommended by metal wall panel manufacturer.

Erect wall panel system in accordance with the approved erection drawings, the printed instructions and safety precautions of the manufacturer.

Sheets are not to be subjected to overloading, abuse, or undue impact. Bent, chipped, or defective sheets shall not be applied.

Sheets must be erected true and plumb and in exact alignment with the horizontal and vertical edges of the building, securely anchored, and with the indicated eave, and sill.

Work is to allow for thermal movement of the wall panel, movement of the building structure, and to provide permanent freedom from noise due to wind pressure.

Field cutting metal wall panels by torch is not permitted.

3.4 FASTENER INSTALLATION

Anchor metal wall panels and other components of the Work securely in place, using manufacturer's approved fasteners according to manufacturer's written instructions.

3.5 FLASHING, TRIM AND CLOSURE INSTALLATION

3.5.1 General Requirements

Comply with performance requirements, manufacturer's written installation instructions, and SMACNA 1793. Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

Sheet metalwork is to be accomplished to form weather-tight construction without waves, warps, buckles, fastening stresses or distortion, and allow for expansion and contraction. Cutting, fitting, drilling, and other operations in connection with sheet metal required to accommodate the work of other trades is to be performed by sheet metal mechanics.

3.5.2 Metal Flashing

Exposed metal flashing is to be installed at building corners, sills and eaves, junctions between metal siding and walling.

Exposed metal flashing is to be the same material, color, and finish as the specified metal wall panel.

Flashing is to be fastened at not more than 8 inches on center, except where flashing are held in place by the same screws that secure covering sheets.

Flashing is to be furnished in at least 8 foot lengths. Exposed flashing is to have 1 inch locked and blind-soldered end joints, and expansion joints at intervals of not more than 16 feet.

Exposed flashing and flashing subject to rain penetration to be bedded in the specified joint sealant.

Flashing which is in contact with dissimilar metals to be isolated by means of the specified asphalt mastic material to prevent electrolytic deterioration.

Drips to be formed to the profile indicated, with the edge folded back 1/2 inch to form a reinforced drip edge.

3.5.3 Closures

Install metal closure strips at open ends of corrugated or ribbed pattern walls, and at intersection of wall and wall unless open ends are concealed with formed eave flashing; and in other required areas.

Install mastic closure strips at intersection of the wall with metal walling; top and bottom of metal siding; heads of wall openings; and in

other required locations.

3.6 WORKMANSHIP

Make lines, arises, and angles sharp and true. Free exposed surfaces from visible wave, warp, buckle, and tool marks. Fold back exposed edges neatly to form a 1/2 inch hem on the concealed side. Make sheet metal exposed to the weather watertight with provisions for expansion and contraction.

Make surfaces to receive sheet metal plumb and true, clean, even, smooth, dry, and free of defects and projections which might affect the application. For installation of items not shown in detail or not covered by specifications conform to the applicable requirements of SMACNA 1793. Provide sheet metal flashing in the angles formed where roof decks abut walls, curbs, ventilators, pipes, or other vertical surfaces and wherever indicated and necessary to make the work watertight.

3.7 ACCEPTANCE PROVISIONS

3.7.1 Erection Tolerances

Erect metal wall panels straight and true with plumb vertical lines correctly lapped and secured in accordance with the manufacturer's written instructions. Horizontal lines must not vary more than 1/8 inch in 40 feet.

3.7.2 Leakage Tests

Finished application of metal wall panels are to be subject to inspection and test for leakage by the Contracting Officer, Architect/Engineer. Inspection and tests will be conducted without cost to the Government.

Inspection and testing is to be made promptly after erection to permit correction of defects and the removal and replacement of defective materials.

3.7.3 Repairs to Finish

Scratches, abrasions, and minor surface defects of finish may be repaired with the specified repair materials. Finished repaired surfaces must be uniform and free from variations of color and surface texture.

Repaired metal surfaces that are not acceptable to the project requirements are to be immediately removed and replaced with new material.

3.7.4 Paint-Finish Metal Siding

Paint-finish metal siding will be tested for color stability by the Contracting Officer during the manufacturer's specified guarantee period.

Panels that indicate color changes, fading, or surface degradation, determined by visual examination, must be removed and replaced with new panels at no expense to the Government.

New panels will be subject to the specified tests for an additional year from the date of their installation.

3.8 CLEAN-UP AND DISPOSAL

Clean all exposed sheet metal work at completion of installation. Remove metal shavings, filings, nails, bolts, and wires from work area. Remove grease and oil films, excess sealants, handling marks, contamination from steel wool, fittings and drilling debris and scrub the work clean. Exposed metal surfaces to be free of dents, creases, waves, scratch marks, solder or weld marks, and damage to the finish coating.

Collect and place scrap/waste materials in containers. Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on-site; transport demolished materials from government property and legally dispose of them.

-- End of Section --

SECTION 09 29 00

GYPSUM BOARD

05/11

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM C1002	(2014) Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs
ASTM C1047	(2014a) Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base
ASTM C1396/C1396M	(2014a) Standard Specification for Gypsum Board
ASTM C475/C475M	(2015) Joint Compound and Joint Tape for Finishing Gypsum Board
ASTM C514	(2004; R 2014) Standard Specification for Nails for the Application of Gypsum Board
ASTM C840	(2013) Application and Finishing of Gypsum Board
ASTM C954	(2015) Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness
ASTM E2129	(2010) Standard Practice for Data Collection for Sustainability Assessment of Building Products

GYPSUM ASSOCIATION (GA)

GA 214	(2010) Recommended Levels of Gypsum Board Finish
GA 216	(2010) Application and Finishing of Gypsum Panel Products

U.S. GREEN BUILDING COUNCIL (USGBC)

LEED NC	(2009) Leadership in Energy and
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Environmental Design(tm) New Construction
Rating System

UNDERWRITERS LABORATORIES (UL)

UL Fire Resistance

(2014) Fire Resistance Directory

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submittals with an "S" are for inclusion in the Sustainability Notebook, in conformance to Section 01 33 29 SUSTAINABILITY REPORTING. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Accessories

Gypsum Board; (LEED NC)

Submit documentation indicating percentage of post-industrial and post-consumer recycled content per unit of product. Indicate relative dollar value of recycled content products to total dollar value of products included in project.

Adhesives; (LEED NC)

Joint Treatment Materials

Submit manufacturer's product data, indicating VOC content.

Local/Regional Materials; (LEED NC)

Documentation indicating distance between manufacturing facility and the project site. Indicate distance of raw material origin from the project site. Indicate relative dollar value of local/regional materials to total dollar value of products included in project.

Environmental Data

SD-07 Certificates

Asbestos Free Materials; G

Certify that gypsum board types, gypsum backing board types, cementitious backer units, and joint treating materials do not contain asbestos.

SD-08 Manufacturer's Instructions

Material Safety Data Sheets

SD-10 Operation and Maintenance Data

Manufacturer maintenance instructions

Waste Management

SD-11 Closeout Submittals

Local/Regional Materials; (LEED)

LEED documentation relative to local/regional materials credit in accordance with LEED Reference Guide. Include in LEED Documentation Notebook.

Gypsum Board; (LEED)

LEED documentation relative to recycled content credit in accordance with LEED Reference Guide. Include in LEED Documentation Notebook.

Adhesives; (LEED)

LEED documentation relative to low emitting materials credit in accordance with LEED Reference Guide. Include in LEED Documentation Notebook.

1.3 DELIVERY, STORAGE, AND HANDLING

1.3.1 Delivery

Deliver materials in the original packages, containers, or bundles with each bearing the brand name, applicable standard designation, and name of manufacturer, or supplier.

1.3.2 Storage

Keep materials dry by storing inside a sheltered building. Where necessary to store gypsum board and cementitious backer units outside, store off the ground, properly supported on a level platform, and protected from direct exposure to rain, snow, sunlight, and other extreme weather conditions. Provide adequate ventilation to prevent condensation. Store per manufacturer's recommendations for allowable temperature and humidity range. Gypsum wallboard shall not be stored with materials which have high emissions of volatile organic compounds (VOCs) or other contaminants. Do not store panels near materials that may offgas or emit harmful fumes, such as kerosene heaters, fresh paint, or adhesives.

1.3.3 Handling

Neatly stack gypsum board and cementitious backer units flat to prevent sagging or damage to the edges, ends, and surfaces.

1.4 ENVIRONMENTAL CONDITIONS

1.4.1 Temperature

Maintain a uniform temperature of not less than 50 degrees F in the structure for at least 48 hours prior to, during, and following the application of gypsum board, cementitious backer units, and joint treatment materials, or the bonding of adhesives.

1.4.2 Exposure to Weather

Protect gypsum board and cementitious backer unit products from direct exposure to rain, snow, sunlight, and other extreme weather conditions.

1.4.3 Temporary Ventilation

Provide temporary ventilation for work of this section.

1.5 SUSTAINABLE DESIGN REQUIREMENTS

1.5.1 Local/Regional Materials

See Section 01 33 29 LEED(tm) DOCUMENTATION for cumulative total local material requirements. Gypsum board materials may be locally available.

1.5.2 Environmental Data

Submit Table 1 of ASTM E2129 for the following products: Gypsum Board.

1.6 QUALIFICATIONS

Furnish type of gypsum board work specialized by the installer with a minimum of 3 years of documented successful experience.

PART 2 PRODUCTS

2.1 MATERIALS

Conform to specifications, standards and requirements specified. Provide gypsum board types and joint treating materials manufactured from asbestos free materials only. Submit Material Safety Data Sheets and manufacturer maintenance instructions for gypsum materials including adhesives.

2.1.1 Gypsum Board

ASTM C1396/C1396M. See Section 01 33 29 LEED(tm) DOCUMENTATION for cumulative total recycled content requirements. Gypsum board may contain post-consumer or post-industrial recycled content.

2.1.1.1 Regular

48 inch wide, 5/8 inch thick, tapered.

2.1.1.2 Type X (Special Fire-Resistant)

48 inch wide, 5/8 inch thick, tapered edges.

2.1.2 Joint Treatment Materials

ASTM C475/C475M. Use all purpose joint and texturing compound containing inert fillers and natural binders, including lime compound. Pre-mixed compounds shall be free of antifreeze, vinyl adhesives, preservatives, biocides and other slow releasing compounds.

2.1.2.1 Embedding Compound

Specifically formulated and manufactured for use in embedding tape at gypsum board joints and compatible with tape, substrate and fasteners.

2.1.2.2 Finishing or Topping Compound

Specifically formulated and manufactured for use as a finishing compound.

2.1.2.3 All-Purpose Compound

Specifically formulated and manufactured to serve as both a taping and a finishing compound and compatible with tape, substrate and fasteners.

2.1.2.4 Setting or Hardening Type Compound

Specifically formulated and manufactured for use with fiber glass mesh tape.

2.1.2.5 Joint Tape

Use cross-laminated, tapered edge, reinforced paper, or fiber glass mesh tape recommended by the manufacturer.

2.1.3 Fasteners

2.1.3.1 Nails

ASTM C514.

2.1.3.2 Screws

ASTM C1002, Type "G", Type "S" or Type "W" steel drill screws for fastening gypsum board to gypsum board, wood framing members and steel framing members less than 0.033 inch thick. ASTM C954 steel drill screws for fastening gypsum board to steel framing members 0.033 to 0.112 inch thick. Provide cementitious backer unit screws with a polymer coating.

2.1.3.3 Staples

No. 16 USS gageflattened galvanized wire staples with 7/16 inch wide crown outside measurement and divergent point for base ply of two-ply gypsum board application. Use as follows:

<u>Length of Legs</u>	<u>Thickness of Gypsum Board</u>
1-1/8 inches	1/2 inch
1-1/4 inches	5/8 inch

2.1.4 Adhesives

Do not use adhesive containing benzene, carbon tetrachloride, or trichloroethylene. Adhesive must meet the requirements of LEED low emitting materials credit.

2.1.4.1 Adhesive for Fastening Gypsum Board to Metal Framing

Not permitted.

2.1.4.2 Adhesive for Laminating

Not permitted.

2.1.5 Gypsum Studs

Provide one inch minimum thickness and 6 inch minimum width. Studs may be of one inch thick gypsum board or multilayers fastened to required thickness. Conform to ASTM C1396/C1396M for material.

2.1.6 Accessories

ASTM C1047. Fabricate from corrosion protected steel or plastic designed for intended use. Accessories manufactured with paper flanges are not acceptable. Flanges shall be free of dirt, grease, and other materials that may adversely affect bond of joint treatment. Provide prefinished or job decorated materials.

2.1.7 Water

Provide clean, fresh, and potable water.

PART 3 EXECUTION

3.1 EXAMINATION

3.1.1 Framing and Furring

Verify that framing and furring are securely attached and of sizes and spacing to provide a suitable substrate to receive gypsum board and cementitious backer units. Verify that all blocking, headers and supports are in place to support plumbing fixtures and to receive soap dishes, grab bars, towel racks, and similar items. Do not proceed with work until framing and furring are acceptable for application of gypsum board and cementitious backer units.

3.1.2 Gypsum Board and Framing

Verify that surfaces of gypsum board and framing to be bonded with an adhesive are free of dust, dirt, grease, and any other foreign matter. Do not proceed with work until surfaces are acceptable for application of gypsum board with adhesive.

3.1.3 Masonry and Concrete Walls

Verify that surfaces of masonry and concrete walls to receive gypsum board applied with adhesive are dry, free of dust, oil, form release agents, protrusions and voids, and any other foreign matter. Do not proceed with work until surfaces are acceptable for application of gypsum board with adhesive.

3.2 APPLICATION OF GYPSUM BOARD

Apply gypsum board to framing and furring members in accordance with ASTM C840 or GA 216 and the requirements specified. Apply gypsum board with separate panels in moderate contact; do not force in place. Stagger end joints of adjoining panels. Neatly fit abutting end and edge joints. Use gypsum board of maximum practical length; select panel sizes to minimize waste. Cut out gypsum board to make neat, close, and tight

joints around openings. In vertical application of gypsum board, provide panels in lengths required to reach full height of vertical surfaces in one continuous piece. Lay out panels to minimize waste; reuse cutoffs whenever feasible. Surfaces of gypsum board and substrate members may not be bonded together with an adhesive. Treat edges of cutouts for plumbing pipes, screwheads, and joints with water-resistant compound as recommended by the gypsum board manufacturer. Provide type of gypsum board for use in each system specified herein as indicated.

3.2.1 Semi-Solid Gypsum Board Partitions

Provide in accordance with ASTM C840, System IV or GA 216 .

3.2.2 Solid Gypsum Board Partitions

Provide in accordance with ASTM C840, System V or GA 216.

3.2.3 Adhesive Application to Interior Masonry or Concrete Walls

Apply in accordance with ASTM C840, System VI or GA 216.

3.2.4 Application of Gypsum Board to Steel Framing and Furring

Apply in accordance with ASTM C840, System VIII or GA 216.

3.2.5 Control Joints

Install expansion and contraction joints in ceilings and walls in accordance with ASTM C840, System XIII or GA 216. Fill control joints between studs in fire-rated construction with firesafing insulation to match the fire-rating of construction.

3.3 FINISHING OF GYPSUM BOARD

Tape and finish gypsum board in accordance with ASTM C840, GA 214 and GA 216. Finish plenum areas above ceilings to Level 1 in accordance with GA 214. Finish walls and ceilings without critical lighting to receive flat paints, light textures, or wall coverings to Level 4 in accordance with GA 214. Unless otherwise specified, finish all gypsum board walls, partitions and ceilings to Level 5 in accordance with GA 214. Provide joint, fastener depression, and corner treatment. Tool joints as smoothly as possible to minimize sanding and dust. Do not use fiber glass mesh tape with conventional drying type joint compounds; use setting or hardening type compounds only. Protect workers, building occupants, and HVAC systems from gypsum dust.

3.3.1 Uniform Surface

Wherever gypsum board is to receive eggshell, semigloss or gloss paint finish, or where severe, up or down lighting conditions occur, finish gypsum wall surface in accordance to GA 214 Level 5. In accordance with GA 214 Level 5, apply a thin skim coat of joint compound to the entire gypsum board surface, after the two-coat joint and fastener treatment is complete and dry.

3.4 SEALING

Seal openings around pipes, fixtures, and other items projecting through gypsum board and cementitious backer units as specified in Section 07 92 00

JOINT SEALANTS Apply material with exposed surface flush with gypsum board or cementitious backer units.

3.5 FIRE-RESISTANT ASSEMBLIES

Wherever fire-rated construction is indicated, provide materials and application methods, including types and spacing of fasteners, wall and ceiling framing in accordance with the specifications contained in UL Fire Resistance for the Design Number(s) indicated. Joints of fire-rated gypsum board enclosures shall be closed and sealed in accordance with UL test requirements requirements. Seal penetrations through rated partitions and ceilings tight in accordance with tested systems.

3.6 PATCHING

Patch surface defects in gypsum board to a smooth, uniform appearance, ready to receive finishes.

3.7 WASTE MANAGEMENT

As specified in Waste Management Plan.

Identify manufacturer's policy for collection or return of remaining construction scrap, unused material, demolition scrap, and packaging material. Institute demolition and construction recycling to take advantage of manufacturer's programs. When such a service is not available, seek local recyclers to reclaim the materials.

-- End of Section --

SECTION 09 51 00

ACOUSTICAL CEILINGS

08/10

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM A1008/A1008M	(2015) Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardened
ASTM A489	(2012) Standard Specification for Carbon Steel Lifting Eyes
ASTM A641/A641M	(2009a; R 2014) Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire
ASTM A653/A653M	(2015) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM B633	(2015) Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel
ASTM C423	(2009a) Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
ASTM C635/C635M	(2013a) Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-In Panel Ceilings
ASTM C636/C636M	(2013) Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels
ASTM C834	(2014) Latex Sealants
ASTM E1264	(2014) Acoustical Ceiling Products
ASTM E1477	(1998a; R 2013) Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers
ASTM E580/E580M	(2014) Application of Ceiling Suspension

Systems for Acoustical Tile and Lay-In
Panels in Areas Requiring Moderate Seismic
Restraint

ASTM E795

(2005; R 2012) Mounting Test Specimens
During Sound Absorption Tests

U.S. DEPARTMENT OF DEFENSE (DOD)

UFC 3-310-04

(2013) Seismic Design for Buildings

1.2 SYSTEM DESCRIPTION

Provide sound controlling units mechanically mounted on a ceiling suspension system for acoustical treatment. The unit size, texture, finish, and color must be as specified. The location and extent of acoustical treatment shall be as shown on the approved detail drawings. Submit drawings showing suspension system, method of anchoring and fastening, details, and reflected ceiling plan. Coordinate with paragraph RECLAMATION PROCEDURES for reclamation of mineral fiber acoustical ceiling panels to be removed from the job site.

1.2.1 Ceiling Sound Absorption

Determine the Noise Reduction Coefficient (NRC) in accordance with ASTM C423 Test Method.

1.2.2 Light Reflectance

Determine light reflectance factor in accordance with ASTM E1477 Test Method.

1.2.3 Other Submittals Requirements

The following shall be submitted:

- a. Manufacturer's data indicating percentage of recycle material in acoustic ceiling tiles to verify affirmative procurement compliance.
- b. Total weight and volume quantities of acoustic ceiling tiles with recycle material.
- c. Certificate attesting that the mineral based acoustical units furnished for the project contain recycled material and showing an estimated percent of such material.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submittals with an "S" are for inclusion in the Sustainability Notebook, in conformance to Section 01 33 29 SUSTAINABILITY REPORTING. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Approved Detail Drawings

SD-04 Samples

Acoustical Units
Acoustic Ceiling Tiles

SD-07 Certificates

Acoustical Units
Acoustic Ceiling Tiles

1.4 DELIVERY, STORAGE. AND HANDLING

Deliver materials to the site in the manufacturer's original unopened containers with brand name and type clearly marked. Carefully handle and store materials in dry, watertight enclosures. Immediately before installation, store acoustical units for not less than 24 hours at the same temperature and relative humidity as the space where they will be installed in order to assure proper temperature and moisture acclimation.

1.5 ENVIRONMENTAL REQUIREMENTS

Maintain a uniform temperature of not less than 60 degrees F nor more than 85 degrees F and a relative humidity of not more than 70 percent for 24 hours before, during, and 24 hours after installation of acoustical units.

1.6 SCHEDULING

Complete and dry interior finish work such as plastering, concrete and terrazzo work before ceiling installation. Complete mechanical, electrical, and other work above the ceiling line; install and start operating heating, ventilating, and air conditioning systems in order to maintain temperature and humidity requirements.

1.7 WARRANTY

Provide manufacturer's standard performance guarantees or warranties that extend beyond a one year period. Include an agreement to repair or replace acoustical panels that fail within the warranty period in the standard performance guarantee or warranty. Failures include, but are not limited to, sagging and warping of panels; rusting and manufacturers defects of grid system.

1.8 EXTRA MATERIALS

Furnish spare tiles, from the same lot as those installed, of each color at the rate of 5 tiles for each 1000 tiles installed.

PART 2 PRODUCTS

2.1 ACOUSTICAL UNITS

Comply with EPA requirements in accordance with Section 01 33 29 SUSTAINABILITY REPORTING. Submit two samples of each type of acoustical unit and each type of suspension grid tee section showing texture, finish, and color. Conform acoustical units to ASTM E1264, Class A, and the following requirements:

2.1.1 Affirmative Procurement

Mineral Wool, Cellulose, and Laminated Paperboard used in acoustic ceiling tiles are materials listed in the EPA's Comprehensive Procurement Guidelines (CPG) (<http://www.epa.gov/cpg/>). EPA's recommended Recovered Materials Content Levels for Mineral Wool, Cellulose, Structural Fiberboard and Laminated Paperboard are:

Product	Material	Percent of Post Consumer Materials	Percent of Total Recovered Materials
Laminate Paperboard	Post Consumer Paper	100	100
Rock Wool	Slag	75	
Cellulose	Post Consumer Paper	75	75

- a. The recommended recovered materials content levels are based on the weight (not volume) of materials in the insulating core only.
- b. Submit recycled material content data for acoustic ceiling tiles indicating compliance with affirmative procurement.
- c. Submit total weight and volume quantities of acoustic ceiling tiles with recycle material.

2.1.2 Humidity Resistant Composition Units

2.1.2.1 Type

Non-asbestos mineral or glass fibers bonded with ceramic, moisture resistant thermo-setting resin, or other moisture resistant material and having a factory applied white paint finish. Provide panels that do not sag or warp under conditions of heat, high humidity or chemical fumes.

2.1.2.2 Flame Spread

Class: A, 25 or less

2.1.2.3 Pattern

Mstch existing.

2.1.2.4 Minimum NRC

Minimum 0.50 when tested on Mounting Type E-400 of ASTM E795.

2.1.2.5 Minimum Light Reflectance Coefficient

LR-1, 0.75 or greater

2.1.2.6 Nominal Size

2.1.2.7 Edge Detail

Match existing.

2.2 SUSPENSION SYSTEM

Provide standard suspension system conforming to ASTM C635/C635M. Provide surfaces exposed to view to match existing. Provide wall molding having a flange of not less than 15/16 inch. Suspended ceiling framing system must have the capability to support the finished ceiling, light fixtures, air diffusers, and accessories, as shown. Provide a suspension system with a maximum deflection of 1/360 of the span length. Conform seismic details to the guidance in UFC 3-310-04 and ASTM E580/E580M.

2.3 HANGERS

Provide hangers and attachment capable of supporting a minimum 300 pound ultimate vertical load without failure of supporting material or attachment.

2.3.1 Wires

Conform wires to ASTM A641/A641M, Class 1, 0.08 inch (12 gauge) in diameter.

2.3.2 Straps

Provide straps of 1 by 3/16 inch galvanized steel conforming to ASTM A653/A653M, with a light commercial zinc coating or ASTM A1008/A1008M with an electrodeposited zinc coating conforming to ASTM B633, Type RS.

2.3.3 Rods

Provide 3/16 inch diameter threaded steel rods, zinc or cadmium coated.

2.3.4 Eyebolts

Provide eyebolts of weldless, forged-carbon-steel, with a straight-shank in accordance with ASTM A489. Eyebolt size must be a minimum 1/4 inch, zinc coated.

2.3.5 Masonry Anchorage Devices

Comply with ASTM C636/C636M for anchorage devices for eyebolts and machine screws.

2.4 ACCESS PANELS

Provide access panels that match adjacent acoustical units, designed and equipped with suitable framing and fastenings for removal and replacement without damage. Size panel to be not less than 12 by 12 inch or more than 12 by 24 inch.

- a. Attach an identification plate of 0.032 inch thick aluminum, 3/4 inch in diameter, stamped with the letters "AP" and finished the same as the unit, near one corner on the face of each access panel.
- b. Identify ceiling access panel by a number utilizing white identification plates or plastic buttons with contrasting numerals. Provide plates or buttons of minimum 1 inch diameter and securely attached to one corner of each access unit. Provide a typewritten card framed under glass listing the code identification numbers and

corresponding system descriptions listed above. Mount the framed card where directed and furnish a duplicate card to the Contracting Officer. Code identification system is as follows:

- 1 Fire detection/alarm system
- 2 Air conditioning controls
- 3 Plumbing system
- 4 Heating and steam systems
- 5 Air conditioning duct system
- 6 Sprinkler system
- 7 Intercommunication system
- 8 Nurse's call system
- 9 Pneumatic tube system
- 10 Medical piping system
- 11 Program entertainment
- 12 Telephone junction boxes
- 13 Detector X-ray

2.5 ADHESIVE

Use adhesive as recommended by tile manufacturer.

2.6 FINISHES

Use manufacturer's standard textures, patterns and finishes as specified for acoustical units and suspension system members. Treat ceiling suspension system components to inhibit corrosion.

2.7 COLORS AND PATTERNS

Use colors and patterns for acoustical units and suspension system components to match existing.

2.8 ACOUSTICAL SEALANT

Conform acoustical sealant to ASTM C834, nonstaining.

PART 3 EXECUTION

3.1 INSTALLATION

Examine surfaces to receive directly attached acoustical units for unevenness, irregularities, and dampness that would affect quality and execution of the work. Rid areas, where acoustical units will be cemented, of oils, form residue, or other materials that reduce bonding capabilities of the adhesive. Complete and dry interior finish work such as plastering, concrete, and terrazzo work before installation. Complete

and approve mechanical, electrical, and other work above the ceiling line prior to the start of acoustical ceiling installation. Provide acoustical work complete with necessary fastenings, clips, and other accessories required for a complete installation. Do not expose mechanical fastenings in the finished work. Lay out hangers for each individual room or space. Provide hangers to support framing around beams, ducts, columns, grilles, and other penetrations through ceilings. Keep main runners and carrying channels clear of abutting walls and partitions. Provide at least two main runners for each ceiling span. Wherever required to bypass an object with the hanger wires, install a subsuspension system so that all hanger wires will be plumb.

3.1.1 Suspension System

Install suspension system in accordance with ASTM C636/C636M and as specified herein. Do not suspend hanger wires or other loads from underside of steel decking.

3.1.1.1 Plumb Hangers

Install hangers plumb and not pressing against insulation covering ducts and pipes. Where lighting fixtures are supported from the suspended ceiling system, provide hangers at a minimum of four hangers per fixture and located not more than 6 inch from each corner of each fixture.

3.1.1.2 Splayed Hangers

Where hangers must be splayed (sloped or slanted) around obstructions, offset the resulting horizontal force by bracing, countersplaying, or other acceptable means.

3.1.2 Wall Molding

Provide wall molding where ceilings abut vertical surfaces. Miter corners where wall moldings intersect or install corner caps. Secure wall molding not more than 3 inch from ends of each length and not more than 16 inch on centers between end fastenings. Provide wall molding springs at each acoustical unit in semi-exposed or concealed systems.

3.1.3 Acoustical Units

Install acoustical units in accordance with the approved installation instructions of the manufacturer. Ensure that edges of acoustical units are in close contact with metal supports, with each other, and in true alignment. Arrange acoustical units so that units less than one-half width are minimized. Hold units in exposed-grid system in place with manufacturer's standard hold-down clips, if units weigh less than 1 psf or if required for fire resistance rating.

3.1.4 Caulking

Seal all joints around pipes, ducts or electrical outlets penetrating the ceiling. Apply a continuous ribbon of acoustical sealant on vertical web of wall or edge moldings.

3.1.5 Adhesive Application

Wipe back of tile to remove accumulated dust. Daub acoustical units on back side with four equal daubs of adhesive. Apply daubs near corners of

tiles. Ensure that contact area of each daub is at least 2 inch diameter in final position. Press units into place, aligning joints and abutting units tight and uniform without differences in joint widths.

3.2 CEILING ACCESS PANELS

Locate ceiling access panels directly under the items which require access.

3.3 CLEANING

Following installation, clean dirty or discolored surfaces of acoustical units and leave them free from defects. Remove units that are damaged or improperly installed and provide new units as directed.

3.4 RECLAMATION PROCEDURES

Neatly stack ceiling tile, designated for recycling by the Contracting Officer, on 4 by 4 foot pallets not higher than 4 foot. Panels must be completely dry. Shrink wrap and symmetrically stack pallets on top of each other without falling over.

-- End of Section --