

SUBMITTAL REGISTER

CONTRACT NO.
(AM-0003)

TITLE AND LOCATION FY03 MCA PHASE 2C1, WHOLE BARRACKS RENEWAL, SCHOFIELD						CONTRACTOR OAHU, HI											
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	
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		01320	SD-01 Preconstruction Submittals														
			Preliminary Project Schedule														
			Initial Project Schedule														
			Periodic Schedule Updates														
			SD-06 Test Reports														
			Narrative Report														
			Schedule Reports														
			SD-07 Certificates														
			Qualifications														
		01430	SD-06 Test Reports														
			Environmental Protection Plan		G												
		01780	SD-02 Shop Drawings														
			As-Built Drawings														
			SD-03 Product Data														
			As-Built Record of Equipment and Materials														
			Warranty Management Plan														
			Warranty Tags														
			Final Clean-Up														
		01900	SD-01 Preconstruction Submittals														
			Organization Plan		G												
			Accident Prevention Plan		G												
			Activity Hazard Analyses		G												
			SD-03 Product Data														
			Equipment Data														
			Recovered Material Report														

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		01900	SD-06 Test Reports														
			Inspection of Existing Conditions														
			Dust Control		G												
			Method(s) of dust control														
			Excavation/Trenching Clearance														
			Condition of Contractor's Operation or Storage Area.														
			SD-07 Certificates														
			Products Containing Recovered Materials														
		02220a	SD-03 Product Data														
			Work Plan		G												
		02230a	SD-03 Product Data														
			Materials Other Than Salable Timber	3.4.1													
		02286	SD-07 Certificates														
			Granular Termite Barrier Materials	2.1													
		02300a	SD-03 Product Data														
			Earthwork														
			SD-06 Test Reports														
			Testing	3.13													
			SD-07 Certificates														
			Testing	3.13													
		02315a	SD-06 Test Reports														
			Testing	3.14	G												
		02316a	SD-06 Test Reports														

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		02316a	Field Density Tests	3.4.3													
			Testing of Backfill Materials	3.4.2													
		02510a	SD-03 Product Data														
			Installation	3.1													
			Waste Water Disposal Method														
			Satisfactory Installation														
			SD-06 Test Reports														
			Bacteriological Disinfection	3.3.1													
			SD-07 Certificates														
			Manufacturer's Representative	1.3													
			Installation	3.1													
			Meters	2.8.5													
		02531a	SD-07 Certificates														
			Portland Cement	2.7.1													
			Joints	2.3													
		02555a	SD-02 Shop Drawings														
			Distribution System	3.5.9													
			SD-03 Product Data														
			Distribution System	3.5.9													
			SD-07 Certificates														
			Distribution System	3.5.9													
			Welding	1.6	G												
			SD-10 Operation and Maintenance														
			Data														
			Distribution System	3.5.9													
		02630a	SD-03 Product Data														

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		02630a	Placing Pipe	3.3													
			SD-04 Samples														
			Pipe for Culverts and Storm Drains	2.1													
			SD-07 Certificates														
			Resin Certification	2.1.2													
			Pipeline Testing	3.8													
			Hydrostatic Test on Watertight Joints	2.3.8.3													
			Determination of Density	3.7.5													
			Frame and Cover for Gratings	2.3.7													
		02721a	SD-03 Product Data														
			Equipment														
			Waybills and Delivery Tickets														
			SD-06 Test Reports														
			Sampling and Testing	1.4													
		02722a	SD-03 Product Data														
			Plant, Equipment, and Tools	1.5													
			Waybills and Delivery Tickets														
			SD-06 Test Reports														
			Sampling and testing	1.4													
			Field Density Tests	1.4.2.4													
		02741a	SD-03 Product Data														
			Mix Design	2.3	G												
			Contractor Quality Control	3.10	G												

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		02741a	Material Acceptance and Percent Payment	3.11	G												
			SD-04 Samples														
			Asphalt Cement Binder	2.2													
			Aggregates	2.1													
			SD-06 Test Reports														
			Aggregates	2.1	G												
			QC Monitoring	3.10.3.10													
			SD-07 Certificates														
			Asphalt Cement Binder	2.2	G												
			Testing Laboratory	3.6													
		02748A	SD-06 Test Reports														
			Sampling and Testing	3.7													
		02763a	SD-03 Product Data														
			Equipment	1.4	G												
			Composition Requirements	2.2.1													
			Qualifications														
			SD-06 Test Reports														
			Sampling and Testing	2.6													
			SD-07 Certificates														
			Volatile Organic Compound (VOC)	2.2.3													
		02770a	SD-03 Product Data														
			Concrete	2.1													
			SD-06 Test Reports														
			Field Quality Control	3.7													

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		02770a	Equipment Calibration														
		02811a	SD-02 Shop Drawings														
			Sprinkler System	3.1													
			SD-03 Product Data														
			Framed Instructions	3.3													
			Field Training	3.4													
			Sprinkler System	3.1													
			Spare Parts														
			SD-06 Test Reports														
			Field Tests	3.2													
			SD-07 Certificates														
			Sprinkler System	3.1													
			SD-10 Operation and Maintenance Data														
			Sprinkler System	3.1													
		02870a	SD-02 Shop Drawings														
			Site Furnishing Standards	2.5													
			SD-03 Product Data														
			Site Furnishings	1.4													
			Installation	3.1													
			Materials	2.1													
			SD-04 Samples														
			Finish	2.4													
		02915a	SD-02 Shop Drawings														
			Finished Grade and Topsoil														
			Underground Utilities	3.1.2													

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		02915a	Obstructions Below Ground	3.3.1													
			SD-03 Product Data														
			Root Barriers	3.4.2													
			Equipment	1.4													
			Transplanting Plan	1.4													
			Application of Pesticide	3.7													
			Plant Establishment Period	3.9													
			Maintenance Record	3.9.2.6													
			SD-07 Certificates														
			Fertilizer	2.1													
			Pesticide	2.9													
			SD-10 Operation and Maintenance														
			Data														
			Maintenance Instructions	3.9.5													
		02921a	SD-03 Product Data														
			Equipment														
			Surface Erosion Control Material	2.7													
			Chemical Treatment Material	1.4.3													
			Finished Grade and Topsoil	3.2.1													
			Topsoil	2.2													
			Quantity Check	3.5													
			Seed Establishment Period	3.9													
			Maintenance Record	3.9.3.5													
			Application of Pesticide	3.6													
			SD-04 Samples														
			Delivered Topsoil	1.4.1.1													

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		02921a	Soil Amendments	2.3													
			Mulch	2.4													
			SD-06 Test Reports														
			Equipment Calibration	3.1.2													
			Soil Test	3.1.3													
			SD-07 Certificates														
			Seed	2.1													
			Topsoil	2.2													
			pH Adjuster	2.3.1													
			Fertilizer	2.3.2													
			Organic Material	2.3.4													
			Soil Conditioner	2.3.5													
			Mulch	2.4													
			Asphalt Adhesive	2.4.2													
			Pesticide	2.6													
		02930a	SD-02 Shop Drawings														
			Finished Grade, Topsoil and Underground Utilities	3.2.1													
			SD-03 Product Data														
			Geotextile	2.5													
			Chemical Treatment Material	1.4.3.2													
			Delivery	1.4.1													
			Plant Establishment Period	3.9													
			Maintenance Record	3.9.2.6													
			Application of Pesticide	3.7													
			SD-04 Samples														

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		02930a	Delivered Topsoil	1.4.1.3													
			Soil Amendments	3.1.2.2													
			Mulch	2.4													
			Geotextile	2.5													
			SD-06 Test Reports														
			Soil Test	3.1.2.2													
			Percolation Test	3.1.2.1													
			SD-07 Certificates														
			Plant Material	2.1													
			Topsoil	2.2													
			pH Adjuster	2.3.1													
			Fertilizer	2.3.2													
			Organic Material	2.3.3													
			Soil Conditioner	2.3.4													
			Organic Mulch	2.4.2													
			Mycorrhizal Fungi Inoculum	2.11													
			Pesticide	2.13													
			SD-10 Operation and Maintenance Data														
			Maintenance Instructions	3.9.5													
		02935a	SD-03 Product Data														
			Chemical Treatment Material	1.3.3													
			Work Plan and Schedule														
			Delivery Schedule	1.3.1													
			Maintenance Record	3.4.4													
			Application of Pesticide	3.3													

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		02935a	SD-07 Certificates														
			pH Adjuster	2.1.1													
			Fertilizer	2.1.2													
			Mulch	2.2													
			Pesticide	2.4													
		03100a	SD-02 Shop Drawings														
			Formwork	3.1.1	G RE												
			SD-03 Product Data														
			Design	1.3	G RE												
			Form Materials	2.1	G RE												
			Form Releasing Agents	2.1.5	G RE												
		03150a	SD-03 Product Data														
			Preformed Expansion Joint Filler	2.2	G												
			Sealant	2.3	G												
			SD-07 Certificates														
			Preformed Expansion Joint Filler	2.2	G												
			Sealant	2.3	G												
		03200a	SD-02 Shop Drawings														
			Reinforcement	3.1	G												
			SD-03 Product Data														
			Welding	1.3	G												
			SD-07 Certificates														
			Reinforcing Steel	2.2	G												
		03300	SD-03 Product Data														
			Mixture Proportions	1.6	G												
			Dry Shake Finish	3.10.7													

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		03300	SD-06 Test Reports														
			Testing and Inspection for Contractor Quality Control	3.15	G												
			SD-07 Certificates														
			Qualifications	1.4	G												
		04200a	SD-02 Shop Drawings														
			Masonry Work	1.3	G												
			SD-04 Samples														
			Concrete Masonry Units (CMU)	2.2	G												
			Anchors, Ties, and Bar Positioners	2.6	G G												
			Expansion-Joint Material	2.9	G G												
			SD-06 Test Reports														
			Efflorescence Test	3.15.3	G												
			Field Testing of Mortar	3.15.1	G												
			Field Testing of Grout	3.15.2	G												
			Prism tests	3.15.4	G												
			Masonry Cement	2.4	G												
			Special Inspection	1.5	G												
			SD-07 Certificates														
			Concrete Masonry Units (CMU)	2.2	G												
			Control Joint Keys	2.8	G												
			Anchors, Ties, and Bar Positioners	2.6	G												
			Expansion-Joint Material	2.9	G												
			Reinforcing Steel Bars and Rods	2.7													

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		04200a	Masonry Cement	2.4													
			Precast Concrete Items	2.3	G												
			Mortar Admixtures	2.4.1													
			Grout Admixtures	2.5.1													
		05090a	SD-03 Product Data														
			Welding Procedure Qualifications	1.5	G												
			Welder, Welding Operator, and Tacker Qualification	1.6	G												
			Inspector Qualification	1.7	G												
			Previous Qualifications	1.5.1	G												
			Prequalified Procedures	1.5.2	G												
			SD-06 Test Reports														
			Quality Control	3.2	G												
		05120a	SD-02 Shop Drawings														
			Structural Steel System	1.4.1.1	G AE												
			Structural Connections	1.4.1.1	G AE												
			Structural Connections	3.2.1	G AE												
			SD-03 Product Data														
			Erection	3.2	G												
			Welding	3.3	G												
			SD-04 Samples														
			High Strength Bolts and Nuts	2.4	G												
			Carbon Steel Bolts and Nuts	2.5	G												
			Nuts Dimensional Style	2.6	G												
			Washers	2.7	G												
			SD-07 Certificates														

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		05120a	Mill Test Reports	1.4.1.2	G												
			Welder Qualifications	1.4.2	G												
			Welding Inspector	1.6	G												
			Fabrication	3.1	G												
		05300a	SD-02 Shop Drawings														
			Deck Units	2.1	G AE												
			Accessories	2.5	G												
			Attachments	3.2	G												
			Holes and Openings	3.3	G												
			SD-03 Product Data														
			Deck Units	2.1	G												
			Attachments	3.2	G												
			SD-04 Samples														
			Deck Units	2.1	G												
			Accessories	2.5	G												
			SD-07 Certificates														
			Deck Units	2.1	G												
			Attachments	3.2	G												
		05400a	SD-02 Shop Drawings														
			Framing Components	2.1	G AE												
			SD-07 Certificates														
			Mill Certificates	1.3.1	G												
			Welds	1.3.1	G												
			Welds	3.2.1	G												
		05500a	SD-02 Shop Drawings														
			Miscellaneous Metal Items	1.6													

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ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH	GOVT CLASSIFICATION REVWNR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION		APPROVING AUTHORITY					MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
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(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		05500a	SD-04 Samples														
			Miscellaneous Metal Items	1.6													
		06100a	SD-02 Shop Drawings														
			Nailers and Nailing Strips	3.2.2													
			SD-07 Certificates														
			Grading and Marking	2.1.1													
		06200a	SD-02 Shop Drawings														
			Finish Carpentry														
			SD-04 Samples														
			Molding														
		06650	SD-02 Shop Drawings														
			Installation	3.2													
			SD-03 Product Data														
			Solid polymer material	2.1													
			Qualifications	1.6													
			Fabrications	2.3													
			SD-04 Samples														
			Material	2.1													
			Counter and Vanity Tops	2.3.4													
			SD-06 Test Reports														
			Solid polymer material	2.1													
			SD-07 Certificates														
			Fabrications	2.3													
			Qualifications	1.6													
			SD-10 Operation and Maintenance														
			Data														

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TITLE AND LOCATION FY03 MCA PHASE 2C1, WHOLE BARRACKS RENEWAL, SCHOFIELD						CONTRACTOR OAHU, HI											
ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	GOVT CLASSIFICATION REV NR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION		APPROVING AUTHORITY				MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS	
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		06650	Solid polymer material	2.1													
			Clean-up	3.3													
		07131a	SD-02 Shop Drawings														
			Waterproofing	3.1													
			SD-03 Product Data														
			Installation	3.2													
			SD-07 Certificates														
			Materials	2.1													
		07132a	SD-03 Product Data														
			Reinforcing Fabric														
			Protection Board	3.4.1													
			Applications														
			SD-07 Certificates														
			Materials	1.4													
		07141	SD-03 Product Data														
			Fluid-applied membrane	2.1													
			Membrane primer	2.2													
			Moisture meter	3.4.1													
			SD-08 Manufacturer's Instructions														
			Installation														
			SD-07 Certificates														
			Materials														
			SD-04 Samples														
			Fluid-applied membrane	2.1													
			Aggregates														
		07210	SD-02 Shop Drawings														

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FY03 MCA PHASE 2C1, WHOLE BARRACKS RENEWAL, SCHOFIELD						OAHU, HI											
ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	GOVT CLASSIFICATION REVIEWER	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION		APPROVING AUTHORITY				MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS	
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		07210	Fastening Spacing														
			SD-08 Manufacturer's Instructions														
			Application of Insulation														
			SD-06 Test Reports														
			Inspection														
		07220a	SD-03 Product Data														
			Application of Insulation	3.5													
			Inspection	3.6													
			SD-07 Certificates														
			Insulation	2.1													
		07240	SD-02 Shop Drawings														
			Shop drawings	3.3													
			SD-03 Product Data														
			Sheathing board	2.2													
			Thermal insulation	2.5													
			Mechanical Fasteners	2.4													
			Accessories	2.10													
			Base coat	2.6													
			Reinforcing fabric	2.7													
			Finish coat	2.8													
			Joint Sealant	2.11													
			Primer	2.9													
			Bond breaker	2.12													
			Backer Rod	2.13													
			Warranty	1.7													
			SD-04 Samples														

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		07240	Sample Boards	1.2.3.7													
			Mock-up Installation of EIFS	1.2.1.4	G												
			SD-05 Design Data														
			Wind load	1.2.1.2													
			Moisture analysis	1.2.4													
			SD-06 Test Reports														
			Abrasion resistance	1.2.3.1													
			Accelerated weathering	1.2.3.2													
			Impact resistance	1.2.2.3													
			Mildew resistance	1.2.3.3													
			Salt spray resistance	1.2.3.4													
			Water vapor transmission														
			Absorption-freeze-thaw	1.2.3.6													
			Flame spread														
			Water penetration	1.2.1.1													
			Water resistance	1.2.3.5													
			Full scale or intermediate scale fire test	1.2.1.3													
			Radiant heat	1.2.2.2													
			Wind load	1.2.1.2													
			SD-07 Certificates														
			Qualifications of EIFS Manufacturer	1.4.1													
			Qualification of EIFS Installer	1.4.2													
			Qualification of Sealant Applicator	1.4.3													

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		07240	Qualifications of Third Party Inspector														
			Inspection Check List	3.5.2													
			SD-08 Manufacturer's Instructions Installation	3.3													
			SD-10 Operation and Maintenance Data														
			EIFS	1.7													
		07416a	SD-02 Shop Drawings														
			Structural Standing Seam Metal Roof System														
			SD-03 Product Data														
			Design Analysis														
			Qualifications														
			SD-04 Samples														
			Accessories	2.3													
			Roof Panels	2.1													
			Factory Color Finish	2.6													
			Fasteners	2.4													
			Gaskets and Insulating Compounds	2.8													
			Sealant	2.7													
			Concealed Anchor Clips	2.2													
			Subpurlins (Zee Purlins)	2.5													
			EPDM Rubber Boots	2.9													
			SD-06 Test Reports														

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		07416a	Test Report for Uplift Resistance of the SSSMR														
			SD-07 Certificates														
			Structural Standing Seam Metal Roof System														
		07600a	SD-02 Shop Drawings Materials	2.1													
		07840a	SD-02 Shop Drawings Firestopping Materials	2.1													
			SD-07 Certificates Firestopping Materials	2.1													
			Installer Qualifications	1.5													
			Inspection	3.3													
		07900a	SD-03 Product Data														
			Backing	2.1													
			Bond-Breaker	2.2													
			Sealant	2.4													
			SD-07 Certificates Sealant	2.4													
		08110	SD-02 Shop Drawings														
			Doors	2.1													
			Doors	2.1													
			Frames	2.5													
			Frames	2.5													
			Accessories	2.3													
			SD-03 Product Data														

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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	
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		08110	Doors	2.1													
			Frames	2.5													
			Accessories	2.3													
		08120	SD-02 Shop Drawings														
			Doors and frames	2.1	G												
			SD-08 Manufacturer's Instructions														
			Doors and frames	2.1													
		08210	SD-02 Shop Drawings														
			Doors	2.1													
			SD-03 Product Data														
			Doors	2.1													
			Accessories	2.2													
			Water-resistant sealer warranty	2.3.7 1.4													
			Fire resistance rating	2.1.2													
			SD-06 Test Reports														
			Split resistance	2.4													
			Cycle-slam	2.4													
			Hinge loading resistance	2.4													
		08330a	SD-02 Shop Drawings														
			Overhead Rolling Door Unit														
			SD-03 Product Data														
			Overhead Rolling Door Unit														
			SD-04 Samples														
			Overhead Rolling Door Unit														

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		08330a	SD-10 Operation and Maintenance Data														
			Maintenance and Repair Manual														
		08390	SD-02 Shop Drawings														
			Installation	3.1	G												
			SD-03 Product Data														
			Blast Resistant Door		G												
			Design Requirements	1.3.1	G												
			Manufacturer's Field Service	3.3													
			SD-06 Test Reports														
			Tests	3.2	G												
			Tests, Inspections, and Verifications	2.6													
			Fire Rating Test and Inspection	2.6.4	G												
			Prototype Blast Test		G												
			SD-07 Certificates														
			Materials	2.1	G												
			Fire-Rated Door Assemblies	2.6.4	G												
			SD-10 Operation and Maintenance Data														
			Blast Resistant Door														
		08510	SD-02 Shop Drawings														
			Windows	2.2													
			SD-03 Product Data														
			Fasteners	2.6.2													
			Accessories	2.6													

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		08510	SD-04 Samples														
			Color coating	2.7.1													
			Windows	2.2	G												
			SD-05 Design Data														
			Calculations	2.2													
			SD-06 Test Reports														
			Air infiltration	1.3.1													
			Water infiltration	1.3.1													
		08520a	SD-02 Shop Drawings														
			Aluminum Windows														
			SD-03 Product Data														
			Aluminum Windows														
			SD-04 Samples														
			Aluminum Windows		G												
			SD-05 Design Data														
			calculations	2.1													
			SD-06 Test Reports														
			Aluminum Windows														
			SD-07 Certificates														
			Aluminum Windows														
		08710	SD-02 Shop Drawings														
			Hardware schedule	1.3													
			Keying system	2.3.6													
			SD-03 Product Data														
			Hardware items	2.3													
			Card Key Access Controls														

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FY03 MCA PHASE 2C1, WHOLE BARRACKS RENEWAL, SCHOFIELD						OAHU, HI											
ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH	GOVT CLASSIFICATION REVIEWER	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION		APPROVING AUTHORITY					MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
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		08710	SD-08 Manufacturer's Instructions Installation	3.1													
			SD-10 Operation and Maintenance Data														
			Hardware Schedule	1.3													
			SD-11 Closeout Submittals Key biting	1.4													
		08810a	SD-02 Shop Drawings Glazing and materials and accessories														
			SD-03 Product Data Glass														
			Glazing Accessories	2.4													
			SD-04 Samples Glass		G												
			SD-05 Design Data calculations	1.4.2													
			SD-07 Certificates Glass														
			Glazing Accessories	2.4													
		09100N	SD-02 Shop Drawings Metal support systems	2.1													
		09250	SD-03 Product Data Cementitious backer units	2.1.3													
			Water-Resistant Gypsum Backing Board	2.1.2													

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		09250	Accessories	2.1.7													
			SD-07 Certificates														
			Asbestos Free Materials	2.1													
		09310A	SD-03 Product Data														
			Tile	2.1													
			Tile	2.1													
			Setting-Bed	2.2													
			Mortar and Grout	2.4													
			Mortar and Grout	2.4													
			SD-04 Samples														
			Tile	2.1													
			Accessories	2.1.3													
			Marble Thresholds	2.5													
			SD-07 Certificates														
			Tile	2.1													
			Mortar and Grout	2.4													
		09510A	SD-02 Shop Drawings														
			Approved Detail Drawings	1.3													
			SD-03 Product Data														
			Acoustical Ceiling Systems														
			SD-04 Samples														
			Acoustical Units	2.1													
			SD-06 Test Reports														
			Ceiling Attenuation Class and Test	2.6													
			SD-07 Certificates														

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		09510A	Acoustical Units	2.1													
		09650A	SD-03 Product Data														
			Resilient Flooring and Accessories														
			SD-04 Samples														
			Flooring	3.2													
			SD-06 Test Reports														
			Moisture Test	3.3													
		09680A	SD-02 Shop Drawings														
			Installation	3.4													
			Molding	2.3													
			SD-03 Product Data														
			Carpet and Accessories														
			Surface Preparation	3.1													
			Installation	3.4													
			Regulatory Requirements	1.3													
			SD-04 Samples														
			Carpet and Accessories														
			Molding	2.3													
			SD-06 Test Reports														
			Moisture and Alkalinity Tests	3.2													
			SD-07 Certificates														
			Carpet and Accessories														
			SD-10 Operation and Maintenance														
			Data														
			Carpet and Accessories														

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		09680A	Cleaning and Protection	3.5													
		09720A	SD-03 Product Data														
			Wallcoverings	2.1													
			Manufacturer's Instructions														
			Installation	3.3													
			Maintenance														
			Clean-Up	3.4													
			SD-04 Samples														
			Wallcoverings	2.1													
			SD-07 Certificates														
			Wallcoverings	2.1													
		09880	SD-03 Product Data														
			Acrylic Textured Wall Coating														
			SD-04 Samples														
			Color														
			Acrylic Textured Wall Coating														
			SD-07 Certificates														
			Applicator's Qualifications														
			Acrylic Textured Wall Coating														
			SD-08 Manufacturer's Instructions														
			Mixing and Thinning														
			Application														
		09900	SD-02 Shop Drawings														
			Piping identification	3.10													
			stencil	3.10													
			SD-03 Product Data														

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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		
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		09900	Coating	2.1													
			Manufacturer's Technical Data Sheets	2.1													
			SD-04 Samples														
			Color	1.9	G												
			SD-07 Certificates														
			Applicator's qualifications	1.3													
			Qualification Testing	1.4.1.2													
			SD-08 Manufacturer's Instructions														
			Application instructions														
			Mixing	3.6.2													
			Manufacturer's Material Safety Data Sheets	1.7.2													
			SD-10 Operation and Maintenance Data														
			Coatings:	2.1													
		09915	SD-04 Samples														
			Color Schedule	2.2													
		10100A	SD-03 Product Data														
			Visual Display Boards														
			SD-04 Samples														
			Aluminum	2.2.3													
			Porcelain Enamel	2.2.1													
			Materials	2.2													
			07 Certificates														
			Visual Display Boards														

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		10160A	SD-02 Shop Drawings Approved Detail Drawings	1.3													
			SD-03 Product Data Toilet Partition System														
			SD-04 Samples Toilet Partition System														
		10201N	SD-02 Shop Drawings Wall louvers	2.2													
			Door louvers	2.3													
			SD-04 Samples Wall louvers	2.2													
			Door louvers	2.3													
		10430A	SD-02 Shop Drawings Approved Detail Drawings	3.1													
			SD-03 Product Data Modular Exterior Signage System	2.1													
			Installation	3.1													
			SD-04 Samples Exterior Signs														
		10440A	SD-02 Shop Drawings Detail Drawings	3.1													
			SD-03 Product Data Installation	3.1													
			SD-04 Samples Interior Signage	1.3													

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		10650A	SD-02 Shop Drawings														
			Operable Partitions	2.2													
			SD-03 Product Data														
			Operable Partitions	2.2													
			SD-04 Samples														
			Operable Partitions	2.2													
			SD-07 Certificates														
			Materials	2.1													
			Operable Partitions	2.2													
			SD-10 Operation and Maintenance														
			Data														
			Operable Partitions	2.2													
		10800A	SD-03 Product Data														
			Finishes	2.1.2													
			Accessory Items	2.2													
			SD-04 Samples														
			Finishes	2.1.2													
			Accessory Items	2.2													
		11020	SD-02 Shop Drawings														
			Security vault doors														
			SD-03 Product Data														
			Vault Door and Frame	2.1													
			SD-07 Certificates														
			Vault Door and Frame	2.1													
			SD-08 Manufacturer's Instructions														
			Installation														

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		12320A	SD-02 Shop Drawings Installation	3.1													
			SD-03 Product Data Cabinets	2.1													
			SD-04 Samples Cabinets	2.1													
			SD-06 Test Reports Cabinets and Countertops														
		12490A	SD-02 Shop Drawings Approved Detail Drawings	3.1													
			SD-03 Product Data Window Treatments	3.1													
			Hardware	1.3													
			SD-04 Samples Window Treatments	3.1													
		13080	SD-02 Shop Drawings Bracing	3.1													
			Resilient Vibration Isolation Devices	3.4													
			Equipment Requirements	1.4													
			SD-03 Product Data Bracing	3.1	G												
			Equipment Requirements	1.4	G												
		13280A	SD-03 Product Data Respiratory Protection Program	1.12	G AE												
			Cleanup and Disposal	3.9	G AE												

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		13280A	Detailed Drawings		G AE												
			Materials and Equipment		G AE												
			Qualifications	1.5	G AE												
			Training Program	1.11	G AE												
			Medical Requirements	1.10	G AE												
			Encapsulants	2.1	G AE												
			SD-06 Test Reports														
			Exposure Assessment and Air Monitoring	3.7	G AE												
			Licenses, Permits and Notifications	1.14	G AE												
			SD-07 Certificates														
			Vacuum, Filtration and Ventilation Equipment														
		13283N	SD-03 Product Data														
			Vacuum filters	1.12.4	G												
			Respirators	1.12.1	G												
			SD-06 Test Reports														
			Sampling results	1.9	G												
			Assessment data report	1.10	G												
			SD-07 Certificates														
			Qualifications of CP	1.5	G												
			Testing laboratory	1.7	G												
			Third party consultant	1.6	G												

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		13283N	Lead-Based Paint/Lead-Containing Paint Removal Plan	1.8	G												
			Rental equipment notification	1.12.3	G												
			Respiratory protection program	1.11.4	G												
			Hazard communication program	1.11.5	G												
			disposal facility	3.2.5	G												
			Hazardous waste management plan	1.11.6	G												
			Vacuum filters	1.12.4	G												
			SD-08 Manufacturer's Instructions														
			Chemicals	2.1	G												
			Materials	2.2	G												
			Material safety data sheets	2.1	G												
			SD-11 Closeout Submittals														
			manifest	3.2.5	G												
			medical examinations	1.11.1	G												
			training certification	1.11.3.1	G												
		13286N	SD-07 Certificates														
			Qualifications of CIH	1.8.1	G												
			Training Certification	1.8.1	G												
			PCB and Lamp Removal Work Plan	1.8.2	G												
			PCB and Lamp Disposal Plan	1.8.3	G												
			SD-11 Closeout Submittals														
			Transporter certification	3.5.2	G												

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		13286N	Certification of Decontamination	3.2.4													
			Certificate of Disposal and/or recycling	3.5.2.1													
			DD Form 1348-1	3.5.2.1													
			Testing results														
		13288	SD-07 Certificates														
			Qualifications of CIH	1.5.3	G												
			Training Certification		G												
			Mercury removal work plan	1.5.4	G												
			Mercury disposal plan	1.5.5	G												
			SD-11 Closeout Submittals														
			Transporter certification	1.5.6	G												
			Transporter certification	3.6.1	G												
			Certification of Decontamination	1.5.6													
			Certificate of Disposal	1.5.6													
			DD Form 1348-1	1.5.6													
		13851A	SD-02 Shop Drawings														
			Fire Alarm Reporting System	1.4.1	G												
			SD-03 Product Data														
			Storage Batteries	2.2	G												
			Voltage Drop	1.6.1	G												
			Special Tools and Spare Parts	2.7.4													
			Technical Data and Computer Software	1.5	G												
			Training	3.6													
			Testing	3.5	G												

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		13851A	SD-06 Test Reports														
			Testing	3.5	G												
			SD-07 Certificates														
			Equipment	1.6.2	G												
			Qualifications	1.3.7	G												
			SD-10 Operation and Maintenance														
			Data														
			Technical Data and Computer	1.5	G												
			Software														
		13930A	SD-02 Shop Drawings														
			Sprinkler System	1.2	G												
			As-Built Shop Drawings		G												
			SD-03 Product Data														
			Fire Protection Related Submittals	3.1	G												
			Load Calculations for Sizing Sway	1.7.1.1	G												
			Bracing														
			Components and Equipment Data	1.7.1.2	G												
			Hydraulic Calculations	1.7.1.3	G												
			Hydraulic Calculations	1.8	G												
			Spare Parts	1.7.1.4													
			Preliminary Tests Procedures	1.7.1.5	G												
			Final Acceptance Test	1.7.1.6	G												
			Procedures														
			On-site Training Schedule	1.7.1.7	G												
			Preliminary Tests	3.10	G												
			Final Acceptance Test	3.11	G												

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		13930A	Fire Protection Specialist Qualifications	1.7.1.8	G												
			Sprinkler System Installer Qualifications	1.7.1.9	G												
			Sprinkler System Installer Qualifications	1.10	G												
			SD-06 Test Reports														
			Preliminary Tests Report	1.7.2.1	G												
			Final Acceptance Test Report	1.7.2.2	G												
			SD-07 Certificates														
			Fire Protection Specialist Inspection	1.7.3	G												
			SD-10 Operation and Maintenance Data														
			Wet Pipe Sprinkler System	1.7.3													
		14240A	SD-02 Shop Drawings														
			Elevator System														
			SD-03 Product Data														
			Training Data														
			Elevator System														
			Framed Instructions	3.5													
			Test Procedures		G												
			SD-04 Samples														
			Finishes														
			SD-06 Test Reports														
			Testing	3.4													

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		14240A	SD-07 Certificates														
			Qualification Certificates														
			SD-10 Operation and Maintenance														
			Data														
			Elevator System		G												
		15070A	SD-02 Shop Drawings														
			Coupling and Bracing	3.1													
			Flexible Couplings or Joints	3.3													
			Equipment Requirements	1.3													
			Contractor Designed Bracing	1.2.4	G RE												
			SD-03 Product Data														
			Coupling and Bracing	3.1	G RE												
			Equipment Requirements	1.3	G RE												
			Contractor Designed Bracing	1.2.4	G RE												
			SD-07 Certificates														
			Flexible Ball Joints	2.2													
		15080A	SD-02 Shop Drawings														
			Mica Plates	3.2.2.4													
			SD-03 Product Data														
			General Materials	2.1													
			SD-04 Samples														
			Thermal Insulation Materials														
		15181A	SD-02 Shop Drawings														
			Piping System	2.4													
			SD-03 Product Data														
			Piping System	2.4													

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		15181A	Water Treatment Systems	2.12													
			Spare Parts														
			Qualifications	1.3													
			Field Tests	3.3													
			Demonstrations	3.4													
			Verification of Dimensions	1.6.1													
			SD-06 Test Reports														
			Field Tests	3.3													
			Condenser Water Quality Tests	3.3.3													
			One-Year Inspection	3.5													
			SD-07 Certificates														
			Service Organization	2.1													
			SD-10 Operation and Maintenance														
			Data														
			Operation Manuals														
			Maintenance Manuals	3.4													
			Water Treatment Systems	2.12													
		15400A	SD-02 Shop Drawings														
			Plumbing System	3.8.1													
			Electrical Schematics														
			SD-03 Product Data														
			Welding														
			Plumbing Fixture Schedule	3.9													
			Vibration-Absorbing Features	3.4													
			Plumbing System	3.8.1													
			SD-06 Test Reports														

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		15400A	Tests, Flushing and Disinfection Backflow Prevention Assembly Tests	3.8													
			SD-07 Certificates														
			Materials and Equipment														
			Bolts	2.1.1													
			SD-10 Operation and Maintenance Data														
			Plumbing System	3.8.1													
		15620A	SD-02 Shop Drawings														
			Drawings														
			Installation	3.1													
			SD-03 Product Data														
			Refrigeration System	3.1.1													
			Spare Parts														
			Posted Instructions	3.5													
			Verification of Dimensions	1.5.1													
			Manufacturer's Multi-Year Compressor Warranty	1.6	G												
			Factory Tests	2.9													
			System Performance Tests	3.1.1.2													
			System Performance Tests	3.4													
			Demonstrations	3.5													
			SD-06 Test Reports														
			Factory Tests	2.9													
			System Performance Tests	3.1.1.2													

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		15620A	System Performance Tests	3.4													
			SD-07 Certificates														
			Refrigeration System	3.1.1													
			Service Organization	2.1													
			SD-10 Operation and Maintenance Data														
			Operation Manuals														
			Maintenance Manuals	3.5													
		15645A	SD-03 Product Data														
			Cooling Tower	2.5													
			Spare Parts														
			Posted Instructions	3.4													
			Performance Tests	3.3													
			Demonstrations	3.4													
			Verification of Dimensions	1.5.1													
			SD-06 Test Reports														
			Performance Tests	3.3													
			SD-07 Certificates														
			Service Organization	2.1													
			SD-10 Operation and Maintenance Data														
			Operation Manuals														
			Maintenance Manuals	3.4													
		15895A	SD-02 Shop Drawings														
			Drawings	3.1.9													
			Installation	3.1													

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SECTION 02531A

SANITARY SEWERS

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 in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 74	(1998) Cast Iron Soil Pipe and Fittings
ASTM A 276	(2000a) Stainless Steel Bars and Shapes
ASTM C 33	(1999a) Concrete Aggregates
ASTM C 76	(2000) Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
ASTM C 94/C 94M	(2000) Ready-Mixed Concrete
ASTM C 150	(2000) Portland Cement
ASTM C 260	(2000) Air-Entraining Admixtures for Concrete
ASTM C 270	(2000) Mortar for Unit Masonry
ASTM C 425	(2000) Compression Joints for Vitriified Clay Pipe and Fittings
ASTM C 443M	(2001) Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets (Metric)
ASTM C 478	(1997) Precast Reinforced Concrete Manhole Sections
ASTM C 564	(1997) Rubber Gaskets for Cast Iron Soil Pipe and Fittings
ASTM C 700	(2000) Vitriified Clay Pipe, Extra Strength, Standard Strength, and Perforated
ASTM C 828	(1998) Low-Pressure Air Test of Vitriified Clay Pipe Lines
ASTM C 924M	(1998) Concrete Pipe Sewer Lines by Low-Pressure Air Test Method (Metric)

ASTM C 972	(2000) Compression-Recovery of Tape Sealant
ASTM D 412	(1998a) Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers - Tension
ASTM D 624	(2000) Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers
ASTM D 1248	(2000a) Polyethylene Plastics Extrusion Materials for Wire and Cable
ASTM D 1784	(1999a) Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds
ASTM D 2680	(1995a) Acrylonitrile-Butadiene-Styrene (ABS) and Poly(Vinyl Chloride) (PVC) Composite Sewer Piping
ASTM D 2751	(1996a) Acrylonitrile-Butadiene-Styrene (ABS) Sewer Pipe and Fittings
ASTM D 3034	(1998) Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings
ASTM D 3212	(1996a) Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
ASTM D 3350	(2000) Polyethylene Plastics Pipe and Fittings Materials
ASTM F 402	(1993; R 1999) Safe Handling of Solvent Cements, Primers, and Cleaners Used for Joining Thermoplastic Pipe and Fittings
ASTM F 714	(2001) Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter
ASTM F 794	(1999) Poly(Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter
ASTM F 894	(1998a) Polyethylene (PE) Large Diameter Profile Wall Sewer and Drain Pipe
ASTM F 949	(2001a) Poly(Vinyl Chloride) (PVC) Corrugated Sewer Pipe with a Smooth Interior and Fittings

AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA C110	(1998) Ductile-Iron and Gray-Iron Fittings, 3 In. Through 48 In. (75 mm through 1200 mm), for Water and Other
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Liquids

AWWA C111	(2000) Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
AWWA C115	(1999) Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges
AWWA C151	(1996) Ductile-Iron Pipe, Centrifugally Cast, for Water or Other Liquids

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 49	(1994) Hazardous Chemicals Data
NFPA 325-1	(1994) Fire Hazard Properties of Flammable Liquids, Gases, and Volatile Solids
NFPA 704	(1996) Identification of the Fire Hazards of Materials for Emergency Response

UNI-BELL PVC PIPE ASSOCIATION (UBPPA)

UBPPA UNI-B-6	(1990) Recommended Practice for the Low-Pressure Air Testing of Installed Sewer Pipe
UBPPA UNI-B-9	(1990; Addenda 1994) Recommended Performance Specification for Polyvinyl Chloride (PVC) Profile Wall Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter (Nominal Pipe Sizes 4-48 inch)

1.2 GENERAL REQUIREMENTS

The construction required herein shall include appurtenant structures and building sewers to points of connection with the building drains 1.5 m outside the building to which the sewer system is to be connected. The Contractor shall replace damaged material and redo unacceptable work at no additional cost to the Government. Excavation and backfilling is specified in Section 02316a EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITIES SYSTEMS. Backfilling shall be accomplished after inspection by the Contracting Officer. Before, during, and after installation, plastic pipe and fittings shall be protected from any environment that would result in damage or deterioration to the material. The Contractor shall have a copy of the manufacturer's instructions available at the construction site at all times and shall follow these instructions unless directed otherwise by the Contracting Officer. Solvents, solvent compounds, lubricants, elastomeric gaskets, and any similar materials required to install the plastic pipe shall be stored in accordance with the manufacturer's recommendation and shall be discarded if the storage period exceeds the recommended shelf life. Solvents in use shall be discarded when the recommended pot life is exceeded.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When

used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-07 Certificates

Portland Cement

Certificates of compliance stating the type of cement used in manufacture of concrete pipe, fittings and precast manholes.

Joints

Certificates of compliance stating that the fittings or gaskets used for waste drains or lines designated on the plans as are oil resistant.

PART 2 PRODUCTS

2.1 PIPE

Pipe shall conform to the respective specifications and other requirements specified below.

2.1.1 Plastic Pipe

Acrylonitrile-butadiene-styrene (ABS) and polyvinyl chloride (PVC) composite sewer piping shall conform to ASTM D 2680. Size 200 mm (8 inch) through 380 mm (15 inch) diameter.

2.1.1.1 ABS Pipe

ASTM D 2751.

2.1.1.2 PVC Pipe

ASTM D 3034, Type PSM with a maximum SDR of 35, Size 380 mm (15 inch) or less in diameter. ASTM F 949 for corrugated sewer pipes with a smooth interior. UBPPA UNI-B-9 and ASTM F 794, Series 46, for ribbed sewer pipe with smooth interior, size 200 mm (8 inch) through 1200 mm (48 inch) diameters. PVC shall be certified by the compounder as meeting the requirements of ASTM D 1784, cell Class 12454B. The pipe stiffness shall be greater than or equal to 735/D for cohesionless material pipe trench backfills.

2.1.1.3 High Density Polyethylene Pipe

ASTM F 894, Class 63, size 450 mm (18 inch) through 3000 mm (120 inch). ASTM F 714, size 100 mm (4 inch) through 1200 mm (48 inch). The polyethylene shall be certified by the resin producer as meeting the requirements of ASTM D 3350, cell Class 334433C. The pipe stiffness shall be greater than or equal to 1170/D for cohesionless material pipe trench backfills.

2.1.2 Ductile Iron Pipe

Pipe shall conform to AWWA C151 unless otherwise shown or specified.

2.1.3 Cast Iron Soil Pipe

Cast iron soil pipe shall conform to ASTM A 74, Class SV, except where Class XH is indicated.

2.1.4 Clay Pipe

Extra strength bell and spigot type. ASTM C 700.

2.2 REQUIREMENTS FOR FITTINGS

Fittings shall be compatible with the pipe supplied and shall have a strength not less than that of the pipe. Fittings shall conform to the respective specifications and other requirements specified below.

2.2.1 Fittings for Plastic Pipe

ABS and PVC composite sewer pipe fittings shall conform to ASTM D 2680.

2.2.1.1 Fittings for ABS Pipe

ASTM D 2751.

2.2.1.2 Fittings for PVC Pipe

ASTM D 3034 for type PSM pipe. ASTM F 949 for corrugated sewer pipe with a smooth interior. UBPPA UNI-B-9 and ASTM F 794, Series 46, for ribbed sewer pipe with smooth interior.

2.2.1.3 Fittings for High Density Polyethylene Pipe

ASTM F 894.

2.2.2 Fittings for Ductile Iron Pipe

Mechanical fittings shall conform to AWWA C110, rated for 1.03 MPa (150 psi). Push-on fittings shall conform to AWWA C110 and AWWA C111, rated for 10.3 MPa (150 psi).

2.2.3 Fittings for Cast Iron Soil Pipe

ASTM A 74.

2.2.4 Fittings for Clay Pipe

ASTM C 700.

2.3 JOINTS

Joint installation shall comply with the manufacturer's instructions. "Biobarrier" or other approved equal root barrier shall be wrapped around all joints of new sewer pipes and appurtenances within the spread (branches and leaves) of existing trees and 6m (20 ft) from center of newly planted trees. The root deterrent material shall extend a minimum of 230mm (9") on either side of the joint. Overlap of material shall be 100mm (4-inch) minimum. Method of fastening material to the pipe shall be with plastic ties or as recommended by the manufacturer and subject to the approval of the Contracting Officer.

2.3.1 Plastic Pipe Jointing

Flexible plastic pipe (PVC or high density polyethylene pipe) gasketed joints shall conform to ASTM D 3212.

2.3.1.1 ABS Pipe Jointing

ASTM D 2751, solvent weld or bell and spigot O-ring joint, size 300 mm (12 inches) or less in diameter, dimensions and tolerances in accordance with Table 2 of ASTM D 2751.

2.3.1.2 High Density Polyethylene Pipe Jointing

Rubber gasket joints shall conform to ASTM C 443M .

2.3.2 Ductile Iron Pipe Jointing

Push-on joints shall conform to AWWA C111. Mechanical joints shall conform to AWWA C111 as modified by AWWA C151. Flanged joints shall conform to AWWA C115.

2.3.3 Cast Iron Soil Pipe Jointing

Rubber gaskets for compression joints shall conform to ASTM C 564. Packing material for caulked joints shall be twisted jute or oakum, tarred type, or asphalt-saturated cellulose-fiber. Joints for acid resisting cast iron soil pipe shall be made with acid resistant non-asbestos packing. The packing shall not contain material which would affect adhesion of the joint sealing material to the pipe. Lead shall be suitable for caulking of joints.

2.3.4 Clay Pipe Jointing

Compression joints shall conform to ASTM C 425.

2.4 BRANCH CONNECTIONS

Branch connections shall be made by use of regular fittings or solvent cemented saddles as approved. Saddles for ABS and PVC composite pipe shall conform to Figure 2 of ASTM D 2680; saddles for ABS pipe shall comply with Table 3 of ASTM D 2751; and saddles for PVC pipe shall conform to Table 4 of ASTM D 3034.

2.5 FRAMES AND COVERS

Frames and covers shall be cast iron, ductile iron. Cast iron frames and covers shall be as indicated or shall be of type suitable for the application, circular, without vent holes. The frames and covers shall have a combined weight of not less than 181.4 kg (400 pounds). Cast iron and ductile iron frames and covers shall be coated with an approved coal tar compound. Coating thickness shall be approximately 20 mils dry film thickness. The word "SEWER" shall be cast into covers so that it is plainly visible.

2.6 STAINLESS STEEL LADDER

A steel ladder shall be provided where the depth of a manhole exceeds 1.0 m (3 feet). The ladder shall not be less than 406 mm (16 inches) in width, with 19 mm (3/4 inch) diameter rungs spaced 305 mm (12 inches) apart.

The two stringers shall be a minimum 10 mm (3/8 inch) thick and 51 mm (2 inch) wide. Ladders and inserts shall be fabricated of AISI Type 304 stainless steel in conformance with ASTM A 276.

2.7 CEMENT MORTAR

Cement mortar shall conform to ASTM C 270, Type M with Type II cement.

2.7.1 Portland Cement

Portland cement shall conform to ASTM C 150, Type II V for concrete used in concrete pipe, concrete pipe fittings, and manholes and type optional with the Contractor for cement used in concrete cradle, concrete encasement, and thrust blocking. Air-entraining admixture conforming to ASTM C 260 shall be used with Type V cement. Where aggregates are alkali reactive, as determined by Appendix XI of ASTM C 33, a cement containing less than 0.60 percent alkalies shall be used.

2.7.2 Portland Cement Concrete

Portland cement concrete shall conform to ASTM C 94/C 94M, compressive strength of 28 MPa at 28 days, except for concrete cradle and encasement or concrete blocks for manholes. Concrete used for cradle and encasement shall have a compressive strength of 17 MPa minimum at 28 days. Concrete in place shall be protected from freezing and moisture loss for 7 days.

2.8 STRUCTURES

2.8.1 Precast Reinforced Concrete Manhole Sections

Precast reinforced concrete manhole sections shall conform to ASTM C 478, except that portland cement shall be as specified herein. Joints shall be cement mortar, an approved mastic, rubber gaskets, a combination of these types; or the use of external preformed rubber joint seals and extruded rolls of rubber with mastic adhesive on one side.

2.9 MANHOLE

2.9.1 Manhole Inserts

Manholes in paved areas (and unpaved areas subject to ponding) shall have a manhole insert fully seated around the manhole frame rim to prevent water from infiltrating between the cover and the manhole frame rim. (Manhole frame shall be cleaned of all dirt and debris prior to placing the manhole insert on the rim.)

2.9.1.1 Manhole (similar to "No Flow Inflow Dish" or approved equal)

Manhole (similar to "No Flow Inflow Dish" or approved equal) shall be made of high density polyethylene copolymer material that meets ASTM D 1248, Class A, Category 5, Type 111 (the insert shall have a minimum impact brittleness temperature of -180 deg F). The thickness shall be uniform 3mm or greater. The insert shall be manufactured to the dimensions as shown on the contract drawings to allow easy installation within the manhole frame. A lift strap shall be attached to the rising edge of the bowl of the insert. The lift strap shall be made of 1" width woven polypropylene web and shall be seared on all cut ends to prevent unraveling. The lift strap shall be attached to the insert by means of a stainless steel rivet. Location of the lift strap shall be such as to provide easy visual

location. Ventilation of the Insert shall be via a vent hole located on the side wall of the dish 19mm below the lip. The hole thus placed allows a maximum release of 38 liters per 24 hours and is not affected by debris that might collect at the bottom of the dish.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Adjacent Facilities

3.1.1.1 Water Lines

Where the location of the sewer is not clearly defined by dimensions on the drawings, the sewer shall not be closer horizontally than 3 m to a water-supply main or service line, except that where the bottom of the water pipe will be at least 300 mm above the top of the sewer pipe, the horizontal spacing may be a minimum of 2 m. Where gravity-flow sewers cross above water lines, the sewer pipe for a distance of 3 m on each side of the crossing shall be fully encased in concrete or shall be acceptable pressure pipe with no joint closer horizontally than 1 m to the crossing. The thickness of the concrete encasement including that at the pipe joints shall be not less than 100 mm.

3.1.1.2 Sleeves

Sewer pipe shall be encased in a sleeve of rigid conduit if required in paragraph 3.1.1.3 Structural Foundations. When sleeves are required, the pipe sleeve shall be reinforced concrete pipe for storm drains in accordance with ASTM C 76, Class V as specified in Section 02630a STORM-DRAINAGE SYSTEM. A minimum clearance of at least 50mm between the inner wall of the sleeve and the maximum outside diameter of the sleeved pipe and joints shall be provided. Sand bedding or suitable pipe support shall be provided for the sewer pipe through the sleeve.

3.1.1.3 Structural Foundations

Where sewer pipe is to be installed within 1 m of an existing or proposed building or structural foundation such as a retaining wall, control tower footing, water tank footing, or any similar structure, the sewer pipe shall be sleeved as specified above. Contractor shall ensure there is no damage to these structures, and no settlement or movement of foundations or footing.

3.1.1.4 Abandoned Manholes and Sewer Lines:

Unless otherwise indicated, all existing sewer manholes indicated to be demolished on the demolition plan shall be demolished and completely removed from the site. Sewer manholes indicated to be abandoned shall have all connecting sewer lines plugged with concrete at each end. The concrete plug shall extend from the manhole a minimum 2 feet into the abandoned line.

Abandoned sewer manholes should have the manhole bottoms cracked to permit subsurface water drainage through the bottom. The manhole should be backfilled with (a) compacted granular material such base course or S4C or (b) lean concrete. The manhole cover should be completely removed along with the manhole cone or the upper 3 feet for cast-in-place manholes.

3.1.2 Pipe Laying

- a. Pipe shall be protected during handling against impact shocks and free fall; the pipe interior shall be free of extraneous material.
- b. Pipe laying shall proceed upgrade with the spigot ends of bell-and-spigot pipe and tongue ends of tongue-and-groove pipe pointing in the direction of the flow. Each pipe shall be laid accurately to the line and grade shown on the drawings. Pipe shall be laid and centered so that the sewer has a uniform invert. As the work progresses, the interior of the sewer shall be cleared of all superfluous materials.
- c. Before making pipe joints, all surfaces of the portions of the pipe to be joined shall be clean and dry. Lubricants, primers, and adhesives shall be used as recommended by the pipe manufacturer. The joints shall then be placed, fitted, joined, and adjusted to obtain the degree of water tightness required.
- d. ABS composite pipe ends with exposed truss and filler material shall be coated with solvent weld material before making the joint to prevent water or air passage at the joint between the inner and outer wall of the pipe.
- e. Installations of solvent weld joint pipe, using ABS or PVC pipe and fittings shall be in accordance with ASTM F 402. The Contractor shall ensure adequate trench ventilation and protection for workers installing the pipe.

3.1.2.1 Caulked Joints

The packing material shall be well packed into the annular space to prevent the entrance of lead into the pipe. The remainder of the space shall be filled with molten lead that is hot enough to show a rapid change in color when stirred. Scum shall be removed before pouring. The lead shall be caulked to form a tight joint without overstraining the bell and shall have a minimum depth of 25 mm after caulking.

3.1.2.2 Trenches

Trenches shall be kept free of water and as dry as possible during bedding, laying, and jointing and for as long a period as required. When work is not in progress, open ends of pipe and fittings shall be satisfactorily closed so that no trench water or other material will enter the pipe or fittings.

3.1.2.3 Backfill

As soon as possible after the joint is made, sufficient backfill material shall be placed along the pipe to prevent pipe movement off line or grade. Plastic pipe shall be completely covered to prevent damage from ultraviolet light.

3.1.2.4 Width of Trench

If the maximum width of the trench at the top of the pipe, as specified in Section 02316a EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITIES SYSTEMS, is exceeded for any reason other than by direction, the Contractor

shall install, at no additional cost to the Government, concrete cradling, pipe encasement, or other bedding required to support the added load of the backfill.

3.1.2.5 Jointing

Joints between different pipe materials shall be made as specified, using approved jointing materials.

3.1.2.6 Handling and Storage

Pipe, fittings and joint material shall be handled and stored in accordance with the manufacturer's recommendations. Storage facilities for plastic pipe, fittings, joint materials and solvents shall be classified and marked in accordance with NFPA 704, with classification as indicated in NFPA 49 and NFPA 325-1.

3.1.3 Leakage Tests

Lines shall be tested for leakage by low pressure air testing, infiltration tests or exfiltration tests, as appropriate. Low pressure air testing for vitrified clay pipes shall be as prescribed in ASTM C 828. Low pressure air testing for concrete pipes shall be as prescribed in ASTM C 828. Low pressure air testing for PVC pipe shall be as prescribed in UBPPA UNI-B-6. Low pressure air testing procedures for other pipe materials shall use the pressures and testing times prescribed in ASTM C 828 and ASTM C 924M, after consultation with the pipe manufacturer. Prior to infiltration or exfiltration tests, the trench shall be backfilled up to at least the lower half of the pipe. If required, sufficient additional backfill shall be placed to prevent pipe movement during testing, leaving the joints uncovered to permit inspection. Visible leaks encountered shall be corrected regardless of leakage test results. When the water table is 600 mm or more above the top of the pipe at the upper end of the pipeline section to be tested, infiltration shall be measured using a suitable weir or other device acceptable to the Contracting Officer. When the Contracting Officer determines that infiltration cannot be properly tested, an exfiltration test shall be made by filling the line to be tested with water so that a head of at least 600 mm is provided above both the water table and the top of the pipe at the upper end of the pipeline to be tested. The filled line shall be allowed to stand until the pipe has reached its maximum absorption, but not less than 4 hours. After absorption, the head shall be re-established. The amount of water required to maintain this water level during a 2-hour test period shall be measured. Leakage as measured by either the infiltration test or exfiltration test shall not exceed 94 L per 1 mm diameter per km of pipeline per day. When leakage exceeds the maximum amount specified, satisfactory correction shall be made and retesting accomplished. Testing, correction, and retesting shall be made at no additional cost to the Government.

3.1.4 Test for Deflection

When flexible pipe is used, a deflection test shall be made on the entire length of the installed pipeline not less than 30 days after the completion of all work including the leakage test, backfill, and placement of any fill, grading, paving, concrete, or superimposed loads. Deflection shall be determined by use of a deflection device or by use of a spherical, spheroidal, or elliptical ball, a cylinder, or circular sections fused to a common shaft. The ball, cylinder, or circular sections shall have a diameter, or minor diameter as applicable, of 92.5 percent of the inside

diameter of the pipe, but 95 percent for RPMP and RTRP. A tolerance of plus 0.5 percent will be permitted. The ball, cylinder, or circular sections shall be of a homogeneous material throughout, shall have a density greater than 1.0 as related to water at 4.0 degrees C (39.2 degrees F), and shall have a surface brinell hardness of not less than 150. The device shall be center bored and through bolted with a 6 mm (1/4 inch) minimum diameter steel shaft having a yield strength of 480 MPa (70,000 psi)

or more, with eyes at each end for attaching pulling cables. The eye shall be suitably backed with flange or heavy washer; a pull exerted on the opposite end of the shaft shall produce compression throughout the remote end of the ball, cylinder or circular section. Circular sections shall be spaced so that the distance from the external faces of the front and back sections shall equal or exceed the diameter of the circular section. Failure of the ball, cylinder, or circular section to pass freely through a pipe run, either by being pulled through or by being flushed through with water, shall be cause for rejection of that run. When a deflection device is used for the test in lieu of the ball, cylinder, or circular sections described, such device shall be approved prior to use. The device shall be sensitive to 1.0 percent of the diameter of the pipe being measured and shall be accurate to 1.0 percent of the indicated dimension. Installed pipe showing deflections greater than 7.5 percent of the normal diameter of the pipe, or 5 percent for RTRP and RPMP, shall be retested by a run from the opposite direction. If the retest also fails, the suspect pipe shall be replaced at no cost to the Government.

3.1.5 Sewage Spills

Any sewage spill occurring as a result of Contractor's operations shall be stopped immediately. DPW Environmental Division shall be notified immediately (656-2878 x1049). Contaminated areas shall be cleaned and disinfected. Contractor shall accomplish any required shoreline monitoring of waters as required by the State Dept of Health and/or Environmental Protection Agency. The Contractor shall develop an after-action plan addressing problems and corrective actions that will be implemented to prevent spills from occurring again.

3.2 CONCRETE CRADLE AND ENCASEMENT

The pipe shall be supported on a concrete cradle, or encased in concrete where indicated or directed.

3.3 INSTALLATION OF WYE BRANCHES

Wye branches shall be installed where sewer connections are indicated or where directed. Cutting into piping for connections shall not be done except in special approved cases. When the connecting pipe cannot be adequately supported on undisturbed earth or tamped backfill, the pipe shall be encased in concrete backfill or supported on a concrete cradle as directed. Concrete required because of conditions resulting from faulty construction methods or negligence by the Contractor shall be installed at no additional cost to the Government. The installation of wye branches in an existing sewer shall be made by a method which does not damage the integrity of the existing sewer. One acceptable method consists of removing one pipe section, breaking off the upper half of the bell of the next lower section and half of the running bell of wye section. After placing the new section, it shall be rotated so that the broken half of the bell will be at the bottom. The two joints shall then be made with joint packing and cement mortar.

3.4 MANHOLE DETAILS

3.4.1 General Requirements

Manholes shall be constructed of concrete or precast concrete manhole sections. The invert channels shall be smooth and semicircular in shape conforming to the inside of the adjacent sewer section. Changes in direction of flow shall be made with a smooth curve of as large a radius as the size of the manhole will permit. Changes in size and grade of the channels shall be made gradually and evenly. The invert channels shall be formed directly in the concrete of the manhole base, or shall be built up with brick and mortar, or shall be half tile laid in concrete, or shall be constructed by laying full section sewer pipe through the manhole and breaking out the top half after the surrounding concrete has hardened. Pipe connections shall be made to manhole using water stops, standard O-ring joints, special manhole coupling, or shall be made in accordance with the manufacturer's recommendation. The Contractor's proposed method of connection, list of materials selected, and specials required, shall be approved prior to installation. The floor of the manhole outside the channels shall be smooth and shall slope toward the channels not less than 100 mm per meter nor more than 200 mm per meter. Free drop inside the manholes shall not exceed 500 mm, measured from the invert of the inlet pipe to the top of the floor of the manhole outside the channels; drop manholes shall be constructed whenever the free drop would otherwise be greater than 500 mm.

3.4.2 Steel Ladder Anchorage

Ladder shall be adequately anchored to the wall by means of steel inserts spaced not more than 1850 mm apart vertically, and shall be installed to provide at least 150 mm of space between the wall and the rungs. The wall along the line of the ladder shall be vertical for its entire length.

3.4.3 Jointing, Plastering and Sealing

Mortar joints shall be completely filled and shall be smooth and free from surplus mortar on the inside of the manhole. Mortar and mastic joints between precast rings shall be full-bedded in jointing compound and shall be smoothed to a uniform surface on both the interior and exterior of the manhole. Installation of rubber gasket joints between precast rings shall be in accordance with the recommendations of the manufacturer. Precast rings may also be sealed by the use of extruded rolls of rubber with mastic adhesive on one side.

3.4.4 Setting of Frames and Covers

Unless otherwise indicated, tops of frames and covers shall be set flush with finished grade in paved areas or 50 mm higher than finished grade in unpaved areas. Frame and cover assemblies shall be sealed to manhole sections using external preformed rubber joint seals that meet the requirements of ASTM D 412 and ASTM D 624, or other methods specified in paragraph Jointing, Plastering and Sealing, unless otherwise specified.

3.4.5 External Preformed Rubber Joint Seals

External preformed rubber joint seals and extruded rolls of rubber with mastic adhesive shall meet the requirements of ASTM D 412 and ASTM C 972 to ensure conformance with paragraph Leakage Tests. The seal shall be multi-section with neoprene rubber top section and all lower sections made

of Ethylene Propylene Di Monomer (EPDM) rubber with a minimum thickness of 1.5 mm. Each unit shall consist of a top and a bottom section and shall have mastic on the bottom of the bottom section and mastic on the top and bottom of the top section. The mastic shall be non-hardening butyl rubber sealant and shall seal to the cone/top slab of the manhole/catch basin and over the lip of the casting. One unit shall seal a casting and up to six, 50 mm adjusting rings. The bottom section shall be 305 mm in height. A 152 mm high top section will cover up to two, 50 mm adjusting rings. A 305 mm high bottom section will cover up to six, 50 mm adjusting rings. Extension sections shall cover up to two more adjusting rings. Each extension shall overlap the bottom section by 50 mm and shall be overlapped by the top section by 50 mm.

3.5 CONNECTING TO EXISTING MANHOLES

Pipe connections to existing manholes shall be made so that finish work will conform as nearly as practicable to the applicable requirements specified for new manholes, including all necessary concrete work, cutting, and shaping. The connection shall be centered on the manhole. Holes for the new pipe shall be of sufficient diameter to allow packing cement mortar around the entire periphery of the pipe but no larger than 1.5 times the diameter of the pipe. Cutting the manhole shall be done in a manner that will cause the least damage to the walls.

3.6 BUILDING CONNECTIONS

Building connections shall include the lines to and connection with the building waste drainage piping at a point approximately 1.5 m outside the building, unless otherwise indicated. Where building drain piping is not installed, the Contractor shall terminate the building connections approximately 1.5 m from the site of the building at a point and in a manner designated.

3.7 CLEANOUTS AND OTHER APPURTENANCES

Cleanouts and other appurtenances shall be installed where shown on the drawings or as directed by the Contracting Officer, and shall conform to the detail of the drawings.

-- End of Section --

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SECTION 02630A

STORM-DRAINAGE SYSTEM

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 in the text by basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS
(AASHTO)

AASHTO M 198 (1998) **Joints for Circular Concrete Sewer and Culvert Pipe Using Flexible Watertight Gaskets**

AMERICAN RAILWAY ENGINEERING & MAINTENANCE-OF-WAY ASSOCIATION
(AREMA)

AREMA Manual (1999) Manual for Railway Engineering (4 Vol.)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 48M (1994e1) Gray Iron Castings (Metric)

ASTM A 276 (2000ae1) Stainless Steel Bars and Shapes

ASTM A 536 (1984; R 1999e1) Ductile Iron Castings

ASTM A 929/A 929M (1997) Steel Sheet, Metallic-Coated by the Hot-Dip Process for Corrugated Steel Pipe

ASTM B 26/B 26M (1999) Aluminum-Alloy Sand Castings

ASTM C 32 (1999e1) Sewer and Manhole Brick (Made from Clay or Shale)

ASTM C 55 (1999) Concrete Brick

ASTM C 62 (2000) Building Brick (Solid Masonry Units Made from Clay or Shale)

ASTM C 76M (2000) Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe (Metric)

ASTM C 139 (1999) Concrete Masonry Units for Construction of Catch Basins and Manholes

ASTM C 231 (1997e1) Air Content of Freshly Mixed Concrete by the Pressure Method

ASTM C 270 (2000) Mortar for Unit Masonry

ASTM C 425 (2000) Compression Joints for Vitrified Clay Pipe and Fittings

ASTM C 443 (2001) Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets

ASTM C 443M (2001) Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets (Metric)

ASTM C 478M (1997) Precast Reinforced Concrete Manhole Sections (Metric)

ASTM C 789 (1998) Precast Reinforced Concrete Box Sections for Culverts, Storm Drains, and Sewers

ASTM C 828 (1998) Low-Pressure Air Test of Vitrified Clay Pipe Lines

ASTM C 850 (1998) Precast Reinforced Concrete Box Sections for Culverts, Storm Drains, and Sewers with Less Than 2 Ft. of Cover Subjected to Highway Loadings

ASTM C 877M (1994) External Sealing Bands for Noncircular Concrete Sewer, Storm Drain, and Culvert Pipe (Metric)

ASTM C 924M (1998) Concrete Pipe Sewer Lines by Low-Pressure Air Test Method (Metric)

ASTM C 1103M (1994) Joint Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines (Metric)

ASTM D 1056 (1998) Flexible Cellular Materials - Sponge or Expanded Rubber

ASTM D 1171 (1999) Rubber Deterioration - Surface Ozone Cracking Outdoors or Chamber (Triangular Specimen)

ASTM D 1557 (1998) Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/cu. ft. (2,700 kN-m/cu.m.))

ASTM D 1784 (1999a) Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds

ASTM D 1751 (1999) Preformed Expansion Joint Filler for Concrete Paving and Structural

	Construction (Nonextruding and Resilient Bituminous Types)
ASTM D 1752	(1984; R 1996e1) Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction
ASTM D 2167	(1994) Density and Unit Weight of Soil in Place by the Rubber Balloon Method
ASTM D 2922	(1996e1) Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
ASTM D 3017	(1988; R 1996e1) Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
ASTM D 3034	(1998) Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings
ASTM F 679	(1995) Poly(Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings
ASTM F 794	(1999) Poly(Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter
ASTM F 1417	(1992; R 1998) Installation Acceptance of Plastic Gravity Sewer Lines Using Low-Pressure Air

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Placing Pipe

Printed copies of the manufacturer's recommendations for installation procedures of the material being placed, prior to installation.

SD-04 Samples

Pipe for Culverts and Storm Drains

Samples of the following materials, before work is started:

SD-07 Certificates

Resin Certification
Pipeline Testing;
Hydrostatic Test on Watertight Joints;
Determination of Density;
Frame and Cover for Gratings;

Certified copies of test reports demonstrating conformance to applicable pipe specifications, before pipe is installed. Certification on the ability of frame and cover or gratings to carry the imposed live load.

1.3 DELIVERY, STORAGE, AND HANDLING

1.3.1 Delivery and Storage

Materials delivered to site shall be inspected for damage, unloaded, and stored with a minimum of handling. Materials shall not be stored directly on the ground. The inside of pipes and fittings shall be kept free of dirt and debris. Before, during, and after installation, plastic pipe and fittings shall be protected from any environment that would result in damage or deterioration to the material. The Contractor shall have a copy of the manufacturer's instructions available at the construction site at all times and shall follow these instructions unless directed otherwise by the Contracting Officer. Solvents, solvent compounds, lubricants, elastomeric gaskets, and any similar materials required to install plastic pipe shall be stored in accordance with the manufacturer's recommendations and shall be discarded if the storage period exceeds the recommended shelf life. Solvents in use shall be discarded when the recommended pot life is exceeded.

1.3.2 Handling

Materials shall be handled in a manner that ensures delivery to the trench in sound, undamaged condition. Pipe shall be carried to the trench, not dragged.

PART 2 PRODUCTS

2.1 PIPE FOR CULVERTS AND STORM DRAINS

Pipe for culverts and storm drains shall be of the sizes indicated and shall conform to the requirements specified.

2.1.1 Concrete Pipe

ASTM C 76M , Class II.

2.1.2 PVC Pipe

The pipe manufacturer's resin certification, indicating the cell classification of PVC used to manufacture the pipe, shall be submitted prior to installation of the pipe.

2.1.2.1 Type PSM PVC Pipe

ASTM D 3034, Type PSM, maximum SDR 35, produced from PVC certified by the compounder as meeting the requirements of ASTM D 1784, minimum cell class 12454-B.

2.1.2.2 Profile PVC Pipe

ASTM F 794, Series 46, produced from PVC certified by the compounder as meeting the requirements of ASTM D 1784, minimum cell class 12454-B.

2.1.2.3 Smooth Wall PVC Pipe

ASTM F 679 produced from PVC certified by the compounder as meeting the requirements of ASTM D 1784, minimum cell class 12454-B.

2.2 DRAINAGE STRUCTURES

2.2.1 Flared End Sections

Sections shall be of a standard design fabricated from zinc coated steel sheets meeting requirements of ASTM A 929/A 929M.

2.2.2 Precast Reinforced Concrete Box

For highway loadings with 600 mm of cover or more or subjected to dead load only, ASTM C 789; for less than 600 mm of cover subjected to highway loading, ASTM C 850.

2.3 MISCELLANEOUS MATERIALS

2.3.1 Concrete

Unless otherwise specified, concrete and reinforced concrete shall conform to the requirements for 172 MPa concrete under Section 03300 CAST-IN-PLACE STRUCTURAL CONCRETE. The concrete mixture shall have air content by volume of concrete, based on measurements made immediately after discharge from the mixer, of 5 to 7 percent when maximum size of coarse aggregate exceeds 37.5 mm. Air content shall be determined in accordance with ASTM C 231. The concrete covering over steel reinforcing shall not be less than 25 mm thick for covers and not less than 40 mm thick for walls and flooring. Concrete covering deposited directly against the ground shall have a thickness of at least 75 mm between steel and ground. Expansion-joint filler material shall conform to ASTM D 1751, or ASTM D 1752, or shall be resin-impregnated fiberboard conforming to the physical requirements of ASTM D 1752.

2.3.2 Mortar

Mortar for pipe joints, connections to other drainage structures, and brick or block construction shall conform to ASTM C 270, Type M, except that the maximum placement time shall be 1 hour. The quantity of water in the mixture shall be sufficient to produce a stiff workable mortar but in no case shall exceed 21 liters of water per sack of cement. Water shall be clean and free of harmful acids, alkalis, and organic impurities. The mortar shall be used within 30 minutes after the ingredients are mixed with water. The inside of the joint shall be wiped clean and finished smooth. The mortar head on the outside shall be protected from air and sun with a proper covering until satisfactorily cured.

2.3.3 Precast Concrete Segmental Blocks

Precast concrete segmental block shall conform to ASTM C 139, not more than 200 mm (8 inches) thick, not less than 200 mm (8 inches) long, and of such shape that joints can be sealed effectively and bonded with cement mortar.

2.3.4 Brick

Brick shall conform to ASTM C 62, Grade SW; ASTM C 55, Grade S-I or S-II; or ASTM C 32, Grade MS. Mortar for jointing and plastering shall consist of one part portland cement and two parts fine sand. Lime may be added to the mortar in a quantity not more than 25 percent of the volume of cement. The joints shall be filled completely and shall be smooth and free from surplus mortar on the inside of the structure. Brick structures shall be plastered with 10 mm of mortar over the entire outside surface of the walls. For square or rectangular structures, brick shall be laid in stretcher courses with a header course every sixth course. For round structures, brick shall be laid radially with every sixth course a stretcher course.

2.3.5 Precast Reinforced Concrete Manholes

Precast reinforced concrete manholes shall conform to ASTM C 478M . Joints between precast concrete risers and tops shall be full-bedded in cement mortar and shall be smoothed to a uniform surface on both interior and exterior of the structure.

2.3.6 Prefabricated Corrugated Metal Manholes

Manholes shall be of the type and design recommended by the manufacturer. Manholes shall be complete with frames and cover, or frames and gratings.

2.3.7 Frame and Cover for Gratings

Frame and cover for gratings shall be cast gray iron, ASTM A 48M , Class 35B; cast ductile iron, ASTM A 536, Grade 65-45-12; or cast aluminum, ASTM B 26/B 26M, Alloy 356.OT6. Weight, shape, size, and waterway openings for grates and curb inlets shall be as indicated on the plans.

2.3.8 Joints

2.3.8.1 Flexible Watertight Joints

- a. **Materials:** Flexible watertight joints shall be made with plastic or rubber-type gaskets for concrete pipe and with factory-fabricated resilient materials for clay pipe. The design of joints and the physical requirements for plastic gaskets shall conform to AASHTO M 198, and rubber-type gaskets shall conform to ASTM C 443M . Factory-fabricated resilient joint materials shall conform to ASTM C 425. Gaskets shall have not more than one factory-fabricated splice, except that two factory-fabricated splices of the rubber-type gasket are permitted if the nominal diameter of the pipe being gasketed exceeds 1.35 m (54 inches).
- b. **Test Requirements:** Watertight joints shall be tested and shall meet test requirements of paragraph HYDROSTATIC TEST ON WATERTIGHT JOINTS. Rubber gaskets shall comply with the oil resistant gasket requirements of ASTM C 443M. Certified copies of test results shall be delivered to the Contracting Officer before gaskets or

jointing materials are installed. Alternate types of watertight joint may be furnished, if specifically approved.

2.3.8.2 External Sealing Bands

Requirements for external sealing bands shall conform to ASTM C 877M .

2.3.8.3 Flexible Watertight, Gasketed Joints

a. Gaskets: When infiltration or exfiltration is a concern for pipe lines, the couplings may be required to have gaskets. The closed-cell expanded rubber gaskets shall be a continuous band approximately 178 mm (7 inches) wide and approximately 10 mm (3/8 inch) thick, meeting the requirements of ASTM D 1056, Type 2 A1 and shall have a quality retention rating of not less than 70 percent when tested for weather resistance by ozone chamber exposure, Method B of ASTM D 1171. Rubber O-ring gaskets shall be 21 mm (13/16 inch) in diameter for pipe diameters of 914 mm (36 inches) or smaller and 22 mm (7/8 inch) in diameter for larger pipe having 13 mm (1/2 inch) deep end corrugation. Rubber O-ring gaskets shall be 35 mm (1-3/8 inches) in diameter for pipe having 25 mm (1 inch) deep end corrugations. O-rings shall meet the requirements of AASHTO M 198 or ASTM C 443 . Flexible plastic gaskets shall conform to requirements of AASHTO M 198, Type B.

b. Connecting Bands: Connecting bands shall be of the type, size and sheet thickness of band, and the size of angles, bolts, rods and lugs as indicated or where not indicated as specified in the applicable standards or specifications for the pipe. Exterior rivet heads in the longitudinal seam under the connecting band shall be countersunk or the rivets shall be omitted and the seam welded. Watertight joints shall be tested and shall meet the test requirements of paragraph HYDROSTATIC TEST ON WATERTIGHT JOINTS.

2.3.8.4 PVC Plastic Pipes

Joints shall be solvent cement or elastomeric gasket type in accordance with the specification for the pipe and as recommended by the pipe manufacturer.

2.3.8.5 Smooth Wall PE Plastic Pipe

Pipe shall be joined using butt fusion method as recommended by the pipe manufacturer.

2.4 STAINLESS STEEL LADDER

Stainless steel ladder shall be provided where the depth of the manhole exceeds 1.0 m (3 feet). These ladders shall be not less than 406 mm (16 inches) in width, with 19 mm (3/4 inch) diameter rungs spaced 305 mm (12 inches) apart. The two stringers shall be a minimum 10 mm (3/8 inch) thick and 63 mm (2-1/2 inches) wide. Ladders and inserts shall be fabricated of AISI Type 304 stainless steel in conformance with ASTM A 276.

2.5 DOWNSPOUT BOOTS

Boots used to connect exterior downspouts to the storm-drainage system shall be of gray cast iron conforming to ASTM A 48M , Class 30B or 35B. Shape and size shall be as indicated.

PART 3 EXECUTION

3.1 EXCAVATION FOR PIPE CULVERTS, STORM DRAINS, AND DRAINAGE STRUCTURES

Excavation of trenches, and for appurtenances and backfilling for culverts and storm drains, shall be in accordance with the applicable portions of Section 02316a "Excavation, Trenching, and Backfilling for Utilities Systems" and the requirements specified below.

3.1.1 Trenching

The width of trenches at any point below the top of the pipe shall be not greater than the outside diameter of the pipe plus 600 mm to permit satisfactory jointing and thorough tamping of the bedding material under and around the pipe. Sheeting and bracing, where required, shall be placed within the trench width as specified. Contractor shall not overexcavate. Where trench widths are exceeded, redesign with a resultant increase in cost of stronger pipe or special installation procedures will be necessary.

Cost of this redesign and increased cost of pipe or installation shall be borne by the Contractor without additional cost to the Government.

3.1.2 Removal of Rock

Rock in either ledge or boulder formation shall be replaced with suitable materials to provide a compacted earth cushion having a thickness between unremoved rock and the pipe of at least 200 mm or 13 mm for each meter of fill over the top of the pipe, whichever is greater, but not more than three-fourths the nominal diameter of the pipe. Where bell-and-spigot pipe is used, the cushion shall be maintained under the bell as well as under the straight portion of the pipe. Rock excavation shall be as specified and defined in Section 02316a "Excavation, Trenching, and Backfilling for Utilities Systems".

3.1.3 Removal of Unstable Material

Where wet or otherwise unstable soil incapable of properly supporting the pipe, as determined by the Contracting Officer, is unexpectedly encountered in the bottom of a trench, such material shall be removed to the depth required and replaced to the proper grade with select granular material, compacted as provided in paragraph BACKFILLING. When removal of unstable material is due to the fault or neglect of the Contractor in his performance of shoring and sheeting, water removal, or other specified requirements, such removal and replacement shall be performed at no additional cost to the government.

3.2 BEDDING

Plastic pipes shall have S4C bedding material placed 100mm (4 inch) below the bottom of the pipe. Bedding shall be compacted to 95 percent of max density as determined by ASTM D 1557. The bedding surface for the pipe shall provide a firm foundation of uniform density throughout the entire length of the pipe.

3.2.1 Concrete Pipe Requirements

When no bedding class is specified or detailed on the drawings, concrete pipe shall be bedded in a soil foundation accurately shaped and rounded to

conform to the lowest one-fourth of the outside portion of circular pipe or to the lower curved portion of pipe arch for the entire length of the pipe or pipe arch. When necessary, the bedding shall be tamped. Bell holes and depressions for joints shall be not more than the length, depth, and width required for properly making the particular type of joint.

3.3 PLACING PIPE

3.3.1 Concrete Pipe

Laying shall proceed upgrade with spigot ends of bell-and-spigot pipe and tongue ends of tongue-and-groove pipe pointing in the direction of the flow.

3.3.2 Multiple Culverts

Where multiple lines of pipe are installed, adjacent sides of pipe shall be at least half the nominal pipe diameter or 1 meter apart, whichever is less.

3.3.3 Jacking Pipe Through Fills

Methods of operation and installation for jacking pipe through fills shall conform to requirements specified in Volume 1, Chapter 1, Part 4 of AREMA Manual.

3.4 JOINTING

3.4.1 Concrete Pipe

3.4.1.1 Cement-Mortar Bell-and-Spigot Joint

The first pipe shall be bedded to the established gradeline, with the bell end placed upstream. The interior surface of the bell shall be thoroughly cleaned with a wet brush and the lower portion of the bell filled with mortar as required to bring inner surfaces of abutting pipes flush and even. The spigot end of each subsequent pipe shall be cleaned with a wet brush and uniformly matched into a bell so that sections are closely fitted. After each section is laid, the remainder of the joint shall be filled with mortar, and a bead shall be formed around the outside of the joint with sufficient additional mortar. If mortar is not sufficiently stiff to prevent appreciable slump before setting, the outside of the joint shall be wrapped or bandaged with cheesecloth to hold mortar in place.

3.4.1.2 Cement-Mortar Oakum Joint for Bell-and-Spigot Pipe

A closely twisted gasket shall be made of jute or oakum of the diameter required to support the spigot end of the pipe at the proper grade and to make the joint concentric. Joint packing shall be in one piece of sufficient length to pass around the pipe and lap at top. This gasket shall be thoroughly saturated with neat cement grout. The bell of the pipe shall be thoroughly cleaned with a wet brush, and the gasket shall be laid in the bell for the lower third of the circumference and covered with mortar. The spigot of the pipe shall be thoroughly cleaned with a wet brush, inserted in the bell, and carefully driven home. A small amount of mortar shall be inserted in the annular space for the upper two-thirds of the circumference. The gasket shall be lapped at the top of the pipe and driven home in the annular space with a caulking tool. The remainder of the annular space shall be filled completely with mortar and beveled at an angle of approximately 45 degrees with the outside of the bell. If mortar

is not sufficiently stiff to prevent appreciable slump before setting, the outside of the joint thus made shall be wrapped with cheesecloth. Placing of this type of joint shall be kept at least five joints behind laying operations.

3.4.1.3 Cement-Mortar Diaper Joint for Bell-and-Spigot Pipe

The pipe shall be centered so that the annular space is uniform. The annular space shall be caulked with jute or oakum. Before caulking, the inside of the bell and the outside of the spigot shall be cleaned.

- a. Diaper Bands: Diaper bands shall consist of heavy cloth fabric to hold grout in place at joints and shall be cut in lengths that extend one-eighth of the circumference of pipe above the spring line on one side of the pipe and up to the spring line on the other side of the pipe. Longitudinal edges of fabric bands shall be rolled and stitched around two pieces of wire. Width of fabric bands shall be such that after fabric has been securely stitched around both edges on wires, the wires will be uniformly spaced not less than 200 mm apart. Wires shall be cut into lengths to pass around pipe with sufficient extra length for the ends to be twisted at top of pipe to hold the band securely in place; bands shall be accurately centered around lower portion of joint.
- b. Grout: Grout shall be poured between band and pipe from the high side of band only, until grout rises to the top of band at the spring line of pipe, or as nearly so as possible, on the opposite side of pipe, to ensure a thorough sealing of joint around the portion of pipe covered by the band. Silt, slush, water, or polluted mortar grout forced up on the lower side shall be forced out by pouring, and removed.
- c. Remainder of Joint: The remaining unfilled upper portion of the joint shall be filled with mortar and a bead formed around the outside of this upper portion of the joint with a sufficient amount of additional mortar. The diaper shall be left in place. Placing of this type of joint shall be kept at least five joints behind actual laying of pipe. No backfilling around joints shall be done until joints have been fully inspected and approved.

3.4.1.4 Flexible Watertight, Gasketed Joints

Installation shall be as recommended by the gasket manufacturer for use of lubricants and cements and other special installation requirements. The gasket shall be placed over one end of a section of pipe for half the width of the gasket. The other half shall be doubled over the end of the same pipe. When the adjoining section of pipe is in place, the doubled-over half of the gasket shall then be rolled over the adjoining section. Any unevenness in overlap shall be corrected so that the gasket covers the end of pipe sections equally. Connecting bands shall be centered over adjoining sections of pipe, and rods or bolts placed in position and nuts tightened. Band Tightening: The band shall be tightened evenly, even tension being kept on the rods or bolts, and the gasket; the gasket shall seat properly in the corrugations. Watertight joints shall remain uncovered for a period of time designated, and before being covered, tightness of the nuts shall be measured with a torque wrench. If the nut has tended to loosen its grip on the bolts or rods, the nut shall be retightened with a torque wrench and remain uncovered until a tight, permanent joint is assured.

3.5 DRAINAGE STRUCTURES

3.5.1 Manholes and Inlets

Construction shall be of reinforced concrete, plain concrete, brick, precast reinforced concrete, precast concrete segmental blocks, prefabricated corrugated metal, or bituminous coated corrugated metal; complete with frames and covers or gratings; and with fixed galvanized steel ladders where indicated. Pipe studs and junction chambers of prefabricated corrugated metal manholes shall be fully bituminous-coated and paved when the connecting branch lines are so treated.

3.5.2 Walls and Headwalls

Construction shall be as indicated.

3.6 STAINLESS STEEL LADDER INSTALLATION

Ladder shall be adequately anchored to the wall by means of steel inserts spaced not more than 1.83 m (6 feet) vertically, and shall be installed to provide at least 152 mm (6 inches) of space between the wall and the rungs. The wall along the line of the ladder shall be vertical for its entire length.

3.7 BACKFILLING

3.7.1 Backfilling Pipe in Trenches

After the pipe has been properly bedded, selected material from excavation or borrow, at a moisture content that will facilitate compaction, shall be placed along both sides of pipe in layers not exceeding 150 mm in compacted depth. The backfill shall be brought up evenly on both sides of pipe for the full length of pipe. The fill shall be thoroughly compacted under the haunches of the pipe. Each layer shall be thoroughly compacted with mechanical tampers or rammers. This method of filling and compacting shall continue until the fill has reached an elevation of at least 300 mm above the top of the pipe. The remainder of the trench shall be backfilled and compacted by spreading and rolling or compacted by mechanical rammers or tampers in layers not exceeding 150 millimeters. Tests for density shall be made as necessary to ensure conformance to the compaction requirements specified below. Where it is necessary, in the opinion of the Contracting Officer, that sheeting or portions of bracing used be left in place, the contract will be adjusted accordingly. Untreated sheeting shall not be left in place beneath structures or pavements.

3.7.2 Backfilling Pipe in Fill Sections

For pipe placed in fill sections, backfill material and the placement and compaction procedures shall be as specified below. The fill material shall be uniformly spread in layers longitudinally on both sides of the pipe, not exceeding 150 mm in compacted depth, and shall be compacted by rolling parallel with pipe or by mechanical tamping or ramming. Prior to commencing normal filling operations, the crown width of the fill at a height of 300 mm above the top of the pipe shall extend a distance of not less than twice the outside pipe diameter on each side of the pipe or 4 m, whichever is less. After the backfill has reached at least 300 mm above the top of the pipe, the remainder of the fill shall be placed and thoroughly compacted in layers not exceeding 150 mm.

3.7.3 Movement of Construction Machinery

When compacting by rolling or operating heavy equipment parallel with the pipe, displacement of or injury to the pipe shall be avoided. Movement of construction machinery over a culvert or storm drain at any stage of construction shall be at the Contractor's risk. Any damaged pipe shall be repaired or replaced.

3.7.4 Compaction

3.7.4.1 General Requirements

Cohesionless materials include gravels, gravel-sand mixtures, sands, and gravelly sands. Cohesive materials include clayey and silty gravels, gravel-silt mixtures, clayey and silty sands, sand-clay mixtures, clays, silts, and very fine sands. When results of compaction tests for moisture-density relations are recorded on graphs, cohesionless soils will show straight lines or reverse-shaped moisture-density curves, and cohesive soils will show normal moisture-density curves.

3.7.4.2 Minimum Density

Backfill over and around the pipe and backfill around and adjacent to drainage structures shall be compacted at the approved moisture content to the following applicable minimum density, which will be determined as specified below.

- a. Under airfield and heliport pavements, paved roads, streets, parking areas, and similar-use pavements including adjacent shoulder areas, the density shall be not less than 90 percent of maximum density for cohesive material and 95 percent of maximum density for cohesionless material, up to the elevation where requirements for pavement subgrade materials and compaction shall control.
- b. Under unpaved or turfed traffic areas, density shall not be less than 90 percent of maximum density for cohesive material and 95 percent of maximum density for cohesionless material.
- c. Under nontraffic areas, density shall be not less than that of the surrounding material.

3.7.5 Determination of Density

Testing shall be the responsibility of the Contractor and performed at no additional cost to the Government. Testing shall be performed by an approved commercial testing laboratory or by the Contractor subject to approval. Tests shall be performed in sufficient number to ensure that specified density is being obtained. Laboratory tests for moisture-density relations shall be made in accordance with ASTM D 1557 except that mechanical tampers may be used provided the results are correlated with those obtained with the specified hand tamper. Field density tests shall be determined in accordance with ASTM D 2167 or ASTM D 2922. When ASTM D 2922 is used, the calibration curves shall be checked and adjusted, if necessary, using the sand cone method as described in paragraph Calibration of the referenced publications. ASTM D 2922 results in a wet unit weight of soil and when using this method ASTM D 3017 shall be used to determine the moisture content of the soil. The calibration curves furnished with

the moisture gauges shall be checked along with density calibration checks as described in ASTM D 3017 or ASTM D 2922. Test results shall be furnished the Contracting Officer. The calibration checks of both the density and moisture gauges shall be made at the beginning of a job on each different type of material encountered and at intervals as directed.

3.8 PIPELINE TESTING

Lines shall be tested for leakage by low pressure air or water testing or exfiltration tests, as appropriate. Low pressure air testing for vitrified clay pipes shall conform to ASTM C 828. Low pressure air testing for concrete pipes shall conform to ASTM C 924M . Low pressure air testing for plastic pipe shall conform to ASTM F 1417. Low pressure air testing procedures for other pipe materials shall use the pressures and testing times prescribed in ASTM C 828 or ASTM C 924M , after consultation with the pipe manufacturer. Testing of individual joints for leakage by low pressure air or water shall conform to ASTM C 1103M . Prior to exfiltration tests, the trench shall be backfilled up to at least the lower half of the pipe. If required, sufficient additional backfill shall be placed to prevent pipe movement during testing, leaving the joints uncovered to permit inspection. Visible leaks encountered shall be corrected regardless of leakage test results. When the water table is 600 mm or more above the top of the pipe at the upper end of the pipeline section to be tested, infiltration shall be measured using a suitable weir or other device acceptable to the Contracting Officer. An exfiltration test shall be made by filling the line to be tested with water so that a head of at least 600 mm is provided above both the water table and the top of the pipe at the upper end of the pipeline to be tested. The filled line shall be allowed to stand until the pipe has reached its maximum absorption, but not less than 4 hours. After absorption, the head shall be reestablished. The amount of water required to maintain this water level during a 2-hour test period shall be measured. Leakage as measured by the exfiltration test shall not exceed 9 mL per mm in diameter per 100 meters (0.2 gallons per inch in diameter per 100 feet) of pipeline per hour. When leakage exceeds the maximum amount specified, satisfactory correction shall be made and retesting accomplished. Testing, correcting, and retesting shall be made at no additional cost to the Government.

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SECTION 08710

DOOR HARDWARE

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 in the text by the basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM E 283 (1991) Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen

BUILDERS HARDWARE MANUFACTURERS ASSOCIATION (BHMA)

ANSI/BHMA A156.1 (1997) Butts and Hinges (BHMA 101)

ANSI/BHMA A156.2 (1996) Bored and Preamsembled Locks and Latches (BHMA 601)

ANSI/BHMA A156.3 (1994) Exit Devices (BHMA 701)

ANSI/BHMA A156.4 (1992) Door Controls - Closers (BHMA 301)

ANSI/BHMA A156.5 (1992) Auxiliary Locks & Associated Products (BHMA 501)

ANSI/BHMA A156.6 (1994) Architectural Door Trim (BHMA 1001)

ANSI/BHMA A156.7 (1988) Template Hinge Dimensions

ANSI/BHMA A156.8 (1994) Door Controls - Overhead Holders (BHMA 311)

ANSI/BHMA A156.13 (1994) Mortise Locks & Latches (BHMA 621)

ANSI/BHMA A156.16 (1997) Auxiliary Hardware

ANSI/BHMA A156.18 (1993) Materials and Finishes (BHMA 1301)

ANSI/BHMA A156.21 (1996) Thresholds

DOOR AND HARDWARE INSTITUTE (DHI)

DHI-03 (1989) Keying Systems and Nomenclature

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 80 (1999) Fire Doors and Fire Windows

NFPA 101 (2000) Life Safety Code

STEEL DOOR INSTITUTE (SDOI)

ANSI/SDI 100 (1991) Standard Steel Doors and Frames

UNDERWRITERS LABORATORIES (UL)

UL BMD (2002) Building Materials Directory

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Hardware schedule

Keying system

SD-03 Product Data

Hardware items;

Card Key Access Controls

SD-08 Manufacturer's Instructions

Installation

SD-10 Operation and Maintenance Data

Hardware Schedule

SD-11 Closeout Submittals

Key bitting

1.3 HARDWARE SCHEDULE

Prepare and submit hardware schedule in the following form:

Hard- ware Item	Quan- tity	Size	Reference		Mfr. Name and Catalog No.	Key Con- trol Symbols	UL Mark (If fire rated and listed)	ANSI/BHMA Finish Designa- tion
			Type	Finish				
-----	-----	-----	-----	-----	-----	-----	-----	-----

1.4 KEY BITTING CHART REQUIREMENTS

Submit key bitting charts to the Contracting Officer prior to completion of the work. Include:

- a. Complete listing of all keys (AA1, AA2, etc.).

- b. Complete listing of all key cuts (AA1-123456, AA2-123458).
- c. Tabulation showing which key fits which door.
- d. Copy of floor plan showing doors and door numbers.
- e. Listing of 20 percent more key cuts than are presently required in each master system.

1.5 QUALITY ASSURANCE

1.5.1 Hardware Manufacturers and Modifications

Provide, as far as feasible, locks, card key access controls, hinges, pivots, and closers of one lock, hinge, pivot, or closer manufacturer's make. Modify hardware as necessary to provide features indicated or specified.

1.5.2 Keying Schedule

Keying schedule developed in accordance with DHI-03, after the keying meeting with the user. Master keying shall be developed for each building.

1.5.3 Operation and Maintenance Manuals

Complete copies of maintenance instructions listing routine maintenance procedures, possible breakdowns and repairs, and troubleshooting guides shall be provided for the card key access control system. The instructions for electric locks, electric strikes, electro-magnetic closer holder release devices, and electric exit devices shall include simplified diagrams as installed. Training of the owner's personnel shall be accomplished before they are allowed to operate the system. The system's manufacturer shall provide on-site technical personnel to assist with final training. A listing of all the electronic card locks shall be provided together with floor plans identifying the locations of the locks.

1.6 DELIVERY, STORAGE, AND HANDLING

Deliver hardware in original individual containers, complete with necessary appurtenances including fasteners and instructions. Mark each individual container with item number as shown in hardware schedule. Deliver permanent keys and removable cores to the Contracting Officer, either directly or by certified mail. Deliver construction master keys with the locks.

1.7 WARRANTY

Manufacturer's standard performance guarantees or warranties that extend beyond a one year period shall be provided. The Electronic card lockset shall be warranted for a period of two years minimum.

PART 2 PRODUCTS

2.1 TEMPLATE HARDWARE

Hardware to be applied to metal shall be made to template. Promptly furnish template information or templates to door and frame manufacturers.

Template hinges shall conform to ANSI/BHMA A156.7. Coordinate hardware items to prevent interference with other hardware.

2.2 HARDWARE FOR FIRE DOORS AND EXIT DOORS

Provide all hardware necessary to meet the requirements of NFPA 80 for fire doors and NFPA 101 for exit doors, as well as to other requirements specified, even if such hardware is not specifically mentioned under paragraph entitled "Hardware Schedule." Such hardware shall bear the label of Underwriters Laboratories, Inc., and be listed in UL BMD or labeled and listed by another testing laboratory acceptable to the Contracting Officer.

2.3 HARDWARE ITEMS

Hinges, pivots, locks, latches, exit devices, bolts, and closers shall be clearly and permanently marked with the manufacturer's name or trademark where it will be visible after the item is installed. For closers with covers, the name or trademark may be beneath the cover.

2.3.1 Hinges

ANSI/BHMA A156.1, 114 by 114 millimeters unless otherwise specified. Construct loose pin hinges for exterior doors and reverse-bevel interior doors so that pins will be nonremovable when door is closed. Other antifriction bearing hinges may be provided in lieu of ball-bearing hinges.

2.3.2 Pivots

ANSI/BHMA A156.4.

2.3.3 Locks and Latches

2.3.3.1 Mortise Locks and Latches

ANSI/BHMA A156.13, Series 1000, Operational Grade 1, Security Grade 2. Provide mortise locks with escutcheons not less than 178 by 57 mm with a bushing at least 6 mm long. Cut escutcheons to suit cylinders and provide trim items with straight, beveled, or smoothly rounded sides, corners, and edges. Knobs and roses of mortise locks shall have screwless shanks and no exposed screws. Exterior locks and latches shall be provided with non-ferrous metal interior mechanisms. Mortise locks shall be armored front.

2.3.3.2 Electro-Mechanical Locks

Electro-mechanical locks shall allow for locking or unlocking of doors from a remote location by means of a card reader. Locks shall be fail safe mode (unlocked when power is off). Locks shall be mortise series conforming to ANSI/BHMA A156.13 with factory installed electric lock modification or manufactured electro-mechanical locks conforming to ANSI/BHMA A156.13 test standards.

2.3.3.3 **DELETED**

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2.3.3.4 Cipher Locks

Fully mechanical push button access control cipher lock shall be Simplex/Unican, series 1000, and combination changeable. Lock shall be

manufactured by ILCO Unican Corp., Simplex Access Control Division, 2941 Indiana Ave., Winston Salem, NC 27105, USA. Telephone (910) 725-1331, FAX (910) 725-3269 or approved equal. Cipher lock system shall be a complete mechanical access control system with interchangeable core that unlocks when 5 buttons re pressed in correct sequence. Cipher lock shall not be relock automatically when door closes. The cipher lock shall be capable of code being change.d Access form the interior of the stair shall be combination or key override, or passage feature activated from the exterior. Manufacturer shall furnished complete cipher lock assembly for proper operation.

2.3.3.5 Auxiliary Locks

ANSI/BHMA A156.5, Grade 1.

2.3.4 Exit Devices

ANSI/BHMA A156.3, Grade 1.

2.3.4.1 Exit Devices and Auxiliary Items

Trim shall be of wrought construction and commercial plain design with straight, beveled, or smoothly rounded sides, corners, and edges. Adjustable strikes shall be provided for rim type and vertical rod devices.

Open back strikes shall be provided for pairs of doors with mortise and vertical rod devices; except open back strikes shall be used on labeled doors only where specifically provided for in the published listings. Touch bars shall be heavy-duty type with non-ferrous metal interior mechanisms and shall be provided in lieu of conventional crossbars and arms. Escutcheons shall be provided not less than 175 by 55 mm. Escutcheons shall be cut to suit cylinders and operating trim.

2.3.4.2 Door Coordinator

Door coordinator with carry bar shall be Type 21 and shall be provided for each pair of doors equipped with an overlapping astragal. The coordinator may be mechanically operated and shall be capable of holding the active door of a pair open until the inactive door has preceded it in the closing cycle. When used as fire exit hardware, the coordinator and carry bar shall be listed or labeled by a nationally recognized independent testing laboratory.

2.3.4.3 Electric Exit Devices

Electric exit devices shall conform to ANSI/BHMA A156.3 with factory installed electric lock modification having the capability to lock or unlock from remote location by means of card reader. Exit devices shall comply with life safety requirements of NFPA 101. **Electric lock devices shall be fail safe mode (unlocked when power is off).**

2.3.4.4 Automatic Flush Bolts

Automatic flush bolts shall be Type 25 in accordance with ANSI/BHMA A156.3, and shall be installed at the top and bottom of the inactive leaf of pairs of fire rated doors where specified in the hardware sets. Flush bolts shall be mortised in the strike edge of the door..

2.3.5 Cylinders and Cores

Provide cylinders and cores for new locks, including locks provided under other sections of this specification. Cylinders and cores shall have six pin tumblers. Cylinders shall be products of one manufacturer, and cores shall be the products of one manufacturer. Rim cylinders, mortise cylinders, and knobs of bored locksets shall have interchangeable cores which are removable by special control keys. Stamp each interchangeable core with a key control symbol in a concealed place on the core.

2.3.6 Keying System

Provide a grand master keying system. Provide construction interchangeable cores.

2.3.7 Lock Trim

Cast, forged, or heavy wrought construction and commercial plain design.

2.3.7.1 Knobs and Roses

In addition to meeting test requirements of ANSI/BHMA A156.2 and ANSI/BHMA A156.13, knobs, roses, and escutcheons shall be 1.25 mm thick if unreinforced. If reinforced, outer shell shall be 0.89 mm thick and combined thickness shall be 1.78 mm, except knob shanks shall be 1.52 mm thick.

2.3.7.2 Lever Handles

Provide lever handles in lieu of knobs where specified in paragraph entitled "Hardware Schedule". Lever handles for exit devices shall meet the test requirements of ANSI/BHMA A156.13 for mortise locks. Lever handle locks shall have a breakaway feature (such as a weakened spindle or a shear key) to prevent irreparable damage to the lock when a force in excess of that specified in ANSI/BHMA A156.13 is applied to the lever handle. Lever handles shall return to within 13 mm of the door face.

2.3.8 Keys

Furnish one file key, one duplicate key, and one working key for each key change and for each master keying system. Furnish one additional working key for each lock of each keyed-alike group. Furnish 10 grand master keys, and 20 construction master keys, and 10 control keys for removable cores. Furnish a quantity of key blanks equal to 20 percent of the total number of file keys. Stamp each key with appropriate key control symbol and "U.S. property - Do not duplicate." Do not place room number on keys.

2.3.9 Door Bolts

ANSI/BHMA A156.16. Provide dustproof strikes for bottom bolts, except for doors having metal thresholds. Automatic latching flush bolts: ANSI/BHMA A156.3, Type 25.

2.3.10 Closers

ANSI/BHMA A156.4, Series C02000, Grade 1, with PT 4C. Provide with brackets, arms, mounting devices, fasteners, full size covers, except at storefront mounting, and other features necessary for the particular application. Size closers in accordance with manufacturer's recommendations, or provide multi-size closers, Sizes 1 through 6, and list sizes in the Hardware Schedule. Provide manufacturer's 10 year warranty.

2.3.10.1 Identification Marking

Engrave each closer with manufacturer's name or trademark, date of manufacture, and manufacturer's size designation located to be visible after installation.

2.3.11 Overhead Holders

ANSI/BHMA A156.8.

2.3.12 Door Protection Plates

ANSI/BHMA A156.6.

2.3.12.1 Sizes of Mop and Kick Plates

Width for single doors shall be 50 mm less than door width; width for pairs of doors shall be 25 mm less than door width. Height of kick plates shall be 250 mm for flush doors Height of mop plates shall be 100 mm.

2.3.13 Door Stops and Silencers

ANSI/BHMA A156.16. Silencers Type L03011. Provide three silencers for each single door, two for each pair.

2.3.14 Thresholds

ANSI/BHMA A156.21.

2.3.15 Gasketing

Gasketing shall be a compression type seal, silicon based, self-adhesive product for use on steel door frames with wood and steel doors for labeled doors. Color shall be bronze. Air leakage rate of weatherstripping shall not exceed 0.775 liters per second per lineal meter of crack when tested in accordance with ASTM E 283 at standard test conditions.

2.3.16 Special Tools

Provide special tools, such as spanner and socket wrenches and dogging keys, required to service and adjust hardware items.

2.4 CARD KEY ACCESS CONTROL

The card key access control system shall be complete "Kaba-Ilco", or approved equal system. A total of six systems shall be provided. Each system shall include electronic card lockset with lever handles as scheduled, card reader as scheduled, dedicated portable lock interrogation and programming unit, dedicated compact computer with software, check-in station and card keys, remote controllers, and all other accessory items. The card key access control system shall be able to support cross-keying requirements.

2.4.1 Mortise Lock

Locksets shall be mortise type, tamper resistant with one-inch throw hardened steel insert dead bolt, 3/4-inch throw latch bolt, 2-3/4 inch auxiliary dead bolting latch backset. Finish of lock shall be satin

chromium plated, 626, on base metal of brass or bronze. Lever handles shall be provided, unless otherwise specified for knob handles.

2.4.2 Card Reader

Card reader shall be fully weatherproof, waterproof, and shall be of slender modular design to fit on the door frame. Controller Box, Power Supply Box, and Transformer shall be provided with the card reader.

2.4.3 Dedicated Portable Lock Interrogation and Programming Unit

Battery powered unit with additional external powerpack for programming or viewing and downloading the last 100 lock events from the audit trail. Unit shall include a connection to the server to allow report printing.

2.4.4 Dedicated Compact Computer with Internal Modem

Small computer server with proprietary software with customized defaults, password protected data files, internal modem, parallel printer port for system printer shall be provided of each check-in station.

2.4.5 Check-in Station and Card Keys

Provide a total of 5 check-in stations for encoding cards. Provide a minimum of 6,000 blankcards, consisting of 3,000 each of 2 different customized designs, with ANSI or ISO standard magnetic strips. Cards shall resist tearing, scratching and shall be water resistant.

2.4.6 Door Hardware

Provide door hardware which can be reprogrammed for future software changes at the door units without replacement of original lock components. Magnetic cards shall be programmed on a time basis only to eliminate out of sequence cards.

2.4.7 Extra Materials

Extra Electronic Card Locksets shall be furnished at the rate of 2 locksets for each 100 locksets installed. Extra locksets shall be same as those installed.

2.4.8 Mechanical Key Override

The lockset shall be provided with a hidden mechanical key override.

2.4.9 Knob and Lever Test

The lockset shall meet the locked knob and lever torque test for Grade 1 in accordance with ANSI/BHMA A156.13.

2.4.10 Finish

The lockset shall be provided with a durable finish over a solid brass cover, "Ultra-plated Finish, "Kaba-Ilco" or approved equal. The finish shall be fully guaranteed against tarnishing for two years from the date facilities are turned over to the government.

2.4.11 Local Service

Certified service agent/ locksmith shall be located on the island of Oahu.

2.5 FASTENERS

Provide fasteners of proper type, quality, size, quantity, and finish with hardware. Fasteners exposed to weather shall be of nonferrous metal or stainless steel. Provide fasteners of type necessary to accomplish a permanent installation. Fasteners for hardware on exterior doors and interior doors at non-air conditioned areas shall be stainless steel, Type 316.

2.6 FINISHES

ANSI/BHMA A156.18. Hardware shall have BHMA 630 finish (satin stainless steel), unless specified otherwise. Provide items not manufactured in stainless steel in BHMA 626 finish (satin chromium plated) over brass or bronze, except surface door closers which shall have aluminum paint finish, and except steel hinges which shall have BHMA 652 finish (satin chromium plated). Hinges for exterior doors shall be stainless steel with BHMA 630 finish or chromium plated brass or bronze with BHMA 626 finish. Exit devices may be provided in BHMA 626 finish in lieu of BHMA 630 finish except where BHMA 630 is specified under paragraph entitled "Hardware Sets". Exposed parts of concealed closers shall have finish to match lock and door trim. Hardware for aluminum doors shall be finished to match the doors.

PART 3 EXECUTION

3.1 INSTALLATION

Install hardware in accordance with manufacturers' printed instructions. Fasten hardware to wood surfaces with full-threaded wood screws or sheet metal screws. Provide machine screws set in expansion shields for fastening hardware to solid concrete and masonry surfaces. Provide toggle bolts where required for fastening to hollow core construction. Provide through bolts where necessary for satisfactory installation.

3.1.1 Electric Hardware and Access Control Devices

Electric hardware items and access control devices shall be installed in accordance with manufacturer's printed installation procedures.

3.1.2 Gasket Installation

Handle and install gasket so as to prevent damage. Provide full contact, weather-tight seals. Doors shall operate without binding. Gasketing shall be installed at the inside edge of the hinge and head and latch sides of door frame. Frames shall be toleranced for a 3 mm clearance between door and frame. Frames shall be treated with tape primer prior to installation.

3.1.3 Threshold Installation

Extend thresholds the full width of the opening and notch end for jamb stops. Set thresholds in a full bed of sealant and anchor to floor with cadmium-plated, countersunk, steel screws in expansion sleeves.

3.2 FIRE DOORS AND EXIT DOORS

Install hardware in accordance with NFPA 80 for fire doors, NFPA 101 for exit doors.

3.3 HARDWARE LOCATIONS

ANSI/SDI 100, unless indicated or specified otherwise.

- a. Kick Plates: Push side of single-acting doors. Both sides of double-acting doors.
- b. Mop Plates: Bottom flush with bottom of door.

3.4 KEY CONTROL SYSTEM

Tag one set of file keys and one set of duplicate keys. Place other keys in appropriately marked envelopes, or tag each key. Furnish complete instructions for setup and use of key control system. On tags and envelopes, indicate door and room numbers or master or grand master key.

3.5 FIELD QUALITY CONTROL

After installation, protect hardware from paint, stains, blemishes, and other damage until acceptance of work. Submit notice of testing 15 days before scheduled, so that testing can be witnessed by the Contracting Officer. Adjust hinges, locks, latches, bolts, holders, closers, and other items to operate properly. Demonstrate that permanent keys operate respective locks, and give keys to the Contracting Officer. Correct, repair, and finish, as directed, errors in cutting and fitting and damage to adjoining work.

3.6 HARDWARE SETS

Hardware for aluminum doors shall be provided under this section. Deliver Hardware templates and hardware, except field-applied hardware to the aluminum door and frame manufacturer for use in fabricating the doors and frames.

HW GROUP - 001

8.0 EA HINGE	A5111 114 X 114 NRP	630
1.0 EA EXIT DEVICE	Type 06, Function 08 Mod For Elec Trim	630
1.0 EA EXIT DEVICE	Type 06, Function 01	630
	(Exit Devices to Be Touch Bar, Levers)	
2.0 EA CLOSER	C02021, HD Positive Stop Arm	689
1.0 EA CARD READER	Exterior Installation	630
1.0 EA POWER SUPPLY	as Required	---
1.0 EA GASKET	ROY154	---
1.0 EA THRESHOLD	J32100 Modified	719
2.0 EA ASTRAGAL	ROY165 Mod W/concealed Screws	628
2.0 EA DOOR BOTTOM	R0Y534	628
2.0 EA FLOOR STOP	L02161	626

HW GROUP - 002

3.0 EA HINGE	A5111 114 X 114 NRP	630
1.0 EA EXIT DEVICE	Type 04, Function 08	630
	(Exit Devices to Be Touch Bar, Levers)	
1.0 EA CLOSER	C02021, Hd Positive Stop Arm	689
1.0 EA GASKET	ROY154	---
1.0 EA THRESHOLD	J32100 Modified	719

1.0 EA DOOR BOTTOM	ROY534	628
1.0 EA FLOOR STOP	L02161	626

HW GROUP - 003

3.0 EA HINGE	A5112 114 X 114	630
1.0 EA ELECTRONIC EXIT DEV	Type 01, Function 08 (Exit Devices to Be Touch Bar, Levers)	630
1.0 EA CLOSER	C02021	689
1.0 EA GASKET	ROY154	---
1.0 EA DOOR HOLDER	L01381	626

HW GROUP - 004

3.0 EA HINGE	A5112 114 X 11	630
1.0 EA CARD ACCESS LOCK	710.II Mech Key Override, Ultra Finish (Card Access With Lever Handles)	626
1.0 EA CLOSER	C02021	689
1.0 EA GASKET	ROY154	---
1.0 EA ELECTRO-MAG HOLDER	C00011	626

HW GROUP - 005

3.0 EA HINGE	A5112 114 X 114	630
1.0 EA CARD ACCESS LOCK	710.II Mech Key Override, Ultra Finish (Card Access With Lever Handles)	626
1.0 EA CLOSER	C02011	689
1.0 EA GASKET	ROY154	---
1.0 EA FLOOR OR WALL STOP	L02101 OR L02141	630

HW GROUP - 006

3.0 EA HINGE	A5112 114 X 114	630
1.0 EA CARD ACCESS LOCK	710.II Mech Key Override, Ultra Finish (Card Access With Lever Handles)	626
1.0 EA CLOSER	C02021	689
1.0 EA GASKET	ROY154	---
1.0 EA FLOOR OR WALL STOP	L02101 OR L02141	630

HW GROUP - 007

3.0 EA HINGE	A5112 114 X 114	630
1.0 EA LOCKSET	F07, GRADE 1 (1000 SERIES)	630
1.0 EA CLOSER	C02011	689
1.0 EA GASKET	ROY154	---
1.0 EA FLOOR OR WALL STOP	L02101 OR L02141	630

HW GROUP - 008

3.0 EA HINGE	A5112 114 X 114	630
1.0 EA LOCKSET	F07, GRADE 1 (1000 SERIES)	630
1.0 EA FLOOR OR WALL STOP	L02101 OR L02141	630

HW GROUP - 009

3.0 EA HINGE	A5112 4.5 X 4.5	630
1.0 EA DEADLOCK	E06091	630
1.0 EA CYLINDER	E09211A	626
1.0 EA CLOSER	C02011	689
1.0 EA PUSH PLATE	J301 4" X 16"	630
1.0 EA PULL PLATE	J405 4" X 16"	630
1.0 EA KICKPLATE	J102 10" X 2" LDW	630
1.0 EA FLOOR OR WALL STOP		

	L02101 OR L02141	630
<u>HW GROUP - 010</u>		
6.0 EA HINGE	A5112 114 X 114	630
2.0 EA CARD ACCESS EXIT DEV	Type 02, Function 08 Lever, Touch Bar	630
2.0 EA CLOSER	C02021	689
1.0 EA GASKET	ROY154	---
2.0 EA ELECTRO-MAG HOLDER	C00011	626
2.0 EA ASTRAGAL	ROY165 MOD W/concealed Screws	628
<u>HW GROUP - 011</u>		
6.0 EA HINGE	A5112 4.5 X 4.5 NRP	630
1.0 EA LOCKSET	F07, GRADE 1 (1000 SERIES)	630
2.0 EA FLUSH BOLT	L04081 12"	626
1.0 EA D.P. STRIKE	L04011	626
2.0 EA O.H. HOLDER	C02511	626
1.0 EA GASKET	ROY154	---
2.0 EA DOOR BOTTOM	ROY534	628
2.0 EA ASTRAGAL	ROY165 MOD W/concealed Screws	628
1.0 EA THRESHOLD	J12130 (AS REQUIRED)	719
<u>HW GROUP - 012</u>		
1.0 EA SPRING PIVOT	K13201	626
1.0 EA GATE LATCH	AS REQUIRED	626
<u>HW GROUP - 013</u>		
	(ALL HARDWARE BY DOOR SUPPLIER)	
<u>HW GROUP - 014</u>		
3.0 EA HINGE	A5112 114 X 114	630
1.0 EA PRIVACY SET	F19, GRADE 1 (1000 SERIES)	630
1.0 EA FLOOR OR WALL STOP	L02101 OR L02141	630
<u>HW GROUP - 015</u>		
6.0 EA HINGE	A5112 4.5 X 4.5	630
1.0 EA LOCKSET	F07, GRADE 1 (1000 SERIES)	630
2.0 EA FLUSH BOLT	L04081 12"	626
1.0 EA D.P. STRIKE	L04011	626
2.0 EA O.H. HOLDER	C02511	626
<u>HW GROUP - 016</u>		
1.0 EA EXIT DEVICE	Type 08, Function 08 Mod for Elec Trim	630
1.0 EA EXIT DEVICE	Type 08, Function 01 (Exit Devices to Be Touch Bar, Levers)	630
1.0 EA CARD READER	Exterior Installation	630
1.0 EA POWER SUPPLY	As Required	---
1.0 EA THRESHOLD	J12130 (As Required)	719
	(Balance of Hardware by Door Supplier)	
<u>HW GROUP - 017</u>		
3.0 EA HINGE	A5112 114 X 114 NRP	630
1.0 EA LOCKSET	F07, Grade 1 (1000 Series)	630
1.0 EA CLOSER	C02021, HD Positive Stop Arm	689
1.0 EA GASKET	ROY154	---
1.0 EA DOOR BOTTOM	ROY534	628

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SECTION 10201N

METAL WALL AND DOOR LOUVERS

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 in the text by the basic designation only.

AMERICAN ARCHITECTURAL MANUFACTURERS ASSOCIATION (AAMA)

AAMA 605.2 (1992; Addendum 1995) High Performance Organic Coatings on Aluminum Extrusions and Panels

AIR MOVEMENT AND CONTROL ASSOCIATION (AMCA)

AMCA 500 (11989; Rev994) Test Methods for Louvers, Dampers and Shutters

AMCA 511 (1991) Certified Ratings Program for Air Control Devices

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 167 (1999) Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip

ASTM B 221M (2000) Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric)

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Wall louvers

Door louvers

Show all information necessary for fabrication and installation of louvers. Indicate materials, sizes, thicknesses, fastenings, and profiles.

SD-04 Samples

Wall louvers

Door louvers

Colors of finishes shall closely approximate colors indicated. Where color is not indicated, submit the manufacturer's standard colors to the Contracting Officer for selection.

1.3 DELIVERY, STORAGE, AND PROTECTION

Deliver materials to the site in an undamaged condition. Carefully store materials off the ground to provide proper ventilation, drainage, and protection against dampness. Louvers shall be free from nicks, scratches, and blemishes. Replace defective or damaged materials with new.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Extruded Aluminum

ASTM B 221M, alloy 6063-T5 or -T52.

2.1.2 **Stainless Steel**

ASTM A 167.

2.2 METAL WALL LOUVERS

Weather resistant type, with bird screens and made to withstand a wind load of not less than 1.44 kilopascals. Wall louvers shall bear the AMCA certified ratings program seal for air performance and water penetration in accordance with AMCA 500 and AMCA 511. The rating shall show a water penetration of 0.0028 kilograms or less per square meter of free area at a free velocity of 355 meters per minute.

2.2.1 Extruded Aluminum Louvers

Fabricated of extruded 6063-T5 or -T52 aluminum with a wall thickness of not less than 2 mm.

2.2.2 Mullions and Mullion Covers

Same material and finish as louvers. Provide mullions where indicated. Provide mullions covers on both faces of joints between louvers.

2.2.3 Screens and Frames

For aluminum louvers, provide 12.5 mm square mesh, 1.8 or 1.5 mm aluminum or 6 mm square mesh, 1.5 mm aluminum bird screening. Mount screens in removable, rewirable frames of same material and finish as the louvers.

2.3 DOOR LOUVERS

Inverted "Y" sightproof type not less than 25 mm thick with matching metal trim. Louvers for exterior doors shall be weather resistant type.

2.3.1 Extruded Aluminum Door Louvers

Fabricate of 6063-T5 or -T52 aluminum alloy with a wall thickness of not less than 1.25 mm thick. Frames and trim shall be clamp-in "L" type.

2.3.2 Operable Louvers

Louvers shall be 152 mm deep with 35 degree operable drainable blades with double steps and vertical extension along the top rear edges, as detailed on drawings. Each louver shall be provided with 115 volt, 2 position electric motor operator, power open-spring return, minimum 20 pound inches of starting torque and 30 pound inches of breakway torque.

2.4 STAINLESS STEEL REGISTERS

Provide registers at Building BDE-1 soffit, as detailed on drawings and as required for condition. Linear Type, with 12.5 mm square SST mesh. Mount screens in removable rewirable frames.

2.4.1 Screws and Fasteners for Register

Provide SST Screws and fasteners for register. Install per manufacturer's written instructions.

2.5 FASTENERS AND ACCESSORIES

Provide stainless steel screws and fasteners for aluminum louvers. Provide other accessories as required for complete and proper installation.

2.6 FINISHES

2.6.1 Aluminum Wall Louvers

Provide factory-applied organic coating.

2.6.1.1 Organic Coating

Clean and prime exposed aluminum surfaces and apply a standard fluoropolymer conforming to AAMA 605.2, color as indicated.

2.6.2 Aluminum Door Louvers

Provide factory-applied primer coating for applied painted finish.

2.6.2.1 DELETED

DELETED

2.6.3 Stainless Steel Registers

Clean and prime surfaces and apply primer and finish coat paint.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Wall Louvers

Install using stops or moldings, flanges, strap anchors, or jamb fasteners as appropriate for the wall construction and in accordance with

manufacturer's recommendations.

3.1.2 Door Louvers

Install louvers in wood doors by using metal "Z" or "L" moldings. Fasten moldings to door with screws.

3.1.3 Screens and Frames

Attach frames to louvers with screws or bolts.

3.2 PROTECTION FROM CONTACT OF DISSIMILAR MATERIALS

3.2.1 Aluminum

Where aluminum contacts metal other than zinc, paint the dissimilar metal with a primer and two coats of aluminum paint.

3.2.2 Metal

Paint metal in contact with mortar, concrete, or other masonry materials with alkali-resistant coatings such as heavy-bodied bituminous paint.

3.2.3 Wood

Paint wood or other absorptive materials that may become repeatedly wet and in contact with metal with two coats of aluminum paint or a coat of heavy-bodied bituminous paint.

-- End of Section --