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2015 Design Standards

Volume I of III



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TABLE OF CONTENTS**Volume I of III**

INTRODUCTION.....	1
SECTION I: GENERAL PROCEDURES AND POLICIES	4
CHAPTER 1 INTRODUCTION	4
1.1 PURPOSE	4
1.2 ADMINISTRATIVE	4
1.2.1 Baltimore/Washington International Thurgood Marshall (BWI Marshall) Airport.....	4
1.2.2 Feedback	4
CHAPTER 2 GENERAL DESIGN AND CONSTRUCTION POLICIES	5
2.1 OPERATIONAL AND SAFETY REQUIREMENTS	5
2.1.1 Vehicle Access on BWI Marshall Airport Movement Area.....	5
2.1.2 Confined Space Requirements for Designers	5
2.1.3 Requirements for Designers Regarding Identification and Reporting of Confined Spaces during the Design Process.....	8
2.2 MANAGEMENT OF SENSITIVE SECURITY INFORMATION (SSI)	8
2.2.1 Definitions.....	9
2.2.2 Abbreviations and Acronyms	11
2.2.3 Legal and Regulatory Authorities.....	11
2.2.4 Scope.....	12
2.2.5 Protected SSI Systems	13
2.2.6 SSI General Requirements	15
2.2.7 SSI Language to be included in the Notice to Contractors	28
SECTION II: DESIGN PROCEDURES	34
CHAPTER 3 AIRPORTAL APPLICATION	34
CHAPTER 4 DESIGN PHASE	36
4.1 AIRPORT CONSTRUCTION PROJECT CHECKLIST	36
4.2 FAA REQUIREMENTS FOR PROPOSED DEVELOPMENT	36
4.3 PROPOSAL PREPARATION / SCOPING MEETING / SCOPE OF SERVICES.....	38
4.4 DESIGN MEETING MINUTES	45
4.5 DESIGN REPORTS AND STUDIES	45
4.6 DESIGN REVIEWS	45
4.6.1 Process	45
4.7 ALP COORDINATION	45
4.8 ENVIRONMENTAL COORDINATION	46
4.8.1 MDE.....	46

4.8.2	Permitting Process for the Construction of Air Emissions Sources	47
4.8.3	Fuel Burning Equipment Permitting Process.....	49
4.8.4	Underground Storage Tanks (USTs) and Aboveground Storage Tanks (ASTs) Permitting Process.....	62
4.8.5	Gasoline Dispensing/Motor Vehicle Refueling Facilities Permitting Process	62
4.8.6	Paint Booths and Abrasive Blasting Operations Permitting Process.....	68
4.8.7	Abrasive Blasting Operations Permitting Process	72
4.8.8	Stationary Welders Permitting Process.....	74
4.8.9	Parts Washers and Degreasers Permitting Process	75
4.8.10	Snow Melters and Portable Emission Units Permitting Process	76
4.8.11	Heating, Ventilation and Air Conditioning (HVAC) and Fire Suppression Equipment Containing Ozone Depleting Substances (ODS).....	77
4.9	FAA COORDINATION	78
4.9.1	Radar Reflectors.....	78
4.10	DESIGN PHASES AND SUBMITTAL REQUIREMENTS.....	78
4.10.1	Programming and Schematic Design Submittal	78
4.10.2	Design Development (30% Review) Submittal	78
4.10.3	Construction Documents (60% Review) Submittal	78
4.10.4	Construction Documents (100% Review) Submittal	78
4.10.5	Bid Documents.....	79
4.10.6	Professional Engineer Titleblock Rules.....	79
4.10.7	Electronic Non-CAD Document Deliverable Requirements	79
4.10.8	Identification and Reporting of Confined Spaces during the Design Process	83
4.11	DRAWING REQUIREMENTS	84
4.11.1	GIS Standards	84
4.11.2	Standard Drawings.....	85
4.11.3	Stormwater Management Plans	89
4.11.4	Standard Survey Sheet	89
4.11.5	Quantity Sheet for FAA Projects	89
4.11.6	Construction Staging Areas	90
4.11.7	Geotechnical Reports	92
4.11.8	Geotechnical Boring & Core Data.....	93
4.11.9	Construction Phasing Plans.....	93
4.11.10	Maintenance of Traffic (MOT) Plans	94
4.11.11	Signature Requirements for Bid Set Construction Drawings	94
4.12.1	Specification Format and Numbering.....	95
4.12.2	MAA Standard Specifications	96
4.12.3	MAA Special Product Requirements.....	97
4.12.4	Airfield Specifications	97
4.12.5	Landside Site Work Specifications.....	98
4.12.6	Miscellaneous Specification Requirements	99
4.13	SECURITY PLAN AND SPECIFICATION REQUIREMENTS	99
4.13.1	Security Specification (010005X) at BWI Marshall.....	99

4.13.2	Security Plan	100
4.13.3	Security Specification (010006X) at MTN.....	100
4.14	CONSTRUCTION SAFETY AND PHASING PLANS	101
4.14.1	CSPP Review Checklist.....	101
4.14.2	Design Progress Milestones.....	102
4.14.3	Sample CSPP	102
4.14.4	Specific Design Requirements	102
4.15	COST ESTIMATING.....	102
4.15.1	Development of Cost Estimates.....	102
4.15.2	Liquidated Damages	104
4.16	DESIGNATED SUB-CONTRACTOR BIDDING PROCEDURES	104
4.17	MAINTENANCE, REPAIR AND OPERATING ITEMS (MROI).....	105
4.17.1	MROI Approval Form	105
4.17.2	Signature Requirements for MROI.....	106
4.17.3	MROI List Form	106
4.18	Comprehensive Paving and Comprehensive Interior/Exterior Modifications Contract Design Procedure	107
4.18.1	Technical Provisions.....	107
4.18.2	Contract and Task Number	110
4.18.3	Task Durations and Submittal Review	110
4.18.4	Liquidated Damages	111
4.18.5	Deliverables	111
4.18.6	Pre-Bid Meetings	112
4.18.7	Conformed Documents	112
4.18.8	Record Documents.....	112
4.19	Construction Durations and Blackout Dates.....	112
CHAPTER 5	BIDDING AND PROCUREMENT	113
5.1	GUIDELINES FOR THE CONSTRUCTION PROCUREMENT PROCESS	113
5.1.1	General.....	113
5.1.2	Procurement Review Group (PRG)	113
5.1.3	Technical Provisions.....	113
5.1.4	Pre-Bid Conference and Site Inspection	114
5.1.5	Addenda	114
5.1.6	Bid Tabulation and Notice of Recommended Award (NORA).....	115
5.1.7	Conformed Construction Documents	115
5.1.8	Pre-Construction Meeting.....	115
5.2	CONFORMED CONSTRUCTION DOCUMENTS.....	115
CHAPTER 6	CONSTRUCTION ADMINISTRATION	117
6.1	SHOP DRAWING/SUBMITTAL REVIEW	117
6.1.1	MAA Office of the Fire Marshal (OFM) – Authority for Fire Code Enforcement.....	117
6.1.2	OFM Review Comments	117
6.1.3	Design Changes	118
6.2	REQUEST FOR INFORMATION.....	118

6.3	RECORD DRAWING PREPARATION	118
6.3.2	Maintenance of Record Drawings and Specifications for projects containing SSI.....	119
6.3.3	Procedure for Delivery of Record Documents.....	119
SECTION III: DESIGN CRITERIA		123
CHAPTER 7	GENERAL REQUIREMENTS	123
7.1	CODE REQUIREMENTS.....	123
7.1.1	Fire Protection Design Information	123
7.1.2	Terminal Evacuation Plans	126
7.1.3	Identification and Reporting of Confined Spaces During the Design Process	127
7.2	RUNWAY, TAXIWAY, AND TAXILANE CLOSURES	127
7.2.1	Runway 10-28 and 15R-33L Intersection Closure	127
7.3	USE OF LIFTS WITHIN THE TERMINAL BUILDING.....	128
7.4	SAFETY AND SECURITY DURING CONSTRUCTION.....	128
7.4.1	Traffic Cones	128
7.4.2	Dust Control.....	128
CHAPTER 8	SITE DEVELOPMENT.....	129
8.1	GENERAL SITE WORK AND UTILITIES.....	129
8.1.1	Survey Control.....	129
8.1.2	Site Preparation.....	131
8.1.3	Underground Utility Trenches, Utility Markings, and Manhole/Handhole Covers/LIDS	132
8.1.4	Water Mains.....	136
8.1.5	Sanitary Sewers.....	141
8.1.6	Electric/Phone/Telecommunications	141
8.1.7	Miscellaneous Site Elements	141
8.1.8	Use of HDPE Pipe	147
8.2	AIRFIELD CIVIL/SITEWORK.....	148
8.2.1	Pavement Design	148
8.2.2	Pavement Marking	151
8.2.3	Emergency Vehicle Access/Fire Lanes/Fire Hydrants and Fire Department Connections.....	152
8.2.4	Aircraft Parking Marking.....	156
8.3	LANDSIDE CIVIL/SITEWORK	159
8.3.1	Roadways and Parking.....	160
8.3.2	Pavement Design	161
8.3.3	Landscaping	162
CHAPTER 9	PASSENGER BOARDING BRIDGES	163
9.1	GENERAL.....	163
9.2	INITIAL STEPS	163
9.2.1	Step One – Programming.....	163
9.2.2	Step Two – Site Evaluation.....	163
9.2.3	Step Three – Design.....	164

9.3	REQUIREMENTS.....	164
9.3.1	Slope and Code Requirements	164
9.3.2	Structural Analysis.....	165
9.3.3	Contract Technical Specification.....	165
9.3.4	Remove and Dispose of Bridge	166
9.4	TYPICAL ACCESSORIES	166
9.4.1	Pantograph or Cable Conveyance System	166
9.4.2	Telephone.....	166
9.4.3	Pre-Conditioned Air.....	166
9.4.4	400 Hertz Point-of-Use	167
9.4.5	Electrical Submetering.....	167
9.4.6	Adjustable Cab Floor (Articulating Cab Floor (ACF)).....	167
9.4.7	Task Lighting	168
9.4.8	Solid Tires.....	168
9.4.9	Gate Identification Signs.....	168
9.4.10	Baggage Slides.....	168
9.4.11	Subflooring	168
9.4.12	Finished Flooring.....	168
9.4.13	Exterior Finishes	169
9.4.14	Canopy	169
9.4.15	Occupancy Sensors	169
9.4.16	Relocated Bridge.....	169
9.5	PRE-CONDITIONED AIR AND 400 HERTZ SYSTEMS AND ASSOCIATED LOADING BRIDGE REQUIREMENTS.....	173
9.5.1	Design and Construction Requirements.....	173
9.5.2	Metering.....	174
9.6	GROUNDING PROTECTION	176
9.7	FIRE SAFETY REQUIREMENTS FOR PASSENGER BOARDING BRIDGES (PBBS).....	176
9.8	AIRPORTAL SUBMISSION DATA.....	177
9.8.1	PBB Information to Document	177
9.8.2	Photographic Documentation Procedure	177
CHAPTER 10	ENVIRONMENTAL PROCEDURES AND REQUIREMENTS	179
10.1	SEDIMENT CONTROLS AND STORMWATER MANAGEMENT.....	179
10.1.1	Sediment and Erosion Control.....	179
10.1.2	Stormwater Management Facilities (SWM)	179
10.1.3	Stream Restoration.....	190
10.2	BIRD DETERRENT SYSTEMS.....	193
10.2.1	Waterfowl Deterrent System for Sediment Traps at BWI Marshall.....	193
10.3	UNDERGROUND STORAGE TANKS (UST).....	198
10.3.1	Conformance with Regulations, Codes, Standards, and Specifications	198
10.3.2	Underground Fuel Storage Tank Requirements	198
10.3.3	Underground Storage Tank Piping	203
10.4	ABOVE GROUND STORAGE TANKS.....	203
10.4.1	Conformance with Regulations, Codes, Standards, and Specifications	203

10.4.2	Aboveground Fuel Storage Tank Requirements.....	204
10.4.3	Aboveground Storage Tank Venting (Normal Vent).....	207
10.4.4	Aboveground Storage Tank Venting (Emergency Vents).....	208
10.4.5	Aboveground Storage Tank Piping.....	208
10.4.6	Fill Lines	209
10.4.7	Remote Fill Assemblies	210
10.4.8	Collision Protection	210
10.5	STORAGE TANKS ASSOCIATED WITH GASOLINE DISPENSING/MOTOR VEHICLE REFUELING FACILITIES (GD/MVRFs)	211
10.6	PAINT BOOTHS	213
10.6.1	Paint Stripping Operations	213
10.6.2	Surface Coating Operations	215
10.7	PARTS WASHERS AND DEGREASERS.....	216
10.7.1	Batch Cold Cleaning Machine Standards	217
10.7.2	Batch Vapor and In-Line Cleaning Machine Standards	217
10.7.3	Test Methods.....	217
10.7.4	Monitoring Procedures.....	218
10.7.5	Recordkeeping Requirements	219
10.7.6	Reporting Requirements	219
10.8	ASBESTOS AND OTHER HAZARDOUS MATERIALS	221
10.8.1	Asbestos	222
10.8.2	Lead Paint	223
10.8.3	Management of Radioactive Wastes.....	223
10.8.4	Management of Universal Wastes	223
10.9	GLYCOL COLLECTION	224
10.10	FUEL TRUCK PARKING	224
10.11	Oil Water Separator (OWS).....	224
CHAPTER 11	ARCHITECTURAL / Buildings	228
11.1	DESIGN CONTINUITY	228
11.1.1	Domestic Terminal Baggage Claim Areas	228
11.1.2	Domestic Terminal Ticketing Concourse	228
11.1.3	LED and Blade signs shall match existing.	228
11.1.4	Domestic Terminal and International Terminal Concourse Holdrooms....	229
11.1.5	Commercial Storefronts and Signage	229
11.1.6	Service Areas	229
11.1.7	Offices.....	229
11.1.8	FIDS/BIDS Enclosures	229
11.1.9	Bomb Mitigation Design.....	230
11.2	AESTHETICS.....	230
11.2.1	Sustainable Design Innovation	230
11.3	TENANT IMPROVEMENTS	230
11.3.1	International Terminal and Concourse Millwork	230
11.4	PUBLIC AREA MATERIALS, FINISHES AND COLORS.....	231
11.4.1	Restrooms	231

11.5	ROOF SYSTEMS	231
11.5.1	Rooftop Equipment Installation	233
11.6	FLOOR AND WALL COVERINGS	233
11.6.1	Restrooms	233
11.6.2	Tile	233
11.6.3	Carpet Tile	233
11.6.4	Painting	234
11.6.5	Wall Covering	234
11.6.6	Solid Surfacing Material	234
11.6.7	Plastic Laminate	234
11.6.8	Waterproofing	234
11.6.9	Floor Structure Recessed Expansion Joint Covers	245
11.7	LOCK SYSTEM	246
11.7.1	Finish Hardware	246
11.7.2	Cipher Locks	246
11.8	RESTROOM STANDARDS	247
11.8.1	Design and Layout	247
11.8.2	Facility Construction Requirements	248
11.8.3	Restroom Exhibits and Standard Details	254
11.9	DOORS/WINDOWS	274
11.9.1	Roll-up Doors	274
11.9.2	Door Numbers	274
11.9.3	Sterile Area Access Doors	274
11.9.4	Window Opaque	274
11.10	FURNISHINGS	280
11.10.1	Holdroom Tandem Seating	282
11.10.2	Exterior Benches and Bike Racks	282
11.10.3	Trash Receptacles	282
11.10.4	Master Clock System	282
11.11	PASSENGER CONVEYANCE	282
11.11.1	Elevators	282
11.11.2	LIFT-Net Monitoring System	283
11.12	TERMINAL STAIRTOWER RAMP ACCESS	283
11.12.1	General Design Considerations	283
11.12.2	Ramp Configuration	284
11.13	BUILDING AUTOMATION SYSTEM	288
11.13.1	Design Guidelines	291
11.13.2	Existing Demand-Controlled Ventilation (DCV) Software	292
11.14	ARCHITECTURAL WOODWORK	297
11.14.1	General	297
11.14.2	AWS Quality Grades	297
11.14.3	AWI Quality Certification Program (QCP)	298
CHAPTER 12	STRUCTURAL AND STRUCTURAL SYSTEMS	301
12.1	MATERIALS	301
12.1.1	Reinforced Concrete (With Subcategories)	301

12.2	BOMB MITIGATION DESIGN	301
12.3	TRASH COMPACTOR FALL PROTECTION SYSTEMS.....	301
12.4	CORE DRILLING OF CONCRETE FLOORS	306
12.5	TERMINAL BUILDING HEAD KNOCKERS	306
12.5.1	Location	306
12.5.2	Civil.....	307
12.5.3	Structural System	307
12.5.4	Signage.....	308
12.5.5	Electrical	309
12.5.6	Head Knocker Exhibits and Standard Details.....	309
CHAPTER 13	HEATING, VENTILATION, AND AIR CONDITIONING (HVAC)	315
13.1	DUCTWORK	315
13.1.1	Duct Liner	315
13.2	PARTICULATE AIR FILTRATION.....	315
13.3	CO ₂ DEMAND VENTILATION	315
13.4	HVAC PIPE FLUSHING	316
13.4.1	Background.....	316
13.4.2	Design Specification Requirements:	316
13.5	HYDROSTATIC WATER PIPE TESTING	318
13.6	BOILERS AND PRESSURE VESSELS.....	318
13.7	NATURAL GAS PIPING.....	319
13.8	KITCHEN HOODS	322
13.8.1	Design, Fabrication and installation of kitchen hoods.....	322
13.8.2	Type I Exhaust Hood Design.....	322
13.8.3	Type II Exhaust Hood Design.....	323
13.8.4	Air Balance	323
13.9	EXHAUSTS AIR DUCTS AND EXHAUST FANS FOR KITCHEN HOODS.....	323
13.9.1	Design, Fabrication and Installation of exhaust system(s) and exhaust fans	323
CHAPTER 14	PLUMBING.....	325
14.1	BACKFLOW PREVENTERS.....	325
14.2	GREASE INTERCEPTORS.....	325
14.3	HYDROSTATIC WATER PIPE TESTING	326
14.3.1	General.....	326
14.3.2	Hydronic Piping	326
14.3.3	Domestic Water Piping	327
CHAPTER 15	FIRE SUPPRESSION SYSTEMS.....	328
15.1	FIRE SUPPRESSION SYSTEMS.....	328
15.1.1	Sprinkler Systems	328
15.1.2	Fire Hydrants	329
15.1.3	Signature and Seal Requirements of Fire Protection Systems Design Documents and Reports	337
15.2	FIRE ALARM AND LIFE SAFETY	342
15.2.1	BWI Marshall Fire Alarm System	342

15.2.2	Building Access Control	343
15.2.3	Automated External Defibrillator (AED)	343
15.3	INTERFACE OF FIRE ALARM, LIFE SAFETY, AND SECURITY SYSTEMS AT BWI MARSHALL	343
15.3.1	Existing Systems	345
15.3.2	Design Criteria	352
15.3.3	Procurement Policies	369
15.4	FIRE PROTECTION INFORMATION FOR ARCHITECTS AND ENGINEERS	370
15.4.1	Use Classifications	370
15.4.2	Special Fire Protection Interpretations and Requirements of the OFM.....	371
15.4.3	Emergency Power Systems Table.....	380
15.4.4	Existing Construction Types and Use Classifications	381
15.4.5	Fire Suppression Systems Table	383
15.4.6	Fire Detection Systems Table	386
15.4.7	Manual Fire Alarm Pull Station Table	389
15.4.8	Special Fire Protection Code Requirements For Martin State (MTN) Airport	389
15.4.9	Procedures for Determining Occupant Loads and Minimum Required Egress Capacities for Concourses.....	390
15.4.10	Procedures for Holdroom Sizing	401
15.4.11	Pre-Occupancy Fire Inspection Checklist.....	409
CHAPTER 16	SECURITY	411
16.1	SECURITY SYSTEM DRAWINGS.....	411
CHAPTER 17	AIRPORT INFORMATION TECHNOLOGY (IT) SYSTEMS.....	412
CHAPTER 18	ELECTRICAL	413
18.1.	GENERAL ELECTRICAL REQUIREMENTS.....	413
18.1.1	UPS Protection.....	413
18.1.2	Total Harmonic Distortion	413
18.1.3	Approved Testing Laboratories	414
18.1.4	Aluminum Electrical Wire.....	415
18.1.5	Final Cleaning of Electrical/Communication/IT Closets.....	415
18.1.6	Medium Voltage Cable Terminations.....	415
18.1.7	Transformers	415
18.2	GROUNDING AND LIGHTNING PROTECTION.....	416
18.2.1	Grounding	416
18.2.2	Surge Suppression, Bonding and Grounding for Outdoor Systems	416
18.3	POWER DISTRIBUTION SYSTEM AND EQUIPMENT	425
18.3.1	Substations	425
18.3.2	Medium Voltage Electrical Phasing and Rotation (BWI Marshall only) ..	431
18.4	EQUIPMENT	441
18.4.1	Panelboards (Power and Lighting).....	441
18.4.2	Raceways	441
18.4.3	Receptacles	445
18.4.4	Charging Stations.....	445

18.5	EMERGENCY AND STANDBY POWER SYSTEMS	447
18.5.1	Diesel Powered Engine – Generator Load Bank	447
18.5.2	Permitting and Review Requirements	447
18.6	METERING OF POWER.....	447
18.7	TEMPORARY ELECTRIC POWER SERVICE	448
18.7.1	Back-up Generator Requirements for Electrical Work (BWI Marshall Only)	449
18.8	AIRFIELD ELECTRICAL.....	451
CHAPTER 19	LIGHTING	452
19.1	INTERIOR LIGHTING.....	452
19.1.1	Lamps.....	452
19.1.2	Lamp Ballasts.....	452
19.1.3	Light Emitting Diodes –LED.....	453
19.2	EXTERIOR LIGHTING.....	457
19.2.1	Apron Lighting.....	457
19.2.2	Airfield Lighting and Visual Aids Systems and Fixtures	458
19.2.3	Landside Lighting (Parking and Roadways).....	463
19.3	AIRFIELD LIGHTING COUNTERPOISE FOR LIGHTNING PROTECTION.....	465
19.3.1	Purpose.....	465
19.3.2	Lightning Protection Requirements for Airfield Lighting Equipment	465
19.3.3	Bonding.....	466
CHAPTER 20	SIGNAGE AND GRAPHICS	468
20.1	EXTERIOR SIGNAGE	468
20.1.1	Apron/Airfield Signage.....	468
20.1.2	Baggage Makeup Area Exterior Overhead Signage	468
20.2	INTERIOR SIGNAGE	468
20.2.1	Exit Signs.....	468
20.2.2	Identification Signage	470
20.3	TEMPORARY PARTITION WALL GRAPHICS	472
CHAPTER 21	BAGGAGE HANDLING SYSTEMS.....	477
21.1	ABBREVIATIONS	477
21.2	GENERAL CODES AND CRITERIA.....	478
21.3	PERFORMANCE.....	479
21.4	MECHANICAL COMPONENTS.....	480
21.5	ELECTRICAL/CONTROLS.....	481
21.6	OUTBOUND CONVEYOR SYSTEM.....	483
21.7	INBOUND CONVEYOR SYSTEMS.....	483
21.8	TESTING AND COMMISSIONING.....	484
21.9	WARRANTY/MAINTENANCE/TRAINING/MANUALS.....	484
21.10	DESIGN COORDINATION GUIDELINES	485

TABLE OF CONTENTS CONTINUED

EXHIBITS/STANDARD DETAILS

LIST OF DELIVERABLES	44
STAGING AREA EXHIBIT	91
RECORD DRAWING STAMP	120
CD INSERTS	121
SAMPLE EGRESS PLAN	126
MANHOLE/HANDHOLE COVER LIDS	136
COATING OF MECHANICAL COUPLING AND VALVE BOLTS	140
ELECTRICAL STRUCTURE DRAIN DETAIL (PLAN)	143
ELECTRICAL STRUCTURE DRAIN DETAIL (SECTION)	144
PIPE CONNECTION DETAIL	145
RODENT SCREEN	146
MARTIN STATE AIRPORT SECTION	150
FIRE HYDRANT MARKINGS	155
AIRCRAFT PARKING MARKING I	158
AIRCRAFT PARKING MARKING II	159
TYPICAL TASK LIGHT FIXTURE MOUNTING DETAIL	170
TASK LIGHTING MOUNTING DETAIL-ELEVATION VIEWS	171
TASK LIGHTING WIRING DIAGRAM	172
BIRD DETERRENT SYSTEM FOR SEDIMENT TRAPS AND SEDIMENT BASINS	194
WATER FOWL DETERRENT SYSTEM FOR SEDIMENT TRAPS	195-196
FLOOR DRAIN IN COMPOSITE SLAB CONDITION	238
FLOOR DRAIN IN SUSPENDED REINFORCED CONCRETE SLAB CONDITION	239
FLOOR SINK IN COMPOSITE SLAB CONDITION	240
FLOOR SINK IN SUSPENDED REINFORCED CONCRETE SLAB CONDITION	241
FLOOR PENETRATION	242
TOILET STALL AND DETAIL	255
TOILET STALL DETAILS	256
SAMPLE LAYOUT WOMEN'S ROOM	257
LIGHT COVE DETAILS	258
SECTION THROUGH LAVATORIES	259
SECTION THROUGH URINAL SHELF	260
LAVATORY COUNTERTOP	261
URINAL WALL & SHELF	262
URINAL SHELF BULLNOSE DETAIL	263
TOILET ROOM SHELF –DIAPER CHANGING	264
SIGNAGE 1	265
SIGNAGE 2	266
CORNER GUARD/WALL GUARD DETAIL	267
TOILET ROOM ELEVATIONS	268
TOILET ROOM ELEVATIONS-2	269
TOILET ROOM ELEVATIONS-3	270
TOILET ROOM ELEVATIONS-4	271

TOILET ROOM ELEVATIONS-5	272
TOILET ROOM ELEVATIONS-6	273
EXISTING WALL SECTION @ DOMESTIC TERMINAL	277
WALL SECTION-STANDARD DETAIL @ DOMESTIC TERMINAL	278
DETAILS @ HARDBOARD PANEL	279
DETAILS @ HORIZONTAL HARDBOARD PANEL, CONCOURSE A&B, AND A/B	280
DETAILS @ VERTICAL HARDBOARD PANEL, CONCOURSE B	281
RAMP WILL BE LOCATED PARALLEL WITH THE BUILDING	285
WHERE THE RAMP WILL BE LOCATED PERPENDICULAR TO THE BUILDING	286
METASYS NETWORK MAP @ BWI MARSHALL AIRPORT	289
TYPICAL SINGLE TRASH COMPACTOR	303
TYPICAL DOUBLE TRASH COMPACTOR	304
TYPICAL TRASH COMPACTOR SECTION	305
TYPICAL HEAD KNOCKER ELEVATION	310
TYPICAL HEAD KNOCKER SIGN ELEVATION	311
TYPICAL HEAD KNOCKER SIGNAGE	312-313
HEAD KNOCKER PAVEMENT MARKING	314
AIR BALANCE SCHEDULE-KITCHEN AREA/DINING AREA	324
ABOVE GROUND FIRE HYDRANT SETTING DETAIL	334
AIRFIELD SIDE ABOVE GROUND FIRE HYDRANT WITH STORZ PUMPER CONNECTION	335
FLUSH TYPE HYDRANT AND VAULT DETAIL	336
NEPA 170 FIRE SAFETY SYMBOLS	337
CONTRACTOR'S MATERIAL AND TEST CERTIFICATE FOR UNDERGROUND PIPING	338-339
EXISTING CONSTRUCTION TYPES	382
SAMPLE AIRCRAFT LAYOUT PLAN	403
SUBSTATION ONE-LINE DIAGRAM	427
SUBSTATION SEQUENCE OF OPERATION	428
SINGLE LINE DIAGRAM WITH PHASE ROTATION	435
SWITCHGEAR, SUBSTATION AND QUICK CONNECT SWITCHES PHASE ROTATION	436-437
SAMPLE PLACARD FOR EXTERIOR OF QUICK CONNECT CABINET	438
SAMPLE PLACARD FOR INTERIOR OF QUICK CONNECT CABINET	439
SAMPLE PLACARD FOR SWITCHGEAR AND SUBSTATIONS	440
LIGHT POLE	462
STEEL REINFORCING CAGE	463
BAGGAGE MAKE-UP AREA OVERHEAD CAUTION SIGN	469
BAGGAGE MAKE-UP AREA DOOR LOCATION MAP	470
MAA DOOR NUMBER PLAQUE	473
SIGNS 1	474
SIGNS 2	475
SIGNS 3	476

Volume II of III**APPENDICES**

AIRPORT CONSTRUCTION PROJECT CHECKLIST:APPENDIX A

STANDARD FORMS:APPENDIX B

Meeting Minutes Form
 Engineer's Report General Summary
 Standard Cost Estimate
 Knox Box Authorization/Order Forms
 Request for Variance – Interface of Fire Alarm, Life Safety and Security Systems
 Pre-Occupancy Fire Inspection
 SSI – Confidentiality and Non-disclosure Agreement (Construction Contractor Bidders)
 SSI – Confidentiality and Non-disclosure Agreement (A/E, CMI, Tenant & Sole Source)
 SSI – Contractor Representative Information Form
 MROI – Maintenance, Repair and Operating Items List
 MROI – MROI List Approval
 MROI – Record of Delivery
 Construction Safety and Phasing Plan Review Checklist (AC 150/5370-2F)

MAA STANDARD CONTRACT DRAWINGS:APPENDIX C

Cover Sheet (BWI Marshall)
 Cover Sheet (Martin State)
 General Construction and Safety Notes I – SIDA (BWI Marshall)
 General Construction and Safety Notes II – SIDA (BWI Marshall)
 General Construction and Safety Notes – Sterile Building Area (BWI Marshall)
 General Construction and Safety Notes – Non Secure Areas (BWI Marshall)
 General Construction and Safety Notes I (Martin State)
 General Construction and Safety Notes II (Martin State)
 Survey Control Sheet (BWI)
 Survey Control Sheet (MTN)
 Erosion and Sediment Control Plan
 Erosion and Sediment Control Notes I
 Erosion and Sediment Control Notes II
 Vegetative Stabilization Notes 1
 Vegetative Stabilization Notes 2
 Vegetative Stabilization Notes 3
 Erosion and Sediment Control Details 1
 Erosion and Sediment Control Details 2
 Erosion and Sediment Control Details 3
 Erosion and Sediment Control Details 4
 Erosion and Sediment Control Details 5
 Erosion and Sediment Control Details 6
 Erosion and Sediment Control Details 7
 Erosion and Sediment Control Details 8

STANDARD SPECIFICATIONS:.....APPENDIX D

Division 01: MAA Standard Procedures

010001X	Mobilization/Demobilization
010002X	Construction Quality Control Plan
010003X	Maintenance, Repair and Operating Items (MROI)
010004X	Temporary Construction Items
010005X	Security Requirements During Construction at BWI Marshall Airport
010006X	Security Requirements During Construction at Martin State Airport
010007X	Sensitive Security Information (SSI) Requirements During Construction
010008X	Management of Universal Wastes
010009X	Management of Radioactive Wastes
010010X	Survey Requirements During Construction (AGIS)
017823X	Operation and Maintenance Data

Division 08: Openings (Doors and Windows)

087100	Door Hardware
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Division 23: Heating, Ventilation & Air Conditioning (HVAC)

230900	Building Automation Systems (BAS)
230519	Air Flow Monitoring System
230519	Flow Meters

Division 26: Electrical

262300	Power Monitors for Low Voltage Switchgear
262416	Panelboards
262923	Variable Frequency Drives

Division 27: Communications

REFER TO MAA OFFICE OF TECHNOLOGY WEBSITE

Division 28: Electrical Safety and Security

281301	Controlled Access Security System
2: 4500	Closed-Circuit Television (CCTV) System
283111	Fire Alarm System
283200	Flexible Response System

Division 32: Exterior Improvements

329000X	Landscaping
329115X	Topsoil
329201X	Seeding
329202X	Sodding
329203X	Mulching
329300X	Plant Installation

STANDARD SPECIFICATIONS (CONTINUED):APPENDIX D

Division 33: Utilities

335103X Natural Gas Distribution

Division 34: Transportation

347713X Apron Drive Passenger Boarding Bridges

Division 50: FAA Specifications

L-109 Modifications and Additions to Airfield Lighting System

P-209 Crushed Aggregate Base Course

P-401 Plant Mix Bituminous Pavements

SURVEY CONTROL MANUALS: APPENDIX E

Baltimore Washington International Thurgood Marshall Airport Survey Control Manual

Martin State Airport Survey Control Manual

RESTROOM DESIGN CUT SHEETS: APPENDIX F

CODES AND STANDARDS:APPENDIX G

Volume III of III

CADD DESIGN STANDARDS:APPENDIX H

GIS STANDARDS: APPENDIX I

INTRODUCTION

It is required that all Designers and Architects/Engineers (A/E) performing work at MAA owned and operated airports, comply with the MAA policies, standards, procedures, and construction requirements contained in the 2015 Design Standards and its appendices. Below highlights the design standards (some previously issued) that have been added to the 2015 edition of the Design Standards. In addition, the Design Standards and associated Appendices have been reorganized in attempt to incorporate the design information contained in the appendices to the manual itself. Major modifications to existing sections of the Design Standard Manual are also noted:

- Chapter 1, Introduction; MODIFIED in its entirety
- Chapter 3, MODIFIED in its entirety
- Section 4.11.9 through Section 4.11.12.5; ADDED
- Section 4.12, Construction Specifications; MODIFIED in its entirety
- Section 4.13, Security Plan and Specification Requirements, MODIFIED for current security procedures
- Section 4.14, Construction Safety and Phasing Plans; MODIFIED in its entirety with FAA requirements
- Section 4.17, Maintenance, Repair and Operating Items (DST 2014-05; November 14, 2014)
- Section 4.18, Comprehensive Paving and Comprehensive Interior/Exterior Modifications Contract Design Procedure, and Subsections 4.18.1 through 4.18.8; ADDED
- Section 6.3, Record Drawing Preparation; MODIFIED CD label detail
- Section 7.1, Code Requirements (DST 2014-02; May 9, 2014)
- Section 8.1.7.2, Bollards (DST 2014-04; October 17, 2014)
- Section 10.2.2.4 and Section 10.2.25, Airfield Lighting Identification Tags (DST 2014-01; May 6, 2014)
- Section 10.3, Underground Storage Tanks (UST); MODIFIED in its entirety
- Section 10.4, Above Ground Storage Tanks; MODIFIED in its entirety
- Section 10.11, Oil Water Separator (OWS); ADDED
- Section 11.14, Architectural Woodwork (DST 2014-03; September 9, 2014)

- Section 12.5, Terminal Building Head Knockers; ADDED and Details; ADDED
- Section 13.7, Items 3 & 4 welded joint pressure requirement MODIFIED from 0.5PSIG to 5.0PSIG
- Section 13.8, Kitchen Hoods; ADDED
- Section 13.9, Exhaust Air Ducts and Exhaust Fans for Kitchen Hoods; ADDED and Air Balance Schedule – Kitchen Area/Dining Area Table; ADDED
- Section 15.1.2.6, Fire Hydrants – Exhibit of Flush Type Fire Hydrant Detail and Exhibit of Flush Type Fire Hydrant and Vault Detail REPLACED with Exhibit of Flush Type Hydrant and Vault Detail
- Section 18.3.1, Item 8; ADDED signage requirements for substation quick connects
- Section 18.3.2, Medium Voltage Electrical Phasing and Rotation (BWI Marshall only); MODIFIED in its entirety and Phase Rotation Details; ADDED
- Section 19.2.2.4, Airfield Lighting Cable Identification Tags (DST 2014-01; May 6, 2014)
- Section 19.2.2.5, Airfield Lighting Fixture Identification Tags (DST 2014-01; May 6, 2014)
- Section 20.1.2, Baggage Makeup Area Signage; ADDED and Sign and Location Map Details; ADDED
- Appendix B, Standard Cost Estimate; MODIFIED to include mobilization and temporary construction items below Subtotal A and ADDED line item for Project Management Fee under section Additional Program Costs
- Appendix C, Survey Control Sheet; ADDED
- Appendix D and throughout DST Manual, Technical Specification identification numbers; MODIFIED
- Appendix D, Technical Specifications
 - 010001X, Mobilization/Demobilization; ADDED
 - 010002X, Construction Quality Control Plan; ADDED
 - 010003X, Maintenance, Repair and Operating Items (MROI); MODIFIED
 - 010004X, Temporary Construction Items; MODIFIED
 - 010005X, Security Requirements During Construction at BWI Marshall Airport; MODIFIED
 - 010010X, Survey Requirements During Construction (AGIS); ADDED
 - 347713X, Apron Drive Passenger Boarding Bridges; MODIFIED

- Appendix E, Survey Control Manual; BWI Marshall manual MODIFIED to update survey monuments
- Appendix F, Restroom Standards; MOVED to Volume 2
- Appendix G, Code Requirements; MODIFIED and MOVED to Volume 2
- Appendix H, CAD Standards; MODIFIED
- Appendix I, GIS Standards; MODIFIED

The intent of the MAA Design Standards is to supplement and complement established codes, regulations, and industry accepted practices and provide guidance and additional information regarding requirements unique to MAA, Baltimore/Washington International Thurgood Marshall (BWI Marshall) and Martin State Airports.

If any of the included design standards or requirements contained herein conflict with any codes or regulations, it should be brought immediately to the attention of the Director, Office of Design & Construction, (410) 859-7093.

SECTION I: GENERAL PROCEDURES AND POLICIES**CHAPTER 1 INTRODUCTION****1.1 PURPOSE**

The purpose of the MAA Design Standards (DST) Manual is to establish procedures, set standards, and achieve consistency for design and construction projects at both Baltimore/Washington International Thurgood Marshall (BWI Marshall) and Martin State (MTN) Airports. These Design Standards are mandated regulations of the MAA. In this DST, the terms A/E, designer, and consultant are used interchangeably.

1.2 ADMINISTRATIVE**1.2.1 Baltimore/Washington International Thurgood Marshall (BWI Marshall) Airport**

The official name of the airport should read Baltimore/Washington International Thurgood Marshall Airport. An abbreviated version which can be used in correspondence, publications, and other communications is BWI Thurgood Marshall Airport.

The acronym “BWI Marshall” can be used in correspondence and other publications where necessary, for example, Baltimore/Washington International Thurgood Marshall Airport (BWI Marshall).

1.2.2 Feedback

The MAA Design Standards Manual is a living document that is continually updated to reflect the changing policies, procedures and design criteria of the MAA. If you know of a DST which needs to be updated, or have suggestions for improvement, please send an email to designstandards@bwiairport.com or contact the MAA Division of Engineering, Manager.

CHAPTER 2 GENERAL DESIGN AND CONSTRUCTION POLICIES

2.1 OPERATIONAL AND SAFETY REQUIREMENTS

2.1.1 Vehicle Access on BWI Marshall Airport Movement Area

Access to the movement area (taxiways and runways) is restricted to vehicles with an essential function. An essential function is defined as having a need to be on the movement area, e.g., working on runway edge lights. The intent of this action is to eliminate all convenience crossings. Using the movement area to get to other portions of the airport that can be accessed by alternative routing is not permitted. Any questions regarding accessing the movement area can be directed to the MAA Operations Center Manager at 410-859-7024.

2.1.2 Confined Space Requirements for Designers

2.1.2.1 Purpose

The Maryland Aviation Administration (MAA) has identified confined spaces on BWI Thurgood Marshall (BWI Marshall) and Martin State Airport property which require adherence to confined space entry procedures for personnel access in accordance with Occupational and Health Standards for Permit Confined Spaces (OSHA 29 CFR 1910.146). MAA has compiled and maintains a list of all known Confined Spaces located on BWI Marshall Airport property. This list is not guaranteed to be accurate or all inclusive, but is the result of a diligent effort by MAA to maintain an inventory of all confined spaces and associated potential hazards to workers at BWI Marshall Airport. The list is updated annually as confined space classifications change. Martin State Airport does not maintain a confined space list so it is incumbent upon the Designer to assess each potential confined space. The following requirements apply to all Designers engaging in confined space entry as part of their work.

2.1.2.2 Designer Requirements

When it is necessary for Designers to access any confined space on BWI Marshall or Martin State Airport property, Designers and contractors shall conduct all work related to the confined space entry in accordance with applicable Federal, State and local Confined Space Entry regulations contained in the OSHA Standard for Permit-Required Confined Spaces (29 CFR 1910.146), the MOSH Standard for Confined Spaces (COMAR 09.12.35) and the MAA Confined Space Entry Program (RM-1910.146) contained in the MAA Workplace Safety Manual. Forms that are required to be completed by the Designer and contractor are available in Section 7 of the MAA Confined Space Entry Program document. Designers and contractors shall conduct the confined space entry work at their expense and shall include all necessary labor, material and equipment costs in the Designer price proposal or contractor bid price, as applicable.

The Designer shall note in the MAA Confined Space Entry Program (RM-1910.146) Sections 3.9.4 and 3.9.5 that when working at the BWI Marshall Airport, the BWI Marshall Airport Fire and Rescue Department shall only provide the required STANDBY rescue team for MAA's Consulting Firms for entry into confined spaces that are found to be immediately dangerous to life and health (IDLH). When working at Martin State Airport the Designer shall provide their own STANDBY rescue team at the Designer's expense.

Before entering into confined spaces, all Designers shall be required to submit the following, as applicable:

- a. A completed Air Monitoring & Instrument Calibration & Maintenance Record Form, and a completed Confined Space Entry Equipment List Form for the items that the Designer or contractor will have on site, with specific information on make, model, and quantity. The Designer or contractor shall also provide a certification to the MAA Risk Management Department that the equipment complies with the requirements of the MAA Confined Space Entry Program.
- b. Personnel Training Certifications, including a list of names of the trained entrants, attendants, and entry supervisors proposed to perform the entry together with current training certifications. Where the Designer or contractor is providing rescue support, submit a list of names of trained employees proposed to perform such activities. All training shall meet or exceed the MAA's Confined Space Training requirements listed in the Confined Space Entry Program.

2.1.2.3 MAA Risk Management Department

The MAA Risk Management Department shall provide the Designer with the following upon request:

- a. List of known confined spaces on MAA property including permit and non-permit spaces.
- b. List of known hazards associated with the confined space in question, including material safety data sheets for any chemical in the area of the confined space, MAA's experience with the space, and if a permit-required space, the reasons why the space in question is a permit space.
- c. Applicable procedures, including lockout/tagout policy and procedures that MAA has implemented for the protection of employees in or near permit spaces where contractor personnel will be working.

- d. A copy of MAA's Workplace Safety Manual which includes the MAA Confined Space Entry Program requirements.

To obtain this information, the MAA Risk Management Department Coordinator can be contacted by telephone at (410) 859-7509 or by fax at (410) 859-7720.

The Designer is cautioned that due to the constantly changing nature of an airport environment, the confined space information provided by the MAA Risk Management Department is not guaranteed accurate or all inclusive. The Designer and contractor shall be responsible for conducting informed due diligence with regard to any potential confined space to apprise himself/herself of the possible confined space conditions that could exist and take appropriate precautions accordingly. If there is any doubt regarding a possible confined space, the Designer or contractor shall not enter the space without consulting the MAA Risk Management Department Coordinator.

In instances where MAA and Designer or contractor employees will be working simultaneously as authorized entrants in a permit space, the MAA Risk Management Department Coordinator will coordinate entry operations so that MAA and Designer or contractor employees do not endanger each other. In cases where the Designer or contractor employees are working without MAA employees, the Designer or contractor shall be responsible for coordination of entry operations.

2.1.2.4 Pre-Entry Submittal and Approval Requirements

No less than 24 hours prior to planned entry into a confined space, the Designer or contractor shall provide the MAA Risk Management Department Coordinator the following pre-entry materials:

- a. Confined Space Entry Procedure Checklist: A completed Confined Space Entry Procedure Checklist Form.
- b. Confined Space Entry Evaluation: A completed Confined Space Entry Evaluation Form.
- c. Confined Space Entry Permit: A completed Confined Space Entry Permit Form including signature of the Fire Department representative.
- d. Confined Space Emergency Information: A completed Confined Space Emergency Information Form.

2.1.2.5 Entry Requirements

The Designer shall comply with all operational procedures required by the MAA Confined Space Entry Program (RM-1910.146) contained in the MAA Workplace Safety Manual before and during the confined space entry operations.

2.1.2.6 Debriefing Requirements

The Designer shall attend a debriefing session with the MAA Risk Management Department Coordinator at the conclusion of the entry operations. This debrief shall include discussion and documentation of the permit space program followed including descriptions of any hazards confronted or created in permit spaces during entry operations. The following forms will be submitted to the MAA Risk Management Department Coordinator within 24 hours of completion of all confined space entries for use at the debriefing.

1. Confined Space Entry Procedure Checklist
2. Confined Space Entry Evaluation Form
3. Confined Space Entry Permit Form
4. Confined Space Entry Emergency Information Form
5. Confined Space Accountability Form
6. Confined Space Entry Critique/Review Sheet
7. Confined Space Entry Log

2.1.3 Requirements for Designers Regarding Identification and Reporting of Confined Spaces during the Design Process

The Designer shall strive to design all new facilities with as few Confined Spaces as practical. When new confined spaces cannot be avoided, the Designer shall be required to identify and report all possible new confined spaces, including the associated hazards, to MAA during the design process so that informed consent can be obtained before the confined spaces are constructed. As part of the design process, the Designer shall also bring forward possible design changes that, if implemented, could eliminate or minimize the creation of new confined spaces.

Section 4.10, Design Phases and Submittal Requirements, provides guidance to Designers related to identification and reporting of potential new confined spaces during the design process.

2.2 MANAGEMENT OF SENSITIVE SECURITY INFORMATION (SSI)

This section applies to all persons and entities that have access to information classified by the Maryland Aviation Administration as SSI and provides instructions on the procedures that must be strictly adhered to when working with SSI information.

All projects designed, procured and constructed at BWI Marshall and MTN shall comply with these requirements.

2.2.1 Definitions

Bidder – The entity that purchases a set of plans and specifications and submits a bid on an SSI project being advertised by MAA.

Construction Manager – The consultant who is formally retained by MAA for the purpose of construction administration of a construction project containing SSI. The Construction Manager is responsible to the MAA Project Manager (Construction) for the safeguarding and management of SSI by all construction management team members in his charge throughout the entire duration of the project.

Contractor – The entity that has been awarded a contract or a building permit by MAA and will construct the SSI project using its employees and/or those of a subcontractor it subsequently employs. The Contractor is responsible to the appropriate MAA Project Manager (Construction) or MAA Manager (Building Permits) for the safeguarding and management of SSI by all employees and subcontractors in his charge throughout the entire duration of the project.

Covered Person – An individual or entity with transportation security or transportation security-related responsibilities. Covered persons include appropriate MAA employees, consultants, contractors (and their subcontractors), as well as stakeholders and industry partners. A list of covered persons is contained in 49 CFR 1520.7.

Design (Consultant) Project Manager – The consultant who is formally retained by MAA for the purpose of design of a construction project containing SSI. The Design (Consultant) Project Manager leads the design team of consultants and subconsultants and is responsible to the MAA Project Manager (Design) for the safeguarding and management of SSI by all design team members in his charge throughout the entire duration of the project.

Design Team – Individual MAA and consultant staff members involved in the design of a project containing SSI. The MAA Project Manager (Design), in consultation with the Design (Consultant) Project Manager, determines what Design Team members are designated as “covered persons” with the “need to know” SSI.

Freedom of Information Act (FOIA) – A federal law ensuring public access to U.S. government records. FOIA carries a presumption of disclosure; the burden is on the government to substantiate why information may not be released. Upon written request, agencies of the United States government are required to disclose those records, unless

they can be lawfully withheld from disclosure under one of nine specific exemptions in the FOIA. This right of access is ultimately enforceable in federal court. **SSI is exempt from the provisions of FOIA.**

MAA Project Manager (Construction) – The MAA Office of Design & Construction or Office of Technology (OT) staff member designated to direct and to manage the construction of projects involving SSI. The MAA Project Manager (Construction) bears responsibility for the safeguarding and management of SSI by all construction management team members in his charge throughout the entire duration of the project.

MAA Project Manager (Design) – The MAA Office of Design & Construction or Office of Technology (OT) staff member designated to direct and to manage the design of projects involving SSI. The MAA Project Manager (Design) bears responsibility for the safeguarding and management of SSI by all Design Team members in his charge throughout the entire duration of the project.

MAA Project Manager (Procurement) – The MAA Office of Design & Construction or Office of Technology (OT) staff member designated to direct and to manage the procurement of projects involving SSI. The MAA Project Manager (Procurement) bears responsibility for the safeguarding and management of SSI by all Procurement Team members in his charge throughout the entire duration of the project.

MAA Security Coordinator – The MAA Director of Airport Security (DOAS) who is an MAA employee serving as the primary contact for all security-related activities and communication with the Transportation Security Administration (TSA).

Maryland's Public Information Act (PIA) - Maryland State Government Article Section 10-611 et seq., grants the public a broad right of access to records that are in the possession of state and local government agencies. It has been a part of the Annotated Code of Maryland since its enactment as Chapter 698 of the Laws of Maryland 1970 and is similar in purpose to the Federal Freedom of Information Act ("FOIA"), 5 USC. §552, and the public information and open records acts of other states. **SSI is exempt from the provisions of PIA.**

Need to Know – A designation made by the responsible MAA Project Manager (Design, Procurement and Construction) which is limited to persons who carry out, supervise, or are in training for transportation security activities, if necessary, for the performance of their job.

Sensitive Security Information (SSI) - Sensitive Security Information (SSI) is information that, if publicly released, would be detrimental to transportation security as defined by Federal regulation 49 C.F.R. part 1520. SSI is considered Sensitive But Unclassified

(SBU). Civil penalties are assigned for unauthorized disclosure of SSI. Classified national security information is subject to more stringent handling requirements. Criminal penalties can be incurred for unauthorized release of classified national security information. Although SSI is not classified information, there are specific procedures for recognizing, marking, protecting, safely sharing, and destroying SSI. Documents covered as SSI include, but are not limited to, contract plans and specifications, submittals, shop drawings, Requests for Information (RFIs), contract revisions, system drawings, system manuals, software documentation, training documents and materials operation and maintenance manuals and system codes.

Sole Source System Contractor (SSSC) – An employee of the retained, long-term contractor that provides operation and maintenance for one of the four identified physical security systems (CASS, CCTV, Flex Response and CAD) whose component data constitute SSI.

2.2.2 Abbreviations and Acronyms

AED - Automated External Defibrillator
BWI Marshall – Baltimore/Washington International Thurgood Marshall Airport
CAD – Computer Aided Dispatch
CASS – Controlled Access Security System
CCTV – Closed Circuit Television
CFR – Code of Federal Regulations
CMI – Construction Management Inspection
DST – Design Standard
FOIA – Freedom of Information Act
OT – MAA Office of Technology
MAA – Maryland Aviation Administration
MTN – Martin State Airport
NCIC – National Crime Information Center
PIA – Public Information Act
SBU – Sensitive But Unclassified
SG – State Government Article
SSI – Sensitive Security Information
SSSC – Sole Source System Contractor
TSA – Transportation Security Administration
USC – United States Code

2.2.3 Legal and Regulatory Authorities

5 USC § 552

http://www.justice.gov/oip/foia_guide09.htm

49 CFR 1520

http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&tpl=/ecfrbrowse/Title49/49cfr1520_main_02.tpl

Maryland State Government Article Section 10-611 et seq.

http://www.oag.state.md.us/Opengov/Appendix_C.pdf

2.2.4 Scope

The provisions of Section 2.2 apply to the following physical security systems at the Baltimore Washington International/Thurgood Marshall Airport and their component data:

- Controlled Access Security System (CASS)
- Closed Circuit Television (CCTV)
- Flex Response System
- Computer Aided Dispatch (CAD)

Additionally, this section applies to the following groups of personnel who interface with these systems and must manage their associated SSI:

- MAA Office of Design and Construction
- MAA Office of Airport Security
- MAA Office of Procurement
- MAA Office of Airport Operations
- MAA Office of Commercial Management
- MAA Office of Technology
- MAA Office of the Attorney General
- Design Consultants
- Construction Management and Inspection Consultants
- Construction Contractors
- Construction Subcontractors
- Sole Source System Contractors under contract to MAA
- Tenants and their consultants and contractors performing facility modifications under the authority of an MAA Building Permit

Personnel within these organizations that must handle SSI pursuant to discharging their professional responsibilities are considered “covered” with a “need to know.”

2.2.5 Protected SSI Systems

2.2.5.1 Controlled Access Security System (CASS)

Description - The Controlled Access Security System (CASS) provides a means of opening and closing doors to secure areas through the use of a card reader and data contained on an access card (MAA Security Badge). The system produces an automated log of all activity and interfaces with other security systems. Additionally, there are subsystems which use the same components for limited, related applications.

System Components

- CASS Reader
- Power Supply
- Control Panel
- Door Security Hardware
- Head-end Equipment
- Other Peripheral Devices

System Administration

- System Manuals
- System Drawings
- Software
- Training Documents

Note: Data logs, the employee database and other system data may be considered SSI, but are beyond the scope of this section.

2.2.5.2 Closed Circuit Television (CCTV)

Description – The Closed Circuit Television (CCTV) System provides a means of viewing activity at various locations throughout the BWI Marshall campus through the use of a series of cameras and monitors. The system includes the capability to record video of images viewed through the remote camera. The system is integrated and can be controlled remotely. Additionally, there are subsystems which use the same components for limited, related applications (such as the Exit Lane Breach Detection System).

System Components

- Cameras
- Monitors
- Power Supply

- Digital Video Recorders
- Fiber Optic Transceivers
- Head-end Equipment
- CCTV – CASS Interface

System Administration

- System Manuals
- System Drawings
- System Codes
- Software
- Training Documents

2.2.5.3 Flex Response

Description – The Flex Response System is a stand-alone audible and visual alarm system that provides a means of alerting law enforcement and airline gate personnel of a security concern arising from personnel activity or carry-on baggage screening at pier security checkpoints. There are two alert levels: amber and red. Additionally, the system can be activated by opening a door to an Automated External Defibrillator (AED) cabinet.

System Components

- Strobe
- Audio alarm
- Power Source
- Head-end Equipment
- Activation switches

System Administration

- System Manuals
- System Drawings
- Training Documents

2.2.5.4 Computer Aided Dispatch System (CAD)

Description – The Computer Aided Dispatch (CAD) System is an automated point of entry which provides an integrated information gathering function from multiple call, alarm, and signaling sources and distributes that information to appropriate emergency response units for public safety purposes. Basic functions provided by CAD include resource management, call taking, location verification, dispatching, unit status management, and call disposition. Interface with mobile data computers and other external safety and security systems, along with local,

state and federal information systems, benefit timely and effective response to emergency situations.

System Components

- Computer Hardware and Software
- Audio headsets
- Audio visual monitors
- Keyboards
- Cable connections
- Workstation units
- Integration of communication, safety, and alarm systems:
 - Telephone
 - State and Regional NCIC
 - Fire Alarm System
 - Controlled Access Security System (CASS)
 - Closed Circuit Television System (CCTV)
 - Flex Response System
 - Fire Rescue Facility Alerting and Activation
 - Messaging System
 - Master Time Clock
 - Records Management System (RMS)

Systems Administration

- Systems Manuals
- Systems Drawings
- Systems Codes
- Software
- Training Documents
- Maintenance and Service

2.2.6 SSI General Requirements

2.2.6.1 General

The Maryland Aviation Administration maintains physical security systems which are contained within, and integrated into, various facilities. Even though these systems (which are listed above in Section 2.2.4) are maintained and operated by sole source system contractors, they may be affected by various construction projects.

The design and construction of these projects involve the disclosure, reproduction and distribution of SSI among the owner, consultant design team and the contractor team.

2.2.6.2 Access

Access to SSI is limited to “covered persons” listed in 49 CFR 1520.7 with a “need to know,” as defined in 49 CFR 1520.11. “Need to know” is limited to persons who carry out or supervise the maintenance or improvement of designated systems in the performance of their job.

2.2.6.3 Categories of SSI

There are sixteen categories of SSI. Five of those categories pertain to this section. These are highlighted below:

1. Security Programs and Contingency Plans
2. Security Directives
3. Information Circulars
- 4. Performance Specifications**
5. Vulnerability Assessments
6. Security Inspection or Investigative Information
7. Threat Information
8. Security Measures
9. Security Screening Information
- 10. Security Training Materials**
11. Identifying Information of Certain Transportation Security Personnel
- 12. Critical Aviation or Maritime Infrastructure Asset Information**
- 13. Systems Security Information**
- 14. Confidential Business Information**
15. Research and Development
16. Other Information

2.2.6.4 Determination of SSI

Determination of SSI designation for design and construction projects shall be made in accordance with the provisions of this section by the Maryland Aviation Administration Director of Airport Security (DOAS). At each project design kick-off meeting, it shall be the responsibility of the assigned MAA Project Manager (Design) to discuss the project scope with the DOAS and obtain a preliminary SSI determination for the project. The DOAS shall be required to provide a written document outlining what portions of the design are considered SSI subject to the provisions of this section. The MAA Project Manager (Design) shall be responsible for ensuring that this documentation is obtained and distributed only to those team members with a “need to know,” and that all portions of the design designated by the DOAS as SSI are adequately marked in accordance with the provisions of this section.

If a subordinate MAA staff member or consultant design team member believes that the SSI designation has been omitted, he shall immediately inform the MAA Project Manager (Design) for a designation determination. In the absence of the MAA Project Manager, the next highest member of the chain of command shall be notified for a designation determination.

2.2.6.5 Control and Release of SSI

SSI may be released to federal, state and municipal government officials and employees, local law enforcement officials, and regulated parties who have a “need to know” as established by regulation, authorized by procedure established by the DOAS, or authorized by the TSA Administrator.

SSI requested under the Freedom of Information Act (FOIA) is exempt from disclosure under the FOIA based on Exemption 3, 5 USC 552(b)(3). Any decision to release SSI under the FOIA must have the concurrence of the TSA Administrator. Requests for Information that are addressed to regulated parties, such as requests under state and local freedom of information or open records acts, should be referred to the DOAS, who may need to refer the request to the TSA Administrator.

If a record contains SSI but also contains non-SSI that may be disclosed, the latter will be provided in response to a FOIA request, provided the record is not otherwise exempt from disclosure under FOIA, if it is practical to redact the requested information from the record.

Maryland State Government Article Section 10-611 et seq. grants the public a broad right of access to records that are in the possession of state and local government agencies. It has been a part of the Annotated Code of Maryland since its enactment as Chapter 698 of the Laws of Maryland 1970 and is similar in purpose to the FOIA, 5 USC. §552, and the public information and open records acts of other states. **SSI is exempt from the provisions of PIA.**

2.2.6.6 Protective Marking and Media Containing SSI

1. **General:** - Any person who creates a record containing SSI shall include a protective marking and distribution limitation statement.
2. **Paper (“Hard Copy”):** - All SSI documents shall contain the following protective marking in the document header:

Sensitive Security Information

This protective marking should be stamped or typed in plain style bold text.

The following distribution limitation statement shall be contained in the document footer and informs the viewer that the record must be protected from unauthorized disclosure.

WARNING: This record contains Sensitive Security Information that is controlled under 49 CFR parts 15 and 1520. No part of this record may be disclosed to persons without a "need to know", as defined in 49 CFR parts 15 and 1520, except with the written permission of the Administrator of the Transportation Security Administration or the Secretary of Transportation. Unauthorized release may result in civil penalty or other action. For U.S. government agencies, public disclosure is governed by 5 U.S.C. 552 and 49 CFR parts 15 and 1520.

The Header and Footer described above shall appear on the cover page of any document, report or specification that contains **any** SSI and on every page of the document containing SSI.

The distribution limitation statement described above shall be included on all project plan sheets, diagrams, shop drawings, record drawings or any other drawings that contain SSI about the affected systems or their component parts.

Charts, maps, and drawings designated as SSI must have the appropriate protective marking and the distribution limitation statement affixed in a manner that is plainly visible.

3. **Facsimile Cover Sheets:** - Documents used to transmit SSI (such as facsimile cover sheets) but that do not themselves contain SSI, must be marked with the protective marking and distribution limitation statement. The following statements must be affixed to the front page of the cover sheet:

This facsimile is intended for the recipient only. If this is received by someone other than the intended recipient, the person receiving the message should immediately contact the sender for further instructions.

The protective marking SENSITIVE SECURITY INFORMATION and/or the distribution limitation statement on this page are cancelled when the attachments containing SSI are removed.

4. **Transmittal Letters:** – Like facsimile cover letters, transmittal letters do not themselves contain SSI, but may cover other documents that do and must be marked with the protective marking and distribution limitation statement. The following statements must be affixed to the front page of the transmittal letter:

This transmittal letter is intended for the recipient only. If this is received by someone other than the intended recipient, the person receiving the message should immediately contact the sender for further instructions.

The protective marking SENSITIVE SECURITY INFORMATION and/or the distribution limitation statement on this page are cancelled when the attachments containing SSI are removed.

5. **Plans and Specifications containing SSI:**

- a. **Plans and Specifications containing SSI (hereafter also referred to as “plans and specifications”)** - All project plans and specifications used in design and construction that contain SSI shall comply with the provisions of Section 2.2.6.6, Protective Marking of Media Containing SSI.

Plan and specification sets shall be numbered by the MAA Project Manager or his designee. Set numbers shall be recorded by the MAA Project Manager by project phase (design, procurement or construction).

In the case of plan sets or other cases in which these drawings are combined into a single bound document, the document cover page/sheet shall contain the protective marking and distribution limitation statement, and all project plans and specifications that contain SSI shall comply with the provisions of Section 2.2.6.6, Protective Marking of Media Containing SSI.

- b. **Electronic media:** - SSI contained on electronic media and magnetic media must have the protective marking and the distribution limitation statement applied at the beginning and end of the electronic and magnetic text; on each side of the disk and the disk sleeve / jacket; on the non-optical side of the CD-ROM, DVD or other format disk; and on both sides of the CD-ROM, DVD or other format disk case. Memory sticks that contain SSI shall be indelibly marked “SSI” on both sides of the device.
- c. **Electronic Mail (e-mail):** - SSI contained within an electronic mail message must include the protective marking within the subject line of the

message and the distribution limitation statement applied at the end of the message text.

2.2.6.7 Protection and Safeguarding of SSI

All personnel possessing SSI are responsible for ensuring that such information is safeguarded at all times from disclosure to unauthorized personnel. When the information is not under the individual's direct physical control, the individual is responsible for ensuring that it is safeguarded and protected so that it is not physically or visually accessible to persons who do not have a need to know. When unattended, SSI must be secured in a locked container, office, or other restricted access area with access to the keys or combination limited to those with a "need to know."

A person who receives an unmarked record containing SSI should apply the protective marking and distribution limitation statement, and inform the sender of the omission.

Anyone possessing SSI is responsible for ensuring that the information and records containing SSI are protected at all times from disclosure to anyone who does not have a "need to know."

When SSI is not under direct physical control, the covered person must ensure that it is protected in such a way that it is not physically or visually accessible to persons who do not have a "need to know."

The authority to share SSI with any person or entity without a "need to know" is limited to the TSA Administrator.

Every covered person has the responsibility to safeguard SSI according to the CFR and TSA policies. If a covered person encounters a situation in which SSI has been inadvertently shared with a person without the "need to know," immediately notify the MAA Project Manager.

2.2.6.8 Transmission of SSI

1. Non-electronic methods:

- a. Mail – Material will be placed in a single opaque envelope or container and sufficiently sealed to prevent inadvertently opening and to show evidence of tempering. The envelope or container will bear the complete name and address of the sender and addressee. SSI materials will be

mailed by US Postal Service First Class Mail or a reputable commercial delivery services such as Federal Express or UPS. The outside wrapping will NOT be marked as SSI.

- b. Interoffice mail – SSI must be sent using unmarked, opaque, sealed envelope so that SSI cannot be read through the envelope.
- c. Hand-carrying between buildings– SSI material carried by hand within or between buildings must be protected to prevent inadvertent visual disclosure.

2. Electronic methods:

- a. Electronic mail - Prepare SSI information, marked accordingly, in a separate password protected document. Passwords should be sent separately with no subject line or shared either in person or via telephone. Use as attachment in email. SSI should not be sent to personal email accounts. Guidance for passwords:
 - Be at least 8 characters in length
 - Have at least one letter upper case and one letter lowercase
 - Contain at least one special character
 - Contain at least one number
 - Not be a word in the dictionary
- b. Web Posting - MAA does not authorize the posting of SSI on Internet or Intranet sites, unless the site has met prescribed MAA security standards.
- c. Facsimile - Use marked coversheet, mark documents appropriately, and ensure receiver is available to retrieve information immediately. Preferable to be constant voice contact during transmission to confirm receipt.

Facsimiles sent to a controlled, secure area where unauthorized people cannot intercept the SSI material may be sent without requiring the recipient to be there.
- d. Telephone - Will be done carefully to prevent eavesdropping. Land lines in non-public locations are more secure than cellular telephones.
- e. CD's AND DVD's - Should be encrypted or password protected and the SSI Header and Footer should be affixed to the CD or DVD.

- f. Electronic Presentations (e.g., PowerPoint) - Should be marked with the SSI Header on all pages and the SSI Footer on the first and last pages of the presentation.
- g. Video and Audio - Should be marked the SSI Header and the SSI Footer on the protective cover when able and the header and footer should be shown be shown and/or read at the beginning and ending of the program.
- h. When Leaving Your Desk or Computer - SSI must be secured in a locked container, office, or other restricted access area with access to the keys or combination limited to those with a need ‘to know’ and the computer should be turned off.
- i. SSI Stored on Network Folders – Will either require a password to open or the network should limit the access to the folder to covered persons only.

2.2.6.9 Reproduction of SSI

The reproduction of SSI shall be kept to a minimum with only those with a “need to know” being allowed access to the subject files. Documents shall only be reproduced for the expressed use of personnel actively involved with work pertaining to the project. These electronic documents shall be shared via password protected files with the approval of the SSI coordinator. Hard copy reproduction should be avoided unless absolutely necessary and only allowed with the approval of the SSI coordinator. In the event a hard copy is approved by the SSI coordinator, only the trained person with the “need to know” shall be allowed to reproduce the document.

Documents containing SSI may be reproduced by an external organization (e.g., FedEx, Kinko’s, Staples, etc.). The individual(s) assigned to make the reproduction(s) must first sign a non-disclosure agreement (NDA) to be kept by whoever contracted for or purchases such services. A covered person* must be physically present to oversee the process and ensure that the person making the copies does not read or intentionally or unintentionally retain a copy of the SSI document.

- * A covered person, as defined by 49 CFR parts 15 and 1520, may reproduce records containing SSI. Reproductions may only be shared with covered persons with a need to know.

2.2.6.10 *The Project Process***1. Project Responsibilities:**

Responsibilities for SSI during the Project process are shown in the following chart:

Project Phase	Responsible MAA Staff	Cognizant (support) Staff
Pre-Design and Design	Project Manager (Design)*	Design (Consultant) Project Manager Sole Source System Contractor MAA and other Staff participating in Design Review
Procurement	Project Manager (Procurement)*	Design (Consultant) Project Manager Project Manager (Construction) Sole Source System Contractor Contractors/Bidders (Signing the Non-Disclosure Agreement)
Construction	Project Manager (Construction)*	Construction Manager (Consultant) Construction Inspector (Consultant) Contractor Subcontractor Sole Source System Contractor

Note: * MAA Project Phase Management Staff will retain responsibility for the safeguarding and management of SSI by their respective team members from their first contact with SSI until the project is complete and all SSI is retained in archived documents or destroyed.

2. The Pre-design Phase:

General – At the project design kick-off meeting, a preliminary SSI determination will be made by the MAA Director of Airport Security (DOAS). The MAA Project Manager (Design) shall consult with the DOAS and the affected Sole Source System Contractor(s) in making this determination.

If the project is identified as containing SSI, the project management personnel (MAA and Consultant) and MAA reviewers shall obtain MAA Security (Red) Badges and successfully complete MAA SSI training prior to handling SSI throughout the project.

MAA DOAS – The MAA DOAS is responsible for providing SSI training to project personnel and for issuing red security badges to project management

personnel (MAA and Consultant). For MAA reviewers, the MAA DOAS is responsible for providing SSI training and for ensuring that reviewers pass a TSA Criminal History Record Check (CHRC) and a TSA Security Threat Assessment (STA).

3. **The Design Phase:**

MAA Project Manager (Design) – The MAA Project Manager (Design) is the responsible officer for the safeguarding of SSI generated and handled by the Design Team throughout the duration of the project. The MAA Project Manager (Design) assigned to a project that includes SSI shall be thoroughly familiar with the provisions of this section and shall ensure that the Design (Consultant) Project Manager receives a copy of this section for reference and compliance. The MAA Project Manager (Design) shall obtain signed “MAA Confidentiality and Non-Disclosure Agreement – Sensitive Security Information” forms (contained in Appendix B) from all design team members, Design A/E’s, Construction Management and Inspection members and Sole Source System Contractor(s).

The MAA Project Manager (Design) shall also ensure that the contract documents prepared by the design team include the required SSI language in the Notice to Contractors and Specification Section 010007X, SSI Requirements During Construction, (contained in Appendix D) in the project specifications.

The MAA Project Manager (Design) shall ensure the accounting of all Plan and Specification review sets and their destruction. The MAA Project Manager (Design) shall maintain a master list of design team covered persons with “need to know” (including MAA reviewers) throughout the project and ensure that all design team project management staff comply with security badging and SSI training prior to handling SSI. The MAA Project Manager (Design) shall provide and account for final plans and specification sets provided to the affected Sole Source System Contractor(s) for use during design and the procurement phase.

Design (Consultant) Project Manager – The Design (Consultant) Project Manager shall work under the direction of the MAA Project Manager (Design) and ensure compliance with all provisions of this section by all design team members.

Design Review Conferences –The MAA Project Manager (Design) shall ensure that project stakeholders who have the “need to know” and participate

in the design review process for projects with SSI understand and comply with SSI provisions contained herein. Plan and Specification sets used for staff review shall be numbered and accounted for by the MAA Project Manager (Design). Upon completion of all design reviews, all Plan and Specification sets shall be returned for destruction under the supervision of the MAA Project Manager (Design).

Sole Source System Contractor – Affected Sole Source System Contractor(s) shall avail themselves to the MAA Project Manager (Design) for design coordination. Affected Sole Source System Contractor(s) shall attend and participate in all design review conferences.

4. The Procurement Phase:

General – Plan and Specification Sets will be sold only to Contractors and Subcontractors who meet all of the requirements listed within the Notice to Contractors (contained in Section 2.2.7).

All advertisements for projects containing SSI shall include the language contained in Section 2.2.7.

MAA Project Manager (Procurement) – **The MAA Project Manager (Procurement) is the responsible officer for the safeguarding of SSI generated and handled by the Procurement Team throughout the duration of the project.** The MAA Project Manager (Procurement) shall maintain a master list of covered persons (including Contractors who purchase Plans and Specifications) with “need to know” during this phase of the project. The MAA Project Manager (Procurement) shall obtain signed MAA Confidentiality and Non-Disclosure Agreement – Sensitive Security Information forms (contained in Appendix B) from all bidders and shall require a refundable deposit of \$6,000 in the form of a certified check which shall be held until Plan and Specification sets are returned intact to MAA Procurement personnel. The MAA Project Manager (Procurement) shall schedule and conduct the pre-bid conference in accordance with requirements contained herein.

Pre-Bid Conference – The pre-bid conference for a project that includes SSI within the Plans and Specifications shall include a briefing by the MAA Project Manager (Procurement) to all bidders on the SSI handling requirements contained herein, with special emphasis on the provisions of the MAA Confidentiality and Non-Disclosure Agreement – Sensitive Security

Information, bidding, coordination with sole source system contractor(s), and control of SSI during the construction phase.

Sole Source System Contractor - The bidder(s) and the SSSC will confirm task assignments and bid accordingly. Sole source system contractor(s) local representative(s) shall attend the pre-bid conference if their system is affected by the project and avail themselves to bidders to coordinate bid preparation.

5. The Construction Phase:

General – Plans and Specifications shall be used during the construction phase on a “need to know” basis with the disclosure and acknowledgement of the Contractor and Subcontractors and the assistance of the MAA Project Manager (Construction). The Contractor shall obtain the Project SSI Management Plan template from the DOAS to complete. The Contractor shall be required to submit the SSI Management Plan after receipt of a Notice of Recommended Award (NORA). The Contractor’s SSI Management Plan must be accepted by MAA before MAA will issue a Notice to Proceed (NTP) for the project.

The SSI Management Plan is subject to an MAA review and acceptance process wherein MAA has seven (7) calendar days to review and comment on the SSI Management Plan each time it is submitted for review. The Contractor shall be allowed up to thirty-five (35) calendar days from NORA (including MAA review periods) to prepare and gain approval of the SSI Management Plan. If acceptance of the SSI Management Plan occurs after thirty-five (35) calendar days from NORA, the Contract Performance Time specified elsewhere in the contract shall be reduced by the number of days of delay in MAA acceptance of the SSI Management Plan.

The Contractor’s designated Project SSI Coordinator and the designated alternate SSI Project Coordinator shall obtain MAA Security (Red) Badges and undergo MAA SSI training prior to handling Plan and Specification sets.

MAA Project Manager (Construction) – **The MAA Project Manager (Construction) is the responsible officer for the safeguarding of SSI generated and handled by the Construction Team throughout the duration of the project.** The MAA Project Manager (Construction) shall maintain a master list of covered persons with a “need to know” during this phase of the project to ensure that all project management staff comply with security badging and SSI training prior to handling SSI. The MAA Project Manager (Construction) shall obtain signed MAA Confidentiality and Non-

Disclosure Agreement – Sensitive Security Information forms (contained in Appendix B) from all management-level members of the construction Management team (including the CM Management Consultant/Contractor and its Subcontractors and CMI staff who handle SSI). The MAA Project Manager (Construction) shall review and approve the Contractor's Project SSI Management Plan. The MAA Project Manager (Construction) shall account for the return of all Plan and Specification sets.

Construction Manager – The Construction Manager shall work under the direction of the MAA Project Manager (Construction) and ensure compliance with all provisions of this section by all Contractor and CMI team members.

Pre-Construction Conference – The pre-construction conference for a project that includes SSI within the plans and specifications shall include a briefing by the MAA Project Manager (Construction) to the prime contractor and affected subcontractor(s) on coordination with sole source system contractor(s) and control of SSI during the construction phase.

Sole Source System Contractor - Sole source system contractor local representatives shall attend the pre-construction conference if their system is affected by the project.

2.2.6.11 Destruction of SSI

When copies of records containing SSI are no longer needed, they must be promptly and completely destroyed. The objective of destruction is to preclude recognition or reconstruction of the information. Destroying SSI shall be done using a cross cut shredder. The applicable MAA Project Manager (Design, Procurement and Construction) shall supervise and coordinate the destruction of SSI from their applicable project phase and will ensure destruction at the earliest appropriate time.

When a Contractor or Consultant proposes to destroy records containing SSI, the Contractor or Consultant must first provide notification in writing, to the applicable MAA Project Manager (Design, Procurement and Construction), for approval. This notification must include the following minimum information: identification of information to be destroyed, quantity of copies, date and place of destruction, method of destruction, and residual SSI remaining in the custody of the Contractor or Consultant. After destruction of the documents, the Contractor or Consultant shall submit to the MAA Project Manager a certification and register of all documents destroyed.

2.2.6.12 Maintenance of Record Drawings and Specifications for projects containing SSI

Record Drawings and Specifications shall be maintained for all MAA projects containing SSI in accordance with established MAA procedures for the production of project record drawings. All project Record Drawings and Specifications shall be marked in accordance with this section and consolidated for storage in a secure area. The following notation shall be included in the header of SSI record drawings in place of the protective marking:

Sensitive Security Information –Record Drawings
--

Other record drawing notations required per Section 6.3, Record Drawing Preparation, shall be included as well.

The following notation shall be included in the header of SSI record specifications in place of the protective marking:

Sensitive Security Information –Specifications

Other contract documents containing SSI such as shop drawings, coordination drawings, Operations and Maintenance Manuals (O&M), Request for Information (RFI's) and construction progress photographs shall be identified accordingly.

2.2.6.13 Enforcement

Civil penalties are assigned for unauthorized disclosure of SSI.

2.2.7 SSI Language to be included in the Notice to Contractors

All advertisements for projects containing SSI shall include the latest version of the language located on the following pages. The Design (Consultant) Project Manager shall contact the Office of Procurement to obtain the latest version of the SSI language to be included in the Notice to Contractors. The Contractor Representative Information Form (contained in Appendix B) should also be attached to the Notice to Contractors.

Sample language to be included in the Notice to Contractors:

THIS PROJECT CONTAINS SENSITIVE SECURITY INFORMATION (SSI). ALL CONTRACTORS INTERESTED IN THIS SOLICITATION MUST COMPLY WITH THE FOLLOWING REQUIREMENTS PRIOR TO MAA GRANTING ACCESS TO VIEW AND/OR PURCHASE THE PROCUREMENT DOCUMENTS.

This project contains Sensitive Security Information (SSI) which shall be handled in accordance with 49 CFR 1520. To comply with 49 CFR 1520 requirements, MAA has instituted the following new procedure for bidders interested in this project.

New Contract Document Purchase Procedures:

Interested bidders shall not be permitted to view or purchase contract documents for this project or attend the Pre-bid meeting until they have satisfactorily cleared the **Transportation Security Administration (TSA) Security Background Verification** process. There are two levels of security background verification as follows:

1. To Purchase and Hold SSI Documents:

- a. **Bidders who currently possess a valid Red BWI Security badge** shall be required to submit to the Maryland Aviation Administration – Office of Procurement their Name, Company, Security Badge Number and Expiration date as it appears on the security badge. MAA will verify the validity of the bidders badge and Bidders will be notified of the results by email. Should notification not arrive within the specified period, bidders are urged to call Ms. Linda Marcucci, 410-859-7376 to inquire about their processing status.
- b. **Bidders who do not currently possess a valid Red BWI Security badge** must successfully complete a TSA Criminal History Record Check (CHRC) and a TSA Security Threat Assessment (STA). Bidders must complete the attached Application for Airport Identification Badge for all of their designated representatives that will be responsible for purchasing and handling SSI. Individuals who successfully complete a TSA CHRC and STA will be responsible for: protection of the SSI contained in the contract documents; return of all documents at the conclusion of the bidding process; and for any civil penalties incurred in the event that the requirements of 49 CFR 1520 are not complied with. **Please be advised that MAA reserves the right to prohibit any bidder that does not pass the Transportation Security Administration (TSA) Security Background Verification from purchasing or holding SSI for this project.**

Bidders shall submit an original signed copy of each completed Application for Airport Identification Badge to the Maryland Aviation Administration – Office of Procurement for processing. It is recommended that all bidders submit at least two individuals for processing. **(Note: The MAA Office of Procurement will be the Authorized Signer for the Application, please do not place signatures in the Authorized Signer blocks.)** Processing of the application will take at least fourteen (14) Calendar Days and Bidders will be notified of the results by email. Should notification not arrive within the specified period, bidders are urged to call Ms. Linda Marcucci, 410-859-7376 to inquire about their processing status.

NOTE: MAA CANNOT GUARANTEE TIMELY BIDDER APPROVAL AND/OR DOCUMENT DISTRIBUTION FOR LATE APPLICATIONS SUBMITTED. BIDDERS ARE ENCOURAGED TO SUBMIT APPLICATIONS AS EARLY AS POSSIBLE, PRIOR TO THE SCHEDULED PRE-BID DATE, TO ALLOW TIME FOR RECEIPT AND REVIEW OF DOCUMENTS PRIOR TO THE SCHEDULED BID DATE.

- c. Upon notification by MAA of successful **Transportation Security Administration (TSA) Security Background Verification; or verification of the validity of the bidders red badge**, the bidder's approved representative (Contractor's Representative hereafter) or red badge holder (Contractor's Representative hereafter) shall be eligible to purchase the contract documents at the Maryland Aviation Administration – Office of Procurement. In addition, the Contractor's Representative will be required to meet **ALL** of the following requirements to purchase a set(s) of plans and specifications:
1. The Contractor's representative purchasing the contract Plan and Specification Sets shall be required to provide proof of identification before being granted access to the documents. The representative shall present for MAA inspection, two forms of original identification documents (**valid Driver's License and Social Security Card, Etc.**) matching the information supplied on the corresponding Application for Airport Identification Badge for the individual.
 2. The Contractor's Representative shall provide documentation to demonstrate that his/her firm is licensed and registered to do business in the State of Maryland.
 3. The Contractor's Representative shall provide documentation from a surety registered to do business in the State of Maryland demonstrating that his/her firm can secure a bond for the project in the amount specified in the Contract Documents.

4. The Contractor must be registered in the eMaryland Marketplace as a vendor.
5. The Contractor's Representative will be required to execute an MAA Confidentiality and Non-Disclosure Agreement – Sensitive Security Information prior to purchasing project plans and specifications. (included in Appendix B of this manual)
6. The Contractor's Representative shall provide a refundable deposit of \$6,000/set of plans and specifications in the form of a certified check or money order made payable to the Maryland Aviation Administration. The certified check or money order shall be held by MAA until the Plan and Specification sets are returned fully intact to MAA Procurement personnel at which time the check or money order shall be returned to the Contractor.

2. To View SSI Documents, attend Pre-bid Meeting or attend Field Site Visit:

a. Bidders who currently possess a valid Red BWI Security badge

Interested bidders who possess a valid red badge shall be permitted to view contract documents, attend the Pre-bid Meeting or attend the Field Site Visit for this project provided they have submitted to the Maryland Aviation Administration Office of Procurement their Name, Company, Security Badge Number and Expiration date as it appears on the security badge; and received verification of the validity of the bidders badge. Bidders will be notified of the validity of their badge within ten (10) days by email. Should notification not arrive within the specified period, bidders are urged to call Ms. Linda Marcucci, 410-859-7376 o inquire about their processing status.

Interested bidders who possess a valid red badge and would like to view contract documents, attend the Pre-bid Meeting or attend the Field Site Visit shall be required to present a valid red badge before being granted access to the documents and/or meetings/site visits.

b. Bidders who do not currently possess a valid Red BWI Security badge

Interested bidders shall not be permitted to view contract documents, attend the Pre-bid Meeting or attend the Field Site Visit for this project until they have satisfactorily cleared a TSA "No Fly List" Security Background Verification process. Bidders shall be required to complete the attached form titled Contractor Representative Information for all of their designated representatives that will be viewing the contract documents; and/or attending the pre-bid meeting and/or site inspection. Any individual submitting the Contractor Representative Information form shall be considered responsible for protection of the SSI contained in the

contract documents and shall be responsible for any civil penalties incurred in the event that the requirements of 49 CFR 1520 are not complied with. **Please be advised that MAA reserves the right to prohibit any bidder that does not pass the Transportation Security Administration (TSA) “No Fly List” Security Verification from viewing the contract documents; and/or attending the pre-bid meeting and/or site inspection for this project.**

Bidders may submit the Contractor Representative Information form via email to the Office of Procurement to the attention of Ms. Linda Marcucci, lmarcucci@bwiairport.com. Processing of the Contractor Representative Information forms will take at least ten (10) Calendar Days and Bidders will be notified of the results by email. Should notification not arrive within the specified period, bidders are urged to call Ms. Linda Marcucci, 410-859-7376 to inquire about their processing status. **It is recommended that all bidders submit at least two individuals for processing.**

NOTE: MAA CANNOT GUARANTEE TIMELY BIDDER APPROVAL AND/OR DOCUMENT DISTRIBUTION FOR LATE APPLICATIONS SUBMITTED. BIDDERS ARE ENCOURAGED TO SUBMIT CONTRACTOR REPRESENTATIVE INFORMATION FORMS AS EARLY AS POSSIBLE, PRIOR TO THE SCHEDULED PRE-BID DATE, TO ALLOW TIME FOR RECEIPT AND REVIEW OF DOCUMENTS PRIOR TO THE SCHEDULED BID DATE.

Upon notification by MAA of successful **Transportation Security Administration (TSA) Security “No Fly List” Background Verification**, the Contractor’s representative shall be permitted to view contract documents, attend the Pre-bid Meeting or attend the Field Site Visit. In addition, the Contractor’s representative shall meet the following additional requirement:

The Contractor’s representative(s) viewing contract documents, attending the Pre-bid Meeting or attending the Field Site Visit shall be required to bring with him/her and present to MAA Office of Procurement the original signed Contractor Representative Information form and proof of identification before being granted access to the documents and/or meetings/site visits. The representative shall present for MAA inspection, original identification documents (**valid Driver’s License and Social Security Card**) matching the information supplied on the corresponding Contractor Representative Information form for the individual.

NOTE: PLANS AND SPECIFICATIONS FOR THIS PROJECT WILL BE NUMBERED AND ARE NOT AUTHORIZED FOR REPRODUCTION BY

PROJECT BIDDERS. FAILURE TO RETURN ALL PLAN AND SPECIFICATION SETS FULLY INTACT, UNAUTHORIZED REPRODUCTION OF THE PLAN AND SPECIFICATION SETS OR FAILURE TO COMPLY WITH THE REQUIREMENTS OF THE 'MAA CONFIDENTIALITY AND NON-DISCLOSURE AGREEMENT – SENSITIVE SECURITY INFORMATION' SHALL RESULT IN THE FORFEITURE OF THE DEPOSIT AND MAY LEAD TO CIVIL PENALTIES.

SECTION II: DESIGN PROCEDURES

CHAPTER 3 AIRPORTAL APPLICATION

The MAA has developed the AIRPortal web application to serve as a resource for MAA Employees and Consultants. This application houses a vast amount of data pertaining to both of MAA's Airports, BWI Marshall and Martin State, as well as various tools and resources for designing projects and doing business with the MAA. The AIRPortal application can be accessed from the following link:

<http://www.airportal.maa.maryland.gov>

New users shall request a login from the AIRPortal Administrator using the "Register" link on the appropriate login screen for either MAA Employee or MAA Consultant as appropriate – DO NOT REGISTER FOR BOTH. Logins are typically granted in approximately 5 working days. If you have any questions, contact the contact the AIRPortal Administrator at MAAAIRPortal@bwiairport.com

Information provided by this application includes:

- Airfield Operations
 - BWI Gate management
 - BWI Airfield Signs and Markings
- BWI GIS Applications
 - Utility information
 - SUE Status
 - Roadway Signs
- Document Management
 - Record Drawings of previous construction contracts
 - Historical Aerial Photos of BWI and MTN
- Martin State Airport
 - Utility Information
 - SUE Status
- Pavement & Geotechnical
 - Pavement Management
 - BWI Geotechnical (borings & pavement cores)
 - MTN Geotechnical
- Building Floor Plans
 - BWI campus only
- Designer Tools
 - Procurement Templates
 - Contract Management Tools
 - Design Standards and Supplements
 - Internal PM Templates
 - Planning and Environmental Tools

- Preparation of Bid Documents
- Standard CADD Files
- Standard Provisions
- Task Management Tools

Information posted in the “Designer Tools” section of AIRPortal shall be considered the most recent and up to date. Designers shall utilize the documents and resources contained in this section when developing the Contract Documents for a project, unless noted otherwise by the MAA Project Manager.

AIRPortal Digital Data Disclaimer

While every reasonable effort has been made to provide complete and accurate information, MAA grants access to this digital data with no guarantees of its accuracy, correctness, or completeness. The digital data provided is not survey quality, is not legally recorded, and is not intended to be used for surveying, engineering, or site-specific analysis. Any conclusions drawn from such digital data are done so at the sole risk and responsibility of the user. MAA disclaims all express and implied warranties relating to the material, including but not limited to warranties of merchantability, integration, title, and fitness for a particular purpose. **All digital data is provided “as is.” The data provided is exclusively for work associated with MAA projects ONLY and should not be distributed in any form outside MAA.**

As an AIRPortal user, one agrees to the fullest extent permitted by law, to indemnify and hold harmless MAA, its officers, directors, employees and consultants (collectively) against all damages, liabilities or costs, including reasonable attorney’s fees and defense costs, arising from any changes made by anyone or from reuse of the digital data files.

CHAPTER 4 DESIGN PHASE

4.1 AIRPORT CONSTRUCTION PROJECT CHECKLIST

The Maryland Aviation Administration, Office of Design & Construction has created an Airport Construction Project Checklist. All MAA, Office of Design & Construction projects should be performed in accordance with this checklist (located in Appendix A).

The checklist serves as a guide to the requirements and procedures associated with the design of MAA projects. As a guide, it is not intended to be an all-encompassing document addressing every detail, but highlights the minimum requirements for design and administration of MAA projects. The checklist should be completed as design progresses, and must be included with each submission of design documents.

4.2 FAA REQUIREMENTS FOR PROPOSED DEVELOPMENT

Federal Aviation Administration (FAA) requirements for proposed development must be followed at BWI Marshall and Martin State Airports. Designers shall take these items into consideration during the design process and develop project schedules accordingly. During preliminary design, designers shall identify to the Maryland Aviation Administration (MAA) Project Manager the impact of each requirement on the project.

Unless otherwise approved by the MAA Project Manager, it shall be the designers' responsibility to submit all required information identified below well enough in advance to receive all FAA approvals and permits prior to advertisement of the construction documents. Construction Notice to Proceed (NTP) shall not be given on any project until all FAA approvals have been obtained.

With prior approval from the MAA Project Manager, Consultants may submit items directly to the FAA on behalf of the MAA. All submissions shall be made to the FAA Washington Airports District Office (WADO) unless otherwise noted.

The following requirements apply:

1. Environmental document coordination for all development projects as follows:
 - a. At the initiation of each project, the Consultant shall obtain a determination from the MAA Office of Planning and Environmental Services on the required environmental coordination and documentation needed for each project.
 - b. For large/complex projects, designers shall set up a preliminary coordination meeting with the MAA Division of Environmental Planning to coordinate the design with the environmental documentation preparation.
 - c. For development projects with the potential to be categorically excluded, plans shall be submitted to the MAA Division of Environmental Planning at the same time the review

plans are submitted to the MAA Project Manager. MAA needs approximately 30 days to prepare and submit an Environmental Impact Evaluation Form A to the FAA. FAA review time is approximately 15 days. Note: Durations may be longer due to project specifics and the coordination required with state and federal agencies.

2. Pre-design meetings are required for all airfield projects prior to 30% completion.
3. Line of sight (shadow studies), ground radar interference and reflectivity studies for new or modified structures and buildings shall be submitted to the FAA prior to 30% design completion.
4. Eight copies of the construction safety and phasing plans shall be submitted for FAA approval. Designers must include on the Safety and Phasing plans the locations and heights of all structures penetrating any navigational surfaces. Both permanent and temporary structures, including construction equipment, are included in this requirement. Construction equipment heights should be estimated on a worst-case basis and equipment locations should be broadly shown, i.e. envelope locations with coordinates defining the corners.

The Safety and Phasing Plan shall be submitted well enough in advance to receive approval prior to advertisement of the construction documents. Designers should submit eight copies of the Safety and Phasing plans to the FAA. Upon receipt, the FAA will review and approve the structure locations and heights in conjunction with the safety and phasing. FAA review time is 60-90 calendar days. Once approval is received, designers shall provide a copy of the FAA approved plans to MAA, Division of Airport Facilities Planning.

MAA's Division of Airport Facilities Planning shall then issue an Airport Zoning Permit to the contractor per the accepted plan. If the Contractor wants to place equipment and/or cranes at locations and heights which differ from the FAA approved plan, they will be required to submit a Notice of Proposed Construction or Alteration (FAA Form 7460-1). Once Form 7460-1 has been approved by the FAA, the Division of Airport Facilities Planning will issue an additional Airport Zoning Permit for those items which differ from the original plan.

5. Completed Modification of Standards (MOS) forms shall be submitted to the FAA for approval for each modification requested. FAA review time is approximately 60 days.
6. Changes to the FAA Part 139 signing and marking plans shall be submitted (on a separate drawing) to the MAA Project Manager and Office of Airport Operations (OPS) for internal review. Upon MAA approval, Consultants shall provide OPS with three copies of the plan(s), which will be forwarded on to the FAA Eastern Region for coordination and approval. Upon approval, the Eastern Region will send a copy of the approved plan(s) stating that the changes will be added to the next revision of the signage plan to MAA and WADO. The MAA Project Manager will forward an approved copy of the signed plan(s) to the designer. MAA coordination and review time is approximately 14 days, and FAA review time is approximately 30 days.

7. Temporary and permanent changes to the Airport Operations fence lines shall be submitted to the FAA for approval. FAA review time is approximately 30 days.
8. Copies of the plans, specifications, and design report for all projects which MAA plans to request AIP or PFC funding shall be submitted for FAA approval. In addition to the final submission, designers shall submit 60% plans and specifications to FAA for review and comment. MAA shall review the design report internally and submit it directly to the FAA. FAA review time is approximately 14 days.

4.3 PROPOSAL PREPARATION / SCOPING MEETING / SCOPE OF SERVICES

For all MAA Office of Design & Construction projects, the MAA Project Manager, Designer, and end-users shall meet to review the capital program request; develop the scope, budget, and schedule for the project; identify the procurement method; and identify permit requirements. Based on the meeting, Designer shall prepare a proposal for MAA's review and approval.

In addition to the contractual requirements and specific requirements for each task, designers shall submit all proposals, unless directed otherwise, in accordance with and to include the information below. Order of activities listed may vary from task to task. Scope of each project should determine the applicability of activities listed. Prior to submitting a proposal, the Consultant and MAA Task Manager shall meet with the client to develop the project scope. Designer should obtain an approved CTP request form, Capital Program budget, and any preliminary cost estimates performed to date.

GENERAL

Designer shall:

1. Develop a Description of the project.
2. Identify Scope of Services (Phases I, II, and III, as defined in subsequent sections): List types and purpose of specific activities to be performed or considered under each phase.
3. List items specifically not covered in the scope of services, and list of assumptions.
4. Provide requested compensation (must be identified separately):
 - i. Cost for proposal preparation
 - ii. Cost for Phase I (Pre-Design Services, Investigation, Surveying, Geotechnical, etc.)
 - iii. Cost for Phase II (Design Services)
 - iv. Cost for Phase III (Construction Administration/Shop Drawing Review/Record Drawing Preparation, Cost for Record Drawing Preparation should be shown separately)
5. Provide required time of completion for each Phase.
6. Provide Man-Hour Breakdown

7. Identify Out of Pocket/Direct Cost Breakdown (no markups are permitted on ODCs or subconsultant fees)
8. Provide estimated quantity and title of construction drawings with associated man-hours.
9. MAA Task Manager and the Consultant shall complete the attached form (List of Deliverables), which constitute major deliverables for the task.
10. List all subconsultants to be utilized under the task. Subconsultants shall submit their proposal in the format required herein.
11. Identify MBE/DBE Subconsultant to be utilized under the task and state the percentage of the total fee request that will be performed by the MBE/DBE subconsultant. Include a summary of best faith efforts made to secure MBE/DBE participation on the task.
12. Coordinate with the MAA's GIS Coordinator regarding GIS Applicability and identify the extent of compliance with the AEIS/GIS Design Standards.
13. Submit a detailed design schedule within one week following approval of the proposal and notice to proceed.

On federally funded projects, reports, plans, and specifications must be prepared in accordance with FAA guidelines and requirements.

PHASE I – PRE-DESIGN SERVICES & ENGINEERING REPORTS:

Phase I services shall include the following and any additional items requested at the scoping meeting.

1. Data collection and review of existing reports, record drawings, and other available information.
2. Conduct topographic field surveys.
3. Conduct Geotechnical Investigation.
4. Conduct field inspection, investigation, and testing
5. Evaluate environmental considerations, and identify permit requirements. Develop permit schedule.
6. Determine availability of and evaluate existing resources (power, water, gas, sewer, drainage, etc) and future requirements.

7. Attendance at scoping and fact finding meetings with Maryland Aviation Administration, airport tenants and other agencies involved and prepare meeting minutes.
8. Provide GIS Applicability Statement. This shall include the identification of the types of features to be built, moved, reconfigured or demolished during the construction as listed in MAA's AEIS GIS Data Standard. Provide GIS data deliverable identification as per GIS Standards, when applicable.
9. Prepare and submit preliminary construction cost estimate.
10. Provide Recommendations and Concept Plans.
11. Prepare and submit the required number of Conceptual Plans, Cost Estimate and Report with recommendations for review, prepared in accordance with FAA standards, if applicable, including all tests and data and coordinate documents with other agencies.
12. Attend preliminary design review meeting(s).
13. Prepare and submit the required number of preliminary plans, preliminary construction cost estimates and report and incorporate MAA's, tenants' and other agencies' comments.

PHASE II SERVICES (DESIGN AND PREPARATION OF CONSTRUCTION DOCUMENTS):

1. Conduct additional research, data collection, site investigations, testing, and topographic survey if necessary.
2. Prepare agenda and necessary presentation material for attending and conducting pre-design conference. Prepare draft and final minutes of the meetings and distribute.
3. Develop, coordinate, and prepare final construction phasing plan with input from MAA, FAA, tenants and other affected agencies.
4. Prepare and submit construction cost estimate and the required number of 30%, 60% and 100% construction drawings and specifications in appropriate format for review.
5. Incorporate MAA, FAA and other agencies' comments and recommendations into 30%, 60% and 100% contract documents and prepare written responses to comments.
6. Apply for and obtain all required permits and approvals. Include the required correspondence, meetings, and follow-up with agencies concerned.
7. Attend coordination and review meetings with MAA, FAA, Fire Marshal, MDE, DNR, BG&E, Verizon, tenants, and other agencies. Prepare minutes of meetings and follow-up. Attend the Procurement Advisory Group to establish MBE goal for the construction contract.

8. Obtain the required approvals and signatures on the contract drawings from various MAA offices, as noted on the drawings.
9. Prepare and submit the required number of Bid documents suitable for bidding in accordance with MAA/FAA format.
10. Prepare and submit final construction cost estimate and construction duration.
11. Attend pre-bid conference. Respond to the contractor's questions and prepare minutes of the meeting for incorporation into an addendum or addenda.
12. Prepare and submit addenda for distribution (equal to the number of Bid documents produced).
13. Respond to contractors' questions prior to bidding and confirm in writing.
14. Prepare bid tabulation forms in MAA/FAA format to include all bidders and recommend award.
15. Furnish conformed documents in accordance with the MAA Design Standards. Incorporate all revisions made by addendum or addenda.

PHASE III SERVICES (CONSTRUCTION ADMINISTRATION):

1. Justification must be prepared for Engineer's Estimates that are above or below 10% of the apparent low bidder. Prepare Notice of Recommended Award to MAA.
2. Review all submittals by the Contractor for compliance with the drawings and specifications and sign and date.

Designers may receive either hard copy or electronic submittals from the Contractor.

Electronic Submittals/Shop Drawings

Designers shall review electronic submittals the same as hard copy submittals. The submittal shall be reviewed for compliance with the contract documents and, if commenting, the Designer shall mark on a hard copy print in red ink. The Designer shall also initial the submittal as compliant or require resubmission. The hard copy print shall be scanned and returned electronically to the Contractor within the time specified in Section SP-8.06 of the Standard Provisions for Construction Contracts, latest edition.

3. Provide consultation and advice to Construction Management group during construction.
4. Attend meetings with MAA, Construction Management Group or other agencies during construction as required. The Project Engineer or other qualified personnel should be available, as requested by MAA, to meet with MAA, the Resident Engineer or the Contractor

on issues related to the shop drawing submittals, field conditions and construction phasing coordination.

5. Prepare written responses to the Contractor's questions (RFI) regarding the plans and specifications.
6. Conduct site visits as requested by MAA and report findings.
7. Prepare Field Revisions, as required, to address field changes and modifications to the design.
8. Prepare Record Drawings and GIS data (if applicable) in accordance with the MAA Design Standards.
9. Submit Record Drawings and calculations for storm water management facilities to MDE, when applicable.
10. Conduct an as-built survey of SWM facilities in accordance with MDE requirements. Documentation must be submitted to MDE certifying that constructed facilities meet functionality as designed.

TASK MANAGER REQUESTED ITEMS:

The Consultant shall inquire from the Task Manager the need for the following items and if applicable include the cost in the design fee proposal:

1. Conducting Value Engineering/Peer Review.
2. Conducting Constructability Review/Ready Check.
3. Design for mitigation of asbestos and lead paint within the proposed construction area.
4. Independent construction cost estimate coordination and analysis
5. Presentation(s) to the Executive Management Team.
6. Procurement method for construction. Consult with the Task Manager regarding the requirements for preparing construction documents for Building Permit and On-Call Construction Contractors.

NOTES TO THE CONSULTANT:

1. Minutes of meeting must be submitted using the MAA's standard Meeting Minutes Template (Appendix B).

2. Construction cost estimates must be submitted using the MAA's standard Construction Cost Estimate Template. Any increases to the construction estimate must be documented and justified in writing to the MAA Task Manager.
3. Obtain concurrence from the Task Manager regarding the proposed list of assumptions and exclusions, if any, prior to submitting the proposal.
4. Engineer's Reports must be submitted in Draft, Final Draft, and Final.
5. Any out of scope work performed under the task must be with prior approval of the Task Manager. The Consultant must submit a supplemental fee proposal for out of scope work prior to proceeding with the out of scope work. In circumstances where design must start before the proposal can be submitted, the supplemental proposal must be submitted within two weeks following the Task Manager's approval to proceed with the out of scope work.

Standard List of Deliverables

	Letter Size (8 1/2" x 11") PAPER	Half Size (11" x 17") PAPER	Full Size (22" x 34")		DWG (e-Transmit)	GDB (File GDB)	PDF	MSOffice Format
			PAPER	MYLAR				
	QUANTITY OF HARD COPIES				QUANTITY OF ELECTRONIC MEDIA (CD/DVD)			
CTP Cost Estimates							(1)	
Technical Memorandum							(1)	
Draft Study Report	(4)						(4)	
Final Draft Study Report	(5)						(5)	
Final Study Report	(5)						(5)	
Concept Plans		(5)					(10)	
Renderings		(5)					(5)	
PowerPoint Presentations							(5)	
Preliminary Design-Build Drawings		(5)	(5)		(1)		(10)	
Preliminary Design-Build Specifications	(5)							
Final Design-Build Drawings		(5)	(5)	(1)	(1)		(10)	
Final Design-Build Specifications	(5)							
30% Drawings		(5)			(1)		(10)	
30% Outline Specifications	(5)							
30% Cost Estimate							(1)	
30% Engineer's Report	(5)						(10)	
Geotechnical Report	(5)						(10)	
60% Drawings		(5)			(1)		(10)	
60% Specifications/Bid Forms	(5)							
60% Cost Estimate							(1)	
60% Engineer's Report	(5)						(10)	
100% Drawings		(5)			(1)		(10)	
100% Specifications/Bid Forms	(5)							
100% Cost Estimate							(1)	
Final Engineer's Report	(5)						(10)	
Bid Drawings		(2)			(1)		(40)	
Bid Specifications/Bid Forms	(2)							
Cost Estimate to Match Bid Forms							(1)	
Addendum Drawings		(2)	(3)				(40)	
Addendum Specifications/Bid Forms	(2)							
Conformed Drawings		(2)	(2)		(1)		(3)	
Conformed Specifications/Bid Forms	(2)							
Conformed GIS Data						(1)		
Record Drawings			(1) - (2 if AIP)	(1)	(1)		(1) - (2 if AIP)	
Record Specifications			(1) - (2 if AIP)					
Record GIS Data						(1)		
Other Documents (specify):								
Photographs							(1)	

All electronic documents (pdf, dwg, etc.) must comply with MAA's standard naming convention.

Quantities indicate the suggested number of CD/DVDs to be provided unless directed otherwise by the Task Manager.

Digital Plan and Specification submissions (30%, 60%, 100%, etc.) may be combined on 1 CD/DVD.

4.4 DESIGN MEETING MINUTES

All meeting minutes prepared for MAA Office of Design & Construction projects shall be distributed to all attendees and persons invited to the meeting. The Meeting Notice shall also be attached to the meeting minutes. Refer to Appendix B for the standard Meeting Minute form.

4.5 DESIGN REPORTS AND STUDIES

A draft (submitted with 30% documents), final draft (submitted with 60% documents), and final (submitted with 100% documents) engineer's report is required for all FAA reviewed and funded projects. For all non-FAA projects, verify with the MAA Project Manager during the proposal preparation phase if an engineer's report is required for the project. All engineer's reports shall be marked as "draft" until approved by the MAA Project Manager. Once approved by the MAA Project Manager, the final report shall be issued.

All design reports and studies shall include an executive summary which discusses alternatives and recommendations.

All design reports and studies shall include a Summary Page immediately following the cover page. The Summary Page shall include the Prime's Task Manager and the Subconsultant Task Manager (if a subconsultant played a significant role) for the project available to answer questions regarding the report/study. In addition all relevant project information shall be included. The standard template for the Engineer's Report General Summary is included in Appendix B. The first eight (8) items on the standard Engineer's Report General Summary sheet should also be reflected on the Report Cover.

4.6 DESIGN REVIEWS

4.6.1 Process

All written comments will be responded to in writing by the Designer within two weeks after receipt. All comments that cannot be fully addressed in the two-week period will be responded to in writing when resolved, and prior to the final addendum being issued. This applies to all written comments received by the Designer and the MAA Project Manager.

At the beginning of each project, the MAA project managers will determine who the "client" is within MAA. The client should be invited to all scoping, design, phasing, and review meetings. Project Managers and Consultants should use their judgment to additional invitees as needed.

4.7 ALP COORDINATION

At the initiation of each project, designers shall confirm with the MAA Office of Planning and Environmental Services that the project is included on a Federal Aviation Administration (FAA) approved ALP. If the project has not been included, the designer shall identify and coordinate

with the MAA Division of Airport Facilities Planning all changes to the Airport Layout Plan. FAA review time is approximately 14 days for pen and ink revisions and approximately 60 days for more substantial revisions.

4.8 ENVIRONMENTAL COORDINATION

4.8.1 MDE

1. All submittals and re-submittals to MDE shall be forwarded by the Designer to MAA's Manager of the Division of Environmental Planning (DEP). This includes, but is not limited to, concept plans; Stormwater Management (SWM) reports; Erosion and Sediment Control (ESC) drawings; site development and final plans; response to MDE comments; etc.
2. For Notice of Intent (NOI) submittals to MDE the Designer shall complete all forms and documentation required on the application which shall be forwarded to the DEP Manager for Signature of Applicant.
3. All submittals shall include a cover letter/transmittal to the attention of MAA DEP Manager stating the purpose of the submittal and a listing of the attachment(s), as well as any specific instructions or information that may be necessary.
4. The Designer shall email a .pdf copy of the cover letter/transmittal to MAA's Design Task Manager with a copy to the Expedited Reviewer Manager for their information and record.
5. The Designer shall obtain a signed receipt from the DEP Manager or his/her designee for the document(s) delivered. The DEP Manager will maintain a log of all submittals made by the designers for future reference.
6. The DEP Manager will forward the documents submitted by the Designer to MDE for review. Concurrently, the DEP Manager will contact and coordinate with MAA's Expedited Reviewer at MDE regarding the forthcoming documents.
7. Comments and correspondence received on the submittal(s) from MDE will be forwarded by the DEP Manager to the Designer for necessary action. The Designer shall provide complete, point-by-point, response(s) to the MDE comments within ten (10) business days of receipt, unless directed otherwise.
8. Refer to and insert the MDE Plan Review Number on all submittals, correspondence, and drawings to MDE once a number is assigned by MDE.
9. The DEP Manager or his/her designee shall sign the Owner's/Developer's Certification on the ESC plans, as well as the Signature of Applicant required to complete the "NOI" application. If DEP Manager or his/her designee is unavailable,

the Designer may contact MAA's Manager of the Division of Engineering for further instruction or to sign the documents.

10. The DEP Manager or his/her designee will be the principal contact and responsible to manage the NOI process for the BWI Marshall and Martin State Airports' construction sites in compliance with the General Permit for Construction Activity and in accordance with the Environmental Protection Agency's National Pollutant Discharge Elimination System (NPDES) stormwater program.
11. For projects that fall below the threshold to require MDE's ESC review and approval but contain Erosion & Sediment Control drawings and specifications (for example, mill & overlay within existing paved areas), the Designer shall submit the ESC documents to the DEP Manager for review and approval.
12. The DEP Manager will forward a copy of the approvals, permits, and NOI notices to the Designer, MAA Task Manager, MAA Construction Manager, and others, as necessary.

4.8.2 Permitting Process for the Construction of Air Emissions Sources

For the purposes of this section and all subsequent subsections, "Owner" refers to the Maryland Aviation Administration (MAA), or either of BWI Marshall and/or Martin State Airports as determined by the context. "Designer" refers to any entity commissioned to design and/or specify equipment described herein for construction and/or installation at any MAA facility or location within the BWI Marshall and/or Martin State Airports.

Please consult COMAR §26.11.02.10 for a list of sources which are exempt from having to obtain Air Quality Permits to Construct and/or Approvals.

When new sources of air pollution are planned for installation at BWI Marshall and Martin State Airports, an Air Quality Permit to Construct must be obtained (if required) from the Maryland Department of the Environment's Air and Radiation Management Administration (MDE/ARMA) prior to commencing construction. All permit applications shall be submitted to MDE/ARMA in conjunction with and only after approval by MAA's Division of Environmental Compliance. At project initiation, Designer must schedule an initial consultation with MAA's Division of Environmental Compliance to discuss permitting requirements for all new air emissions sources that are planned or proposed. Preparing the applications for such permits is the responsibility of the Designer. Later integration of new sources with facility air quality operating permits is the responsibility of the Owner (MAA).

Whenever practicable, Designer/Owner should consider the incorporation of energy/fuel efficient, lower emission equipment into the design for air emission sources. In addition, when the purchase of a non-environmentally responsible piece of equipment is specified

and/or recommended by the Designer, justification in the form of a best available or economically feasible option will be required.

Whenever fuel burning equipment is added to the MAA inventory, the Division of Environmental Compliance must be notified by the Designer regarding the addition.

Unless otherwise stated, the general application for equipment capable of emitting air pollution (not including air pollution control devices, incinerators, and boilers) is the *Permit to Construct Application for Processing/Manufacturing Equipment* (Form Number 5), which can be found on the MDE website at:

<http://www.mde.state.md.us/assets/document/air/form5.pdf>

Sources which have the potential to emit Toxic Air Pollutants (TAPs) and are subject to COMAR §26.11.15, also require a Form 5A (*Summary of Demonstrations for Meeting the Ambient Impact Requirement and the T-BACT Requirement*) and Form 5B (Emission Data). Forms 5A and 5B can be found on the MDE website at:

<http://www.mde.state.md.us/assets/document/air/form5a.pdf>

<http://www.mde.state.md.us/assets/document/air/form5b.pdf>

If pollution control equipment is to be installed on the unit, then Form 6 (*Application for Permit to Construct Gas Cleaning or Emission Control Equipment*) is required for any control device associated with the equipment described on Form 5. Form 6 can be found on the MDE website at:

<http://www.mde.state.md.us/assets/document/air/form6.pdf>

The application fee of \$500 per piece of equipment will be invoiced once MDE/ARMA receives the permit application. This fee will be paid per the Designer's contractual agreement with MAA. Three (3) copies of the permit application, each signed and dated individually, must be submitted to MDE/ARMA.

Sources Exempt from Permits to Construct

COMAR §26.11.02.10 lists sources which are exempt from having to obtain Air Quality Permits to Construct and/or Approvals.

For sources not listed in COMAR §26.11.02.10, COMAR §26.11.02.10X if the source to be installed meets the following requirements, it may be exempt from an Air Quality Permit to Construct as follows:

- The installation is not subject to any source-specific State or Federal emission standard;

- The expected uncontrolled emissions are less than 1 ton per calendar year of each pollutant for which there is a Federal air quality standard or which is a Class II toxic air pollutant (TAP) as defined in COMAR §26.11.15.01B(5); and
- The emissions contain no more than one (1) pound per day of Class II toxic air pollutant, as defined in COMAR §26.11.15.01B(4).

4.8.2.1 Permitting Process

The Designer shall be responsible for completing the necessary applications for Air Quality Permits to Construct as set forth below. The permit applications shall be submitted to the MAA Environmental Compliance Division in the Office of Planning and Environmental Services. The Owner (MAA) shall be responsible for signing and submitting the appropriate permit applications to the MDE/ARMA. In addition, the MAA is responsible for paying all permitting fees as set forth below. If the MAA is notified that any permit application is deemed incomplete, the Designer shall take immediate action to rectify the situation and submit the appropriate documents to MDE/ARMA.

After an *Application for Processing/Manufacturing Equipment* has been approved by MDE/ARMA, but prior to operating the processing/manufacturing equipment, the Division of Environmental Compliance, upon notification by the Engineer, will submit an *Application for Permit to Operate Process Equipment* (Form 26). Form No. 26 can be found on the MDE website at:

<http://www.mde.state.md.us/assets/document/air/form26.pdf>

Note that BWI Marshall and Martin State Airports each have different environmental regulatory requirements depending on the type and size of equipment to be constructed as the two airports have separate permits. BWI Marshall is a major source (NO_x emissions >25 tpy) under Title V (COMAR 26.11.17); therefore, the addition of equipment may constitute a major modification and trigger major source permitting. This imposes additional air pollution control requirements and significant delays due to the longer permitting process. An evaluation should be completed for any future projects involving the installation of sources emitting NO_x. On the other hand, Martin State is a minor source and therefore; additional equipment would most likely not trigger the need for major modification.

4.8.3 Fuel Burning Equipment Permitting Process

For the purposes of this section and all subsequent subsections, “Owner” refers to the Maryland Aviation Administration (MAA), or either of BWI Marshall and/or Martin State Airports as determined by the context. “Designer” refers to any entity commissioned to design and/or specify equipment described herein for construction

and/or installation at any MAA facility or location within the BWI Marshall and/or Martin State Airports.

All permit applications shall be submitted to MDE/ARMA in conjunction with and only after approval by MAA's Division of Environmental Compliance. At project initiation, Designer must schedule an initial consultation with MAA's Division of Environmental Compliance to discuss permitting requirements for all new air emissions sources that are planned or proposed.

4.8.3.1 Permitting Requirements for Emergency Generators

The following guidelines are for permitting of generators that will serve as emergency power supplies only. Generators that are to serve other purposes are subject to additional requirements.

After an *Application for Fuel Burning Equipment* has been approved by MDE/ARMA, but prior to operating the fuel burning equipment, the Division of Environmental Compliance, upon notification by the Engineer, must submit an *Application for Permit to Operate Fuel Burning Equipment* (Form 28). Form No. 28 can be found on the MDE website at:

<http://www.mde.state.md.us/assets/document/Form%2028jan04.pdf>

1. MDE/ARMA requires that all stationary internal combustion engines with an output greater than or equal to 500 brake horsepower (373kilowatts) have a Permit to Construct **prior to installation** of the equipment. The MDE/ARMA permit application process for emergency generators is three-fold and outlined below. It should be noted that emergency generators which were installed prior to October 1, 2001 and permitted after-the-fact do not require a Certificate of Public Convenience and Necessity (CPCN) Exemption (discussed below).

Certain types of generators are exempted from the CPCN process and may obtain a waiver from the MD Public Service Commission (PSC), including, but not limited to the following:

- Emergency generators which do not export any electricity to the distribution system and with a capacity equal to or less than 70 megawatts;
- Power generation projects for which the generating station produces on-site generated electricity (as defined in PUC Article §1-101(s)), the capacity of the generating station does not exceed 70 megawatts, and less than 20 percent of the annual energy generated is exported or sold on the wholesale market; or

- Power generation projects for which the capacity of the generating station does not exceed 25 megawatts and at least 10 percent of the electricity generated at the generating station each year is consumed on-site.

In order to receive an exemption from the CPCN process, a CPCN Exemption Application must be completed by following the steps listed below. A copy of the CPCN Exemption Application Form can be found on the Maryland Public Service Commission website:

<http://webapp.psc.state.md.us/Intranet/home.cfm>

Specifically, the CPCN Exemption Application Form can be found in the dropdown menu entitled “Electric.”

- a) The Owner shall send a letter to the local electric company, Baltimore Gas and Electric (BGE), requesting relief from the CPCN requirements, pursuant to the Public Utility Companies ("PUC") Article of the Annotated Code of Maryland. The letter shall also provide BGE with the proposed dates for installation and start-up of the generators, the quantity and size of the units, the fuel type, the location of the units, and how the generators will be used (in this case emergency only). A one-line drawing of the generators and routing design shall be included with the letter as well. The Designer shall be responsible for supplying the technical attachments to the letter.
- b) The electric company will determine if an Interconnection, Operation, and Maintenance Agreement (IOMA) is necessary. This is determined by the type of generator to be installed (Type I, II, III, or IV). Definitions of Type I, II, III, and IV generators are provided by the MD (PSC). For Type I generators (generators that will not be synchronized with the local electric company's transmission and distribution system and will be configured so that there is no export of electricity to the transmission and distribution system - includes emergency back-up generators), the local distribution company will provide a letter indicating that an Interconnection, Maintenance, and Operation Agreement is not necessary. For Type II, III, and IV generators, an Interconnection, Maintenance, and Operation Agreement (“Agreement”) with the local electric company will be necessary, and must be filed with the PSC before the CPCN Exemption application will be approved. A Type III generator (synchronized with the electric system and will export electricity for sale on the wholesale electric market) will also require a wholesales agreement with the Independent System Operator. BWI Marshall and MTN airports do not have Type II, III, or IV generators; therefore, an Agreement is not required. The electric company will also determine if the generators' installation meets the

criteria for a CPCN waiver. This approval by the electric company will allow the PSC to review and waive the CPCN requirements for the construction of generating units.

- c) The Owner shall submit a CPCN Exemption Application to the PSC as required under PUC Article §7-207.1. In order for the Designer to complete the application, additional information is required, including the following: the address and point of contact information for the facility, the manufacturer of the generators, a list of the equipment and facilities that will be powered by the generators, and the letter of agreement from BGE regarding the CPCN waiver. The Point of Contact will be the Manager of the MAA Division of Environmental Compliance. The original signed (by legal counsel, an officer, or other person who has the authority to legally bind the Owner) application package (consisting of the application form and BGE's concurrence letter), along with fourteen (14) copies of the signed package, will be submitted to the PSC by the MAA. The PSC waives filing fees for a unit of State government. The PSC will then issue a waiver, if appropriate, to exempt the proposed generators from the CPCN process.
- d) Once the MAA receives the waiver from the PSC, the Designer shall prepare and the MAA shall submit an *Air Quality Permit to Construct & Registration Application for Emergency Generators* (Form 42), along with the waiver, to MDE/ARMA. To complete the permit application, Not-to-Exceed (NTE) emissions data is required and is obtained from the engine manufacturer submittal data. MDE/ARMA permitting fees are \$500 per source and MDE/ARMA will notify the applicant of the appropriate fee upon receiving a complete application. Three (3) copies of the permit application, each signed and dated individually, must be submitted to MDE/ARMA. A copy of Form 42 can be found on the MDE website at:

<http://www.mde.state.md.us/assets/document/Form%2042%20emergency%20generator%283%29.pdf>

- 2. If pollution control equipment is to be installed on the unit, then Form 6 (*Application for Permit to Construct Gas Cleaning or Emission Control Equipment*) is required and must be submitted with the Form 42. A copy of Form 6 can be found on the MDE website at:

<http://www.mde.state.md.us/assets/document/air/form6.pdf>

- 3. All Form 42s require proof of Worker's Compensation for the Owner (not the Contractor) under Environmental article §1-202. The Designer can obtain a copy of this proof from the MAA Division of Employee Risk Management (410-859-7509).

4. If the emergency generators are subject to non-attainment New Source Review (NSR) or Prevention of Significant Deterioration (PSD) requirements, as defined by 40 CFR Parts 51 and 52, COMAR §26.11.02.09, 26.11.02.12, 26.11.06.14, and 26.11.17, additional permitting may be required simultaneously with the application for an MDE/ARMA Permit to Construct.

4.8.3.2 Permitting Requirements for Internal Combustion Engines (Electrical Power Generators, Power Equipment, and Fire Protection Pumps)

The following guidelines are for permitting of electrical power generators (off grid, base load, peak, load shaving, etc.), power equipment (hydraulic, mechanical, etc.), and fire protection pumps. Guidelines for emergency use only generators are discussed in Section 4.8.3.1.

1. MDE/ARMA requires that all stationary internal combustion engines with an output greater than or equal to 500 brake horsepower (373 kilowatts) have a Permit to Construct prior to installation of the equipment. The MDE/ARMA permit application process for electrical power generators is identical to the permit application process for emergency generators and is outlined below. It should be noted that power equipment (hydraulic, mechanical, etc.) and fire protection pumps do not require a CPCN Exemption from the Public Service Commission. Additionally, it should be noted that electrical power generators which were installed prior to October 1, 2001 and permitted after-the-fact do not require a CPCN Exemption (discussed below).
 - a) The Owner shall send a letter to the local electric company, Baltimore Gas and Electric (BGE), requesting relief from the CPCN requirements, pursuant to the PUC Article of the Annotated Code of Maryland. The letter shall also provide BGE with the proposed dates for installation and start-up of the generators, the quantity and size of the units, the fuel type, the location of the units, and how the generators will be used. A one-line drawing of the generators and routing design shall be included with the letter as well. The Designer shall be responsible for supplying the technical attachments to the letter. The electric company will respond with a letter stating what type of generators are to be installed using the definitions of generating systems under the Maryland PSC requirements (Type I, II, or III) and if the generators' installation meets the criteria for a CPCN waiver. This approval by the electric company will allow the PSC to review and waive the CPCN requirements for the construction of generating units.
 - b) The Owner shall submit a CPCN waiver application to the PSC as required under PUC Article §7-207.1. In order for the Designer to complete the application, additional information is required, including the following: the address and point of contact information for the facility, the manufacturer of the generators, a list of the equipment and facilities that

will be powered by the generators, and the letter of agreement from BGE regarding the CPCN waiver. The Point of Contact will be the Manager of the MAA Division of Environmental Compliance. The original signed (by legal counsel, an officer, or other person who has the authority to legally bind the Owner) application package (consisting of the application form and BGE's concurrence letter), along with fourteen (14) copies of the signed package, will be submitted to the PSC by the MAA. The PSC waives filing fees for a unit of State government. The PSC will then issue a waiver, if appropriate, to exempt the proposed generators from the CPCN process.

- c) Once the MAA receives the waiver from the PSC, the Designer shall prepare and the MAA shall submit a Form 44, *Air Quality Permit to Construct & Registration Application for Internal Combustion Engines (Electrical Power Generators, Power Equipment, & Fire Protection Pumps)*, along with the waiver, to MDE/ARMA for the generators. Again, the waiver from the PSC is only required for electrical power generators (not for power equipment or fire protection pumps); power equipment and fire protection pumps only require an *Air Quality Permit to Construct & Registration Application for Internal Combustion Engines*. To complete the permit application, NTE emissions data is required and is obtained from the engine manufacturer submittal data. MDE/ARMA permitting fees are \$500 per source and MDE/ARMA will notify the applicant of the appropriate fee upon receiving a complete application. Three (3) copies of the permit application, each signed and dated individually, must be submitted to MDE/ARMA. Form 44 can be found on the MDE website at:

<http://www.mde.state.md.us/assets/document/Form%2044%20Internal%20Combustion%20Engines.pdf>

2. If pollution control equipment is to be installed on the unit, then Form 6 (*Application for Permit to Construct Gas Cleaning or Emission Control Equipment*) is required and must be submitted with the *Air Quality Permit to Construct & Registration Application for Internal Combustion Engines (Electrical Power Generators, Power Equipment, & Fire Protection Pumps)*. A copy of Form 6 can be found on the MDE website at:

<http://www.mde.state.md.us/assets/document/air/form6.pdf>

3. All Form 44s require proof of Worker's Compensation for the Owner (not the Contractor) under Environmental article §1-202. The Designer can obtain a copy of this proof from the MAA Division of Employee Risk Management (410-859-7509).
4. If the electrical power generators, power equipment, and/or fire protection pumps are subject to non-attainment NSR or PSD requirements, as defined by

40 CFR Parts 51 and 52, COMAR §§ 26.11.02.09, 26.11.02.12, 26.11.06.14, and 26.11.17, additional permitting may be required simultaneously with the application for an MDE/ARMA Permit to Construct.

4.8.3.3 Permitting Requirements for Boilers, Water Heaters, and Other Fuel Burning Equipment (including Snow Melters)

1. MDE/ARMA requires that all fuel burning equipment using fuel oil or gaseous fuel, and with a maximum heat input of one (1) million BTU per hour (MMBtu/hr) or greater, have a Permit to Construct prior to installation. COMAR §26.11.01.01B(17)(a) defines "fuel burning equipment" as any boiler or furnace that has the primary function of heating air, water, or any other medium through indirect heat transfer from the burning of fuels.

- a) All fuel burning equipment with a maximum heat input of ten (10) MMBtu/hr or greater requires an *Application for Fuel Burning Equipment* (Form 11) unless the boiler/heater/snow melter meets the requirements for a General Permit (see below). Form 11 requires an estimate of the potential annual fuel consumption and operating schedules for the equipment. The Designer shall coordinate with the MAA Office of Maintenance and Utilities for this information. In addition, Form 11 also requires stack parameters, total stack emissions, construction start and end dates for the permitted equipment, and the type of control device(s) associated with the equipment. The permitting fee is \$500 per piece of fuel burning equipment and will be invoiced once MDE/ARMA receives the permit application. Three (3) copies of the permit application, each signed and dated individually, must be submitted to MDE/ARMA. Form 11 can be found on the MDE website at:

<http://www.mde.state.md.us/assets/document/air/form11.pdf>

- b) If pollution control equipment is to be installed on the unit, then Form 6 (*Application for Permit to Construct Gas Cleaning or Emission Control Equipment*) is required and must be submitted with the *Application for Fuel Burning Equipment*. A copy of Form 6 can be found on the MDE website at:

<http://www.mde.state.md.us/assets/document/air/form6.pdf>

- c) Natural gas, liquid propane gas, or distillate oil-fired fuel burning equipment with a maximum heat input of one (1) MMBtu/hr or greater, but less than ten (10) MMBtu/hr may submit an *Air Quality General Permit to Construct for Small Fuel Burning Equipment*. This General Permit does not apply to fuel burning equipment that burns residual fuel oil (ASTM fuel oil Numbers 4, 5, and 6). A copy of the

Air Quality General Permit to Construct for Small Fuel Burning Equipment can be found on the MDE website at:

<http://www.mde.state.md.us/assets/document/00%20Small%20Fuel%20Burning%20Package%282%29.pdf>

In order to obtain an *Air Quality General Permit to Construct for Small Fuel Burning Equipment*, the Designer can either request a General Permit to Construct package from MDE/ARMA by calling (410) 537-3230, or the Designer may simply download the package from the MDE website listed above. The package will include the Air Quality General Permit for Small Fuel Burning Equipment, the Request for Coverage Form, instructions on how to submit the completed Request for Coverage, and information regarding the required permit fee. The General Permit includes any construction and/or operating requirements, air emissions limitations, and other regulatory obligations. The required permitting fee is \$500 per piece of small fuel burning equipment and must be submitted to MDE/ARMA with the application form. Once a request for coverage under the General Permit is made by submitting the Request for Coverage Form and permit fee, the MAA may install and operate the applicable small fuel burning equipment stated on the Request for Coverage Form. A new Request for Coverage must be filed with MDE/ARMA, and another permit fee paid for any small fuel burning equipment which is moved to another facility. Three (3) copies of the permit application package, each signed and dated individually, must be submitted to MDE/ARMA.

- d) Natural gas, liquid propane gas, or distillate oil-fired fuel burning equipment with a maximum heat input of ten (10) MMBtu/hr or greater, but less than thirty (30) MMBtu/hr may be eligible for an *Air Quality General Permit to Construct for Medium Fuel Burning Equipment*. This General Permit does not apply to fuel burning equipment that burns residual fuel oil (ASTM fuel oil Numbers 4, 5, and 6). Note that fuel burning equipment that falls under the Medium Fuel Burning Equipment General Permit is also subject to the Federal 40 CFR Part 60, Subpart Dc New Source Performance Standards (NSPS) requirements (discussed below). Please note that BWI Marshall cannot use the Medium Fuel Burning Equipment General Permit since it is a major source of nitrogen oxide (NO_x). A copy of the *Air Quality General Permit to Construct for Medium Fuel Burning Equipment* can be found on the MDE website at:

<http://www.mde.state.md.us/assets/document/00%20medium%20boiler%20permit%20package%285%29.pdf>

In order to obtain a *General Permit to Construct for Medium Fuel Burning Equipment*, the Designer can either request a General Permit to Construct

package from MDE/ARMA by calling (410) 537-3230, or the Designer may simply download the package from the MDE website listed above. The package will include the Air Quality General Permit for Medium Fuel Burning Equipment, the Request for Coverage Form, instructions on how to submit the completed Request for Coverage Form, and information regarding the required permit fee. The General Permit includes any construction and/or operating requirements, air emissions limitations, and other regulatory obligations, including NSPS Subpart Dc requirements. The required permitting fee is \$500 per piece of medium fuel burning equipment, and must be submitted to MDE/ARMA with the application form. Once a request for coverage under the General Permit is made, by submitting the Request for Coverage Form and permit fee, the MAA may install and operated at the applicable medium fuel burning equipment stated on the Request for coverage Form. A new Request for Coverage Form must be filed with MDE/ARMA, and another permit fee paid any time medium fuel burning equipment which is moved to another facility. Three (3) copies of the permit application package, each signed and dated individually, must be submitted to MDE/ARMA.

2. All Permit to Construct Applications (Form 11 or General) require proof of Worker's Compensation Coverage for the Owner (not the Contractor) under Environmental article §1-202. The Designer can obtain a copy of this proof from the MAA Division of Employee Risk Management (410-859-7509).
 - a) If the boilers/heaters/snow melters are subject to non-attainment NSR or PSD requirements, as defined by 40 CFR Parts 51 and 52, COMAR §§26.11.02.09, 26.11.02.12, 26.11.06.14, and 26.11.17, additional permitting may be required simultaneously with the application for an MDE/ARMA Permit to Construct.

4.8.3.4 Design Guidelines for Emergency Generators, Internal Combustion Engines, and Fuel Burning Equipment (including Snow Melters)

1. The Designer shall be responsible for preparing all permit applications and submitting the appropriate documentation to the MAA for all required permits and exemptions as defined above. In addition, the Designer shall specify equipment that meets all State and Federal air quality requirements.
 - a) Specifications for all Fuel Burning Equipment requiring permits shall include:
 - i. Notification that a permit to install the equipment is required;
 - ii. Designation of the "Owner" or "Owner's Agent" as the party responsible for completing the permit application;

- iii. A projection of the permitting process duration after receipt of the required equipment data; and
 - For generators, the CPCN exemption process, including utility approval, can take up to two (2) months and the permitting process can take up to ninety (90) days after a waiver is received and a complete application is received by MDE/ARMA.
 - For boilers/heaters/snow melters with a maximum heat input of ten (10) MMBtu/hr or greater that burn natural gas only and are not subject to the public review process, the permitting process can take up to ninety (90) days after a complete application is received by MDE/ARMA; however, for fuel oil-fired boilers with a maximum heat input of ten (10) MMBtu/hr or greater, the permitting process can take up to six (6) months after a complete application is received by MDE/ARMA.
 - iv. The specific equipment data required for the permit application listed in the "Submittals" paragraph.
- b) The Designer shall specify equipment that meets the Federal requirements for units that are subject to 40 CFR Part 60 (NSPS), Subpart IIII - Standards of Performance for Stationary Compression Ignition (CI) Internal Combustion Engines (ICE) and the Designer is responsible for providing the Owner with the EPA Certificate of Conformity identifying the engine as a certified unit:

Subpart IIII Applicability

- i. Stationary CI ICE that commence construction after July 11, 2005 where the stationary CI ICE are:
 - Manufactured after April 1, 2006 and are not fire pump engines, or
 - Manufactured as a certified National Fire Protection Association (NFPA) fire pump engine after July 1, 2006.
- ii. Stationary CI ICE that are modified or reconstructed after July 11, 2005.

Subpart III Requirements

- i. Emission standards (§60.4204 and 60.4205) for owners and operators of stationary CI ICE vary based on model year (“pre-2007” vs. “2007 and later”) and function (“non-emergency stationary CI ICE” vs. “emergency stationary CI ICE”);
 - ii. Fuel requirements (§60.4207), specifically diesel fuel requirements for owners and operators of stationary CI ICE, must meet the requirements of 40 CFR 80.510(a): sulfur content of 500 parts per million (ppm). Beginning October 1, 2010, owners and operators of stationary CI ICE subject to NSPS Subpart III, with a displacement of 30 liters per cylinder that use diesel fuel must use diesel fuel that meets the requirements of 40 CFR 80.510(b) for nonroad diesel fuel: sulfur content of 15 ppm.
 - iii. Monitoring requirements (§60.4209) for owners and operator of stationary CI ICE include installing a nonresettable hour meter prior to start-up of the engine. Also, if the engine is equipped with a diesel particulate filter, the filter must be installed with a backpressure monitor that notifies the owner or operator when the high back pressure limit of the engine is approached.
 - iv. Compliance requirements (§60.4211) for owners and operators of stationary CI ICE vary based on model year (“pre-2007” vs. “2007 and later”) and function (“non-emergency stationary CI ICE” vs. “emergency stationary CI ICE”).
 - v. Test methods (§60.4212 and 60.4213) for owners and operators of stationary CI ICE vary based on the displacement of the engine (“less than 30 liters per cylinder” vs. “greater than 30 liters per cylinder”).
 - vi. Notification, recordkeeping, and reporting requirements (§60.4241) for owners and operators of stationary CI ICE vary based on model year, function, and displacement (per cylinder) of the engine.
- c) The Designer shall specify equipment that meets the Federal requirements for units that are subject to 40 CFR Part 60 (NSPS), Subpart JJJJ - Standards of Performance for Stationary Spark Ignition (SI) Internal Combustion Engines (ICE):

Subpart JJJJ Applicability

- i. Stationary SI ICE that commence construction after June 12, 2006 where the stationary SI ICE are manufactured on or after:
 - July 1, 2007, for engines with a maximum engine power greater than or equal to 500 horsepower (except lean burn engines with a maximum engine power greater than or equal to 500 horsepower and less than 1,350 horsepower);
 - January 1, 2008, for lean burn engines with a maximum engine power greater than or equal to 500 horsepower and less than 1,350 horsepower;
 - July 1, 2008, for engines with a maximum engine power less than 500 horsepower; or
 - January 1, 2009, for emergency engines with a maximum engine power greater than 19 kilowatts (25 horsepower).
- ii. Stationary SI ICE that commence modification or reconstruction after June 12, 2006.

Subpart JJJJ Requirements

- i. Emission standards (§60.4233) for owners and operators of stationary SI ICE vary based on maximum engine power, date of manufacture, type of fuel combusted, burn type (e.g., lean vs. rich burn engine), and function (“non-emergency stationary SI ICE” vs. “emergency stationary SI ICE”).
- ii. Fuel requirements (§60.4235) for owners and operators of stationary SI ICE that use gasoline must meet the requirements of 40 CFR 80.195.
- iii. Monitoring requirements (§60.4237) for owners and operators of stationary SI ICE vary based on the horsepower of the engine and the date which it was built. In general, monitoring requirements include installing a non-resettable hour meter.
- iv. Compliance requirements (§60.4243) for owners and operators of stationary SI ICE vary based on maximum engine power, date of manufacture, type of fuel combusted, whether or not the stationary SI ICE is certified, and function (“non-emergency stationary SI ICE” vs. “emergency stationary SI ICE”).

- v. Owners and operators of stationary SI ICE who conduct performance tests must follow the test methods and procedures outline in §60.4244.
- vi. Notification, recordkeeping, and reporting requirements (§60.4245) for owners and operators of stationary SI ICE vary based on maximum engine power, date of manufacture, and function (“non-emergency stationary SI ICE” vs. “emergency stationary SI ICE”).

Whenever possible, the Designer shall specify the requirement to install a certified engine under Subpart JJJJ. However, under this rule, manufacturers are not required to certify the majority of engines and therefore, certified engines are not readily available on the market. If a Subpart JJJJ engine is installed and not certified, initial compliance testing will be required for the engine within 180 days of startup. In addition, if the engine is greater than 500 hp, testing every 3 years after the initial compliance testing is also required.

- d) The Designer shall specify equipment that meets the following emission control requirements:
 - i. These units shall be fired with natural gas, and when necessary with No. 2 fuel oil as a back-up fuel, and designed to be high efficiency units. They shall be equipped with a low NOx burner system for guaranteed NOx performance when using natural gas at no greater than 30 ppm, dry volume basis and corrected to 3% excess oxygen (O₂).
 - ii. Burner, boiler/water heater, and low NOx system shall be manufactured as a package by a single manufacturer. The unit's nameplate shall include the approved Underwriter's Laboratory (UL) low NOx model designation. The manufacturer shall provide the Contractor with a copy of the most recent stack testing results to demonstrate compliance with the 30 ppm NOx guarantee. After boiler installation is completed, the Contractor shall provide the services of a manufacturer's field representative for commissioning the unit and training the operator(s). A manufacturer's – approved and authorized commissioning report shall be submitted to the Engineer at the time of start-up.
- e) The Designer shall specify equipment that meets the Federal requirements for 40 CFR Part 60 (NSPS) Subpart Dc – Small Industrial-Commercial-Institutional Steam Generating Units for all fuel burning equipment with a

maximum design heat input greater than or equal to ten (10) MMBtu/hr, but less than or equal to one hundred (100) MMBtu/hr and constructed, modified, or reconstructed after June 9, 1989. In addition, the Designer is responsible for ensuring that these units also meet the more stringent State of Maryland requirements under COMAR §§26.11.09.05A, 26.11.09.06A, and 26.11.09.07A.

4.8.4 Underground Storage Tanks (USTs) and Aboveground Storage Tanks (ASTs) Permitting Process

The storage of deicing compounds or other liquids which may be considered Volatile Organic Liquids (VOLs) may require a permit to construct as they could be subject to a NSPS under 40 CFR Part 60, Subpart Kb. Tanks that store VOLs with a capacity greater than or equal to 75 cubic meters and for which construction, reconstruction or modification began after July 23, 1984, are subject to Subpart Kb. The Designer must consider the following requirements for tanks of certain sizes:

- Tanks with design capacity greater than 151 cubic meters and storing liquid with vapor pressure >5.2 kPa require fixed roof control or internal floating roof control with specific seal requirements.
- Tanks with design capacity greater than or equal to 75 cubic meters and less than 151 cubic meters and storing liquid with vapor pressure >27.6 kPa also require a fixed roof control or internal floating roof control with specific seal requirements.
- Tanks with design capacity greater than 75 cubic meters and storing liquid with vapor pressure >76.6 kPa require a closed vent system.

An *Application for Processing or Manufacturing Equipment* (Form 5) would be used to obtain a permit to construct for a tank subject to Subpart Kb and requiring a permit. The application can be found on MDE's website at:
<http://www.mde.state.md.us/programs/Permits/AirManagementPermits/PermitstoConstructandOperate/Pages/index.aspx>.

Please refer to requirements outlined in Section 4.8.5, below, regarding air quality regulations and permitting requirements for storage tanks that are part of Gasoline Dispensing/Motor Vehicle Refueling Facilities.

4.8.5 Gasoline Dispensing/Motor Vehicle Refueling Facilities Permitting Process

For the purposes of this section and all subsequent subsections, "Owner" refers to the Maryland Aviation Administration (MAA), or either of BWI Marshall and/or Martin State Airports as determined by the context. "Designer" refers to any entity commissioned to design and/or specify equipment described herein for construction

and/or installation at any MAA facility or location within the BWI Marshall and/or Martin State Airports.

All permit applications shall be submitted to MDE/ARMA in conjunction with and only after approval by MAA's Division of Environmental Compliance. At project initiation, Designer must schedule an initial consultation with MAA's Division of Environmental Compliance to discuss permitting requirements for all new air emissions sources that are planned or proposed.

When new Gasoline Dispensing/Motor Vehicle Refueling Facilities (GD/MVRFs) are planned for installation at BWI Marshall and Martin State Airports, a General Permit to Construct Motor Vehicle Refueling Facilities must be obtained from MDE/ARMA if the facility will dispense gasoline into the tanks of motor vehicles and have a gasoline storage tank larger than 2,000 gallons. Multiple tanks at the same location are considered a tank farm and only one permit is required for all the tanks in the tank farm. Preparing the applications for such permits is the responsibility of the Designer.

The emission sources to which these regulations apply are gasoline storage tanks larger than 2,000 gallons and their associated equipment components in vapor or liquid gasoline service, including pressure/vacuum vents on storage tanks and equipment necessary to unload product from cargo tanks into the storage tanks. Equipment used for refueling motor vehicles is not deemed an emission source under these regulations.

No General Permit to Construct is required for the storage of diesel fuel, kerosene, jet fuel, or fuel oils. However, the Designer must inform/notify MAA's Division of Environmental Compliance with the appropriate information that will be necessary to update the Oil Operations Permit (OOP) for newly acquired permanent tanks greater than 10,000 gallons which store oil (includes but is not limited to the following: asphalt, gasoline, ethanol that is intended to be used as a motor fuel or fuel source, kerosene, aviation/jet fuels, diesel fuel, biodiesel fuel regardless of whether the fuel is petroleum based, used oil, waste oil, lubricating oils, hydraulic oil, mineral oil, and all heating oils) through MDE. Designer must also provide sufficient information to allow for update and PE review/stamp of the Spill Prevention Control & Countermeasures (SPCC) Plan and the Stormwater Pollution Prevention Plan (SWPPP). Additionally, Form A and Form M92 must be completed prior to use of the tanks and can be found on the MDE website at:

http://textonly.mde.state.md.us/Programs/LandPrograms/Oil_Control/FactsheetsPublications/Oil_OilPermits.asp

4.8.5.1 Permitting Requirements for GD/MVRFs

The Designer shall be responsible for completing the *Air Quality General Permit to Construct Application Package for Motor Vehicle Refueling Facilities*, including the Request for Coverage Form (Form No. MDE/ARMA/PER.006).

The Application Package can be obtained by calling MDE/ARMA at (410) 537-3230 or downloading from the following website:

http://www.mde.state.md.us/Permits/AirManagementPermits/Air_Permits/index.aspT

The Application Package shall be submitted to the MAA Environmental Compliance Division in the Office of Planning and Environmental Services. MAA shall be responsible for signing and submitting the Application Package to the MDE/ARMA. In addition, the MAA is responsible for paying the \$200 permitting fee (payable to MDE Clean Air Fund) that must accompany the Application Package. If the MAA is notified that any permit application is deemed incomplete, the Designer shall take immediate action to rectify the situation and submit the appropriate documents to MDE/ARMA.

Coverage under the General Permit to Construct begins on the day a complete Application Package (as determined by MDE/ARMA) and full payment of the permitting fee is submitted to MDE/ARMA.

4.8.5.2 Design Guidelines for GD/MVRFs

1. The Designer shall be responsible for preparing all Application Packages and submitting the appropriate documentation to the MAA for all required permits and exemptions as defined above. In addition, the Designer shall specify equipment that meets all State and Federal air quality requirements.

a) Specifications for all GD/MVRFs requiring permits shall include:

- Notification that a General Permit to Construct the equipment is required;
- Designation of the "Owner" or "Owner's Agent" as the party responsible for completing the Application Package;
- A statement that Coverage under the General Permit to Construct begins on the day a complete Application Package (as determined by MDE/ARMA) and full payment of the permitting fee is submitted to MDE/ARMA. MDE/ARMA will reply with a letter acknowledging the receipt of the Application Package and fee payment, which must be retained along with the General Permit to Construct document.

2. Stage I and II Vapor Recovery

- Stage I vapor recovery systems capture the gasoline vapors emitted when a tank truck refills the gasoline storage tank and is required for all gasoline storage tanks larger than 2,000 gallons.
 - Stage II vapor recovery systems capture gasoline vapors lost during vehicle refueling at the pump. Stage II vapor recovery is required for gasoline tanks larger than 2,000 gallons and facilities with a monthly throughput greater than or equal to 10,000 gallons in the following areas: Baltimore City, Anne Arundel, Baltimore, Calvert, Carroll, Cecil Charles, Frederick, Harford, Howard, Montgomery, and Prince George's counties.
3. Permitting and compliance requirements for GD/MVRFs are dependent on various thresholds of monthly throughput of gasoline, where monthly throughput is defined as the total volume of gasoline during a month as calculated on a rolling 30-day average. The Designer shall be responsible for determining the projected throughput threshold, discussed below, that will drive design specifications and notification requirements to comply with state requirements as well as Federal requirements under 40 CFR Part 63 Subpart CCCCCC. Please refer to Chapter 10 "Environmental Procedures and Requirements" for notification, recordkeeping, and reporting requirements.
 4. Monthly Throughput of Less Than 10,000 Gallons – The Designer shall specify a vapor balance line to load product into gasoline storage tanks per Part II.A(1)(a)(i) of the Air Quality General Permit to Construct Application Package for Motor Vehicle Refueling Facilities. Additionally, the Designer shall specify a submerged fill pipe no higher than 6 inches from the bottom of the storage tank for loading product into the storage tank. Other specifications as necessary must be incorporated to minimize vapor releases, such as those that minimize gasoline spills, allow for expeditious cleanup of gasoline spills, use of gasketed seals for gasoline containers and storage tank fill pipes, and minimize product being sent to open waste collection systems that collect and transport gasoline to reclamation and recycling devices such as oil/water separators.
 5. Monthly Throughput of 10,000 Gallons or More – The Designer shall specify identical requirements as above for monthly throughput of less than 10,000 gallons. In addition, in order to comply with Subpart CCCCCC, all storage tanks at or above 250 gallons shall be loaded using submerged fill (drop tubes).

6. Monthly Throughput of 100,000 Gallons or More

- a) The Designer shall specify identical requirements as outlined above in the section for facilities with monthly throughput of 10,000 gallons; in addition, in order to meet the requirements of Subpart CCCCCC, the facility must either (1) operate a vapor balance system that meets a specified enforceable State, local rule or permit or (2) operate a vapor balance system during storage tank loadings, test the system periodically to make sure it works correctly, and includes specific equipment or work practices according to the rule, or meets 95% control.
- b) Because BWI Marshall and Martin State Airports are located in Anne Arundel and Baltimore County, respectively, the Designer must specify Stage II vapor recovery equipment for all new sources.
 - For Stage II vapor recovery equipment, the Designer shall specify instructional signs, to be placed in conspicuous locations at each gasoline dispenser, that include instructions and illustrations for inserting and removing the nozzle and dispensing product, warn against attempts to continue refueling after automatic shut-off of the gasoline occurs (i.e. “topping off”), and that display the MDE/ARMA’s toll-free number for submitting complaints or comments regarding use of the Stage II vapor recovery system.
- c) If the GD/MVRF had a permit for gasoline storage tanks issued before January 10, 2008, the facility is deemed to be in compliance with the following requirements. If not, the Designer must specify the following (note: these requirements do not apply to gasoline storage tanks equipped with a floating roof or equivalent):
 - A vapor balance system having vapor connections and lines that are equipped with closures that seal upon disconnect, and a vapor line between the storage tank and cargo tank that is vapor-tight to 100% of the Lower Explosive Limit (when measured with a combustible gas detector, calibrated with propane, at a distance of one inch from the source). The vapor balance system must not allow the pressure in the tank truck to exceed 18 inches water pressure or 5.9 inches water vacuum when transferring product. All vapor recovery adaptors and connections must be designed to prevent over-tightening or loosening of fittings during normal product delivery.
 - If a gauge well separate from the fill tube is specified, it must be provided with a submerged drop tube that extends no more than 6

inches from the bottom of the tank. Liquid fill connections must be equipped with vapor-tight caps.

- Pressure/vacuum (PV) vent valves shall be specified for the storage tank vent pipes. The pressure specifications for PV vent valves must be a positive pressure setting of 2.5 to 6.0 inches of water and a negative pressure setting of 6.0 to 10.0 inches of water. The total leak rate of all PV vent valves at the GD/MVRF must not exceed 0.17 cubic foot per hour at a pressure of 2.0 inches of water, and 0.63 cubic foot per hour at a vacuum of 4 inches of water.
- The vapor balance system must be capable of meeting the static pressure performance requirement of the following equation:

$$P_f = 2e^{-500.887/v}$$

Where

P_f = Minimum allowable final pressure, inches of water

v = Total ullage affected by the test, gallons

e = Dimensionless constant equal to approximately 2.718

2 = The initial pressure, inches water; and

- For new or reconstructed facilities, or new storage tank(s) at an existing facility, the Designer must specify gasoline storage tank(s) with a dual-point vapor balance system in which the storage tank is equipped with an entry port for a gasoline fill pipe and a separate exit port for a vapor connection.
- d) The Designer shall specify that, at the time of installation and every three years thereafter, the PV vent valves must comply with the leak rate and cracking pressure requirements specified above, using the California Air Resources Board (CARB) Vapor Recovery Test Procedure TP-201.1E or alternative method approved by the MDE/ARMA.
- e) The Designer shall specify that, at the time of installation, the vapor balance system must comply with the static pressure performance requirements specified above, using the CARB Vapor Recovery Test Procedure TP-201.3 or alternative method approved by the MDE/ARMA.

This requirement also applies every three years after initial installation.

- f) If any alternative vapor balance system other than that described in 5.c., above, is specified, the Designer must specify that initial compliance is demonstrated such that a 95 percent reduction in emissions is achieved by

the vapor balance system using CARB Vapor Recovery Test Procedure TP-201.1, and determine and document alternative acceptable values for the leak rate and cracking pressure requirements described in (d) and (e), above.

g) The Designer must specify the following initial CARB-approved tests:

- A leak test in accordance with CARB Vapor Recovery Test Procedure TP-201.3
- An air to liquid volume ratio test in accordance with CARB Vapor Recovery Test Procedure TP-201.5
- A dynamic pressure performance test in accordance with CARB Vapor Recovery Test Procedure TP-201.4
- A vapor return line vacuum integrity test for the Healy Model 400 ORVR System
- A vapor return line vacuum integrity test for the Healy Model 600 System

4.8.6 Paint Booths and Abrasive Blasting Operations Permitting Process

For the purposes of this section and all subsequent subsections, “Owner” refers to the Maryland Aviation Administration (MAA), or either of BWI Marshall and/or Martin State Airports as determined by the context. “Designer” refers to any entity commissioned to design and/or specify equipment described herein for construction and/or installation at any MAA facility or location within the BWI Marshall and/or Martin State Airports.

All permit applications shall be submitted to MDE/ARMA in conjunction with and only after approval by MAA’s Division of Environmental Compliance. At project initiation, Designer must schedule an initial consultation with MAA’s Division of Environmental Compliance to discuss permitting requirements for all new air emissions sources that are planned or proposed.

Coating and painting operations, including the use of paint booths, require the designer to apply for an Air Quality Permit to Construct prior to installation of a paint booth.

Paint booths and their associated spray coating activities are regulated under 40 CFR Part 63 (National Emissions Standards for Hazardous Air Pollutants [NESHAPs]), Subpart HHHHHH – Paint Stripping and Miscellaneous Surface Coating Operations at Area Sources. Categories and entities potentially affected by NESHAP Subpart HHHHHH are paint stripping operations using methylene chloride (MeCl)-containing paint strippers,

motor vehicle and mobile equipment surface coating operations, and miscellaneous surface coating operations located at area sources. An area source is defined in the Clean Air Act (CAA) section 112(a) as any stationary source of Hazardous Air Pollutants (HAPs) that is not a major source. A major source is defined as any stationary source or group of stationary sources located within a contiguous area and under common control that emits, or has the potential to emit, considering controls, in the aggregate, 10 tons per year (tpy) or more of any single HAP or 25 tpy or more of any combination of HAPs. For the purposes of this rule, paint stripping operations are those that perform paint stripping using MeCl for the removal of dried paint (including, but not limited to, paint, enamel, varnish, shellac, and lacquer) from wood, metal, plastic, and other substrates at area sources as either: (1) an independent activity where paint stripping is the principal activity at the source, or (2) an activity incidental to the principal activity (e.g., surface coating, inspection, maintenance, etc.) at the source.

For co-located operations, the EPA considers paint stripping activities that use one ton or less to be incidental to the principal activity and those using more than one ton to be performing paint stripping as a principal activity. Motor vehicle and mobile equipment surface coating operations involve the spray application of coatings at area sources to automobiles, light trucks, heavy duty trucks, buses, construction equipment, self-propelled vehicles, and equipment that may be drawn and/or driven on a roadway. Miscellaneous surface coating operations are those that involve the spray application of coatings that contain compounds of chromium (Cr), lead (Pb), manganese (Mn), nickel (Ni), or cadmium (Cd), herein after referred to as target HAPs, to miscellaneous parts and/or products made of metal or plastic, or combinations of metal and plastic.

4.8.6.1 Permitting Requirements for Vehicle Surface Coating Operations

1. MDE/ARMA requires an *Air Quality General Permit to Construct for Vehicle Refinishing*. This general permit applies to auto body repair facilities that are at a fixed stationary location; use no more than 400 gallons of vehicle refinishing materials per year; have two or less paint spray booths; and do not use materials containing lead, formaldehyde, or pot life extenders. The *Air Quality General Permit to Construct for Vehicle Refinishing* can be found on the MDE website at:

<http://www.mde.state.md.us/assets/document/00%20Autobody%20Package%284%29.pdf>

In order to obtain an *Air Quality General Permit to Construct for Vehicle Refinishing*, the Designer can either request a General Permit to Construct package from MDE/ARMA by calling (410) 537-3230, or the Designer may simply download the package from the MDE website listed above. The package will include the Air Quality General Permit for Vehicle Refinishing, an Initial Notification Form, a Compliance Notification Form, and information regarding the required permit fee. The General Permit includes any construction and/or operating requirements, air emissions limitations, and

other regulatory obligations. The required permitting fee is \$500 for the whole facility and must be submitted to MDE/ARMA with the application form. The Initial Notification Form must be sent to the EPA Region III and MDE/ARMA 180 days after initial start-up for new shops and by January 11, 2010 for existing shops. The Compliance Notification Form must be sent to the EPA Region III and MDE/ARMA 180 days after initial startup for new shops and by March 11, 2011 for existing shops. Three (3) copies of the permit application package, each signed and dated individually, must be submitted to MDE/ARMA.

2. All Permit to Construct Applications, including the *Air Quality General Permit to Construct for Vehicle Refinishing*, require proof of Worker's Compensation for the Owner (not the Contractor) under Environmental article §1-202. The Designer can obtain a copy of this proof from the MAA Division of Employee Risk Management (410-859-7509).
3. In addition to complying with all applicable Federal NESHAP Subpart HHHHHH requirements, the VOC content of the materials used shall not exceed the following limitations:

<u>Coatings*</u>	<u>VOC (lb/gal)</u>
Pretreatment	6.5
Precoat	5.5
Primer surface	4.8
Primer sealer	4.6
Topcoat	5.0
Multi-stage coating system	5.2
Specialty coating	7.0
<u>Preparation materials</u>	
Non-plastic	1.4
Plastic	6.5

*VOC content limitation is for coatings *as applied*.

4.8.6.2 Design Guidelines for Vehicle Surface Coating Operations

1. Per §63.11173(e), the designer must ensure that motor vehicle and mobile equipment surface coating operations and miscellaneous surface coating operations meet the following requirements:
 - a) All spray-applied coatings must be applied in a spray booth, preparation station, or mobile enclosure that meets the following requirements:
 - i. All spray booths, preparation stations, and mobile enclosures must be fitted with a type of filter technology that is demonstrated to

achieve at least 98-percent capture of paint overspray. The procedure used to demonstrate filter efficiency must be consistent with the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) Method 52.1, "Gravimetric and Dust-Spot Procedures for Testing Air-Cleaning Devices Used in General Ventilation for Removing Particulate Matter, June 4, 1992" (incorporated by reference, see §63.14 of subpart A of this part). The test coating for measuring filter efficiency shall be a high solids bake enamel delivered at a rate of at least 135 grams per minute from a conventional (non-HVLP) air-atomized spray gun operating at 40 pounds per square inch (psi) air pressure; the air flow rate across the filter shall be 150 feet per minute. Owners and operators may use published filter efficiency data provided by filter vendors to demonstrate compliance with this requirement and are not required to perform this measurement. Waterwash spray booths that are operated and maintained according to the manufacturer's specifications are not required to meet these requirements.

- ii. Spray booths and preparation stations used to refinish complete motor vehicles or mobile equipment must be fully enclosed with a full roof, and four complete walls or complete side curtains, and must be ventilated at negative pressure so that air is drawn into any openings in the booth walls or preparation station curtains. However, if a spray booth is fully enclosed and has seals on all doors and other openings and has an automatic pressure balancing system, it may be operated at up to, but not more than, 0.05 inches water gauge positive pressure.
 - iii. Spray booths and preparation stations that are used to coat miscellaneous parts and products or vehicle subassemblies must have a full roof, at least three complete walls or complete side curtains, and must be ventilated so that air is drawn into the booth. The walls and roof of a booth may have openings, if needed, to allow for conveyors and parts to pass through the booth during the coating process.
 - iv. Mobile ventilated enclosures that are used to perform spot repairs must enclose and, if necessary, seal against the surface around the area being coated such that paint overspray is retained within the enclosure and directed to a filter to capture paint overspray.
- b) The designer must ensure that all spray-applied coatings must be applied with a high volume, low pressure (HVLP) spray gun, electrostatic application, airless spray gun, air-assisted airless spray gun, or an equivalent technology that is demonstrated by the spray gun manufacturer

to achieve transfer efficiency comparable to one of the spray gun technologies listed above for a comparable operation, and for which written approval has been obtained from the Administrator. The procedure used to demonstrate that spray gun transfer efficiency is equivalent to that of an HVLP spray gun must be equivalent to the California South Coast Air Quality Management District's "Spray Equipment Transfer Efficiency Test Procedure for Equipment User, May 24, 1989" and "Guidelines for Demonstrating Equivalency with District Approved Transfer Efficient Spray Guns, September 26, 2002" (incorporated by reference, see §63.14 of subpart A of this part).

- c) There are additional miscellaneous metal coating regulations pertaining to paint booths for coating items other than motor vehicles that could impose other VOC control requirements. Please refer to COMAR 26.11.19.13 for more information depending on the product being coated.

4.8.7 Abrasive Blasting Operations Permitting Process

For the purposes of this section and all subsequent subsections, "Owner" refers to the Maryland Aviation Administration (MAA), or either of BWI Marshall and/or Martin State Airports as determined by the context. "Designer" refers to any entity commissioned to design and/or specify equipment described herein for construction and/or installation at any MAA facility or location within the BWI Marshall and/or Martin State Airports.

All permit applications shall be submitted to MDE/ARMA in conjunction with and only after approval by MAA's Division of Environmental Compliance. At project initiation, Designer must schedule an initial consultation with MAA's Division of Environmental Compliance to discuss permitting requirements for all new air emissions sources that are planned or proposed.

4.8.7.1 Permitting Requirements for Abrasive Blasting Operations

The MAA or tenant designer is responsible for obtaining an MDE/ARMA Air Quality Permit to Construct if they meet the regulatory definition of abrasive blasting operations, specifically dry abrasive blasting operations which are regulated under 40 CFR Part 63 (National Emissions Standards for Hazardous Air Pollutants [NESHAPs]), Subpart XXXXXX. Entities potentially affected by NESHAP Subpart XXXXXX at MAA include owners or operators of an area source (see Section 4.8.6.1 for definition of area source) that is primarily engaged in the operations in one of the following source categories: (1) Fabricated Metal Products; (2) Industrial Machinery and Equipment Finishing Operations; and (3) Valves and Pipe Fittings. More specifically, NESHAP Subpart XXXXXX applies to area sources in these source categories that use or have the potential to emit compounds of cadmium, chromium, lead, manganese, or nickel from metal fabrication or finishing operations.

Neither BWI Marshall nor Martin State Airports are primarily engaged in the operations of any of the nine source categories listed in this subpart; therefore, the regulations of NESHAP Subpart XXXXXX may not be applicable. However, obtaining a permit to construct for abrasive blasting operations in MD predates the promulgation of Subpart XXXXXX, therefore, a permit to construct may still be required. In addition, there may be tenant operations that require compliance with NESHAP Subpart XXXXXX. Tenant operations are commonly not included in the facility's permit because they are considered under separate ownership and would be required to operate under separate permits. For example, equipment owned/operated by an airline would be permitted under the airline and compliance would be the responsibility of the airline and not MAA.

Abrasive blast cleaning equipment using a suspension of abrasive in water is exempt from obtaining a Permit to Construct per COMAR §26.11.02.10O(1). Furthermore, per COMAR §26.02.07.03, open abrasive blasting for the abatement of lead-containing substances (i.e., lead-based paint) is prohibited.

4.8.7.2 Design Guidelines for Abrasive Blasting Operations

Particulate matter (PM) and (particulate) HAPs are typically emitted from abrasive blasting operations. These emissions are dependent on both the abrasive material and the targeted surface. COMAR Title 26, Department of the Environment, Subtitle 11, Air Quality, regulates visible emissions (VEs), as well as PM emissions. The designer must ensure that the abrasive blasting operation:

- Does not cause or permit the discharge of emissions from any installation or building, other than water in an uncombined form, which is visible to human observers as required under the general provisions in COMAR 26.11.06.02.C.
- Does not cause or permit to be discharged (from a confined source) into the outdoor atmosphere from any other installation, PM in excess of 0.03 gr/SCFD (68.7 mg/dscm) as required by COMAR 26.11.06.03.B(2). Confined sources are defined as installations that discharge into the atmosphere through a stack, duct, hood, flue, or other conduit.
- Does not cause PM emissions to be emitted from unconfined sources without taking reasonable precautions (i.e., installation and use of hoods, fans, and dust collectors to enclose, capture, and vent emissions) to prevent PM from becoming airborne. Unconfined sources are defined as installations that cause emissions which are not enclosed in a stack, duct, hood, flue, or other conduit but which escape into the atmosphere through openings such as windows, vents or doors, ill-fitting closures, or poorly maintained equipment.

- Does not cause or permit any material to be handled, transported, or stored, or a building, its appurtenances, or a road to be used, constructed, altered, repaired, or demolished without taking reasonable precautions to prevent PM from becoming airborne.

4.8.8 Stationary Welders Permitting Process

For the purposes of this section and all subsequent subsections, “Owner” refers to the Maryland Aviation Administration (MAA), or either of BWI Marshall and/or Martin State Airports as determined by the context. “Designer” refers to any entity commissioned to design and/or specify equipment described herein for construction and/or installation at any MAA facility or location within the BWI Marshall and/or Martin State Airports.

All permit applications shall be submitted to MDE/ARMA in conjunction with and only after approval by MAA’s Division of Environmental Compliance. At project initiation, Designer must schedule an initial consultation with MAA’s Division of Environmental Compliance to discuss permitting requirements for all new air emissions sources that are planned or proposed.

4.8.8.1 Permitting Requirements for Stationary Welders

In addition to dry abrasive blasting operations, welding operations that use materials that contain metal fabrication or metal finishing HAPs (MFHAPs) or have the potential to emit MFHAPs and use 2,000 pounds or more per year of welding rod containing one or more MFHAP (calculated on a rolling 12-month basis) are also regulated under 40 CFR Part 63 (National Emissions Standards for Hazardous Air Pollutants [NESHAPs]), Subpart XXXXXX – Nine Metal Fabrication and Finishing Source Categories Applicability and Compliance Dates. However, as explained in Section 4.8.7.1, neither BWI Marshall nor Martin State Airports are “primarily engaged” per §63.11522 in the operations of any of the nine source categories listed in this subpart; therefore, the regulations of NESHAP Subpart XXXXXX are not applicable.

Welding equipment powered by stationary compression ignition (CI) internal combustion engines (ICE) is subject to the requirements of 40 CFR Part 60 (New Source Performance Standards [NSPS]), Subpart IIII – Stationary Compression Ignition Internal Combustion Engines. Refer to Section 4.8.3.3 for permitting requirements for CI ICEs.

Stationary welders would be permitted as process equipment and would require an *Application for Processing or Manufacturing Equipment* (Form 5) to be submitted to MDE to obtain a permit to construct and operate prior to construction. Form 5 can be found on the MDE website at:

<http://www.mde.state.md.us/programs/Permits/AirManagementPermits/PermitstoConstructandOperate/Pages/index.aspx>

It should be noted that portable welding equipment is exempt from obtaining an Air Quality Permit to Construct per COMAR §26.11.02.10G.

Maryland also has air toxics requirements under COMAR 26.11.15 that may apply to welding equipment. Under this regulation, any source that emits a Class I or Class II toxic air pollutant (TAP) into the atmosphere must demonstrate that those emissions do not endanger public health and that the emissions are being reduced through the implementation of control technology.

4.8.8.2 Design Guidelines for Stationary Welders

Welding equipment powered by stationary compression ignition (CI) internal combustion engines (ICE) is subject to the requirements of 40 CFR Part 60 (New Source Performance Standards [NSPS]), Subpart IIII – Stationary Compression Ignition Internal Combustion Engines. Refer to Section 4.8.3.4 for NSPS, Subpart IIII applicability and requirements.

4.8.9 Parts Washers and Degreasers Permitting Process

For the purposes of this section and all subsequent subsections, “Owner” refers to the Maryland Aviation Administration (MAA), or either of BWI Marshall and/or Martin State Airports as determined by the context. “Designer” refers to any entity commissioned to design and/or specify equipment described herein for construction and/or installation at any MAA facility or location within the BWI Marshall and/or Martin State Airports.

All permit applications shall be submitted to MDE/ARMA in conjunction with and only after approval by MAA’s Division of Environmental Compliance. At project initiation, Designer must schedule an initial consultation with MAA’s Division of Environmental Compliance to discuss permitting requirements for all new air emissions sources that are planned or proposed.

4.8.9.1 Permitting Requirements for Parts Washers and Degreasers

Designers should consider the use of non-solvent based parts washers and degreasers whenever practicable. Alternative non-solvent based (citrus-based or microbial cleaning agents) parts washers and degreasers do not require permitting and will reduce air emissions at MAA and tenant owned facilities. If an alternative non-solvent based parts washer and/or degreaser cannot be installed, the Division of Environmental Compliance must be notified.

Cold and vapor degreasing and the control of VOC emissions is covered under COMAR 26.11.19.09 and specifies requirements for the use of VOC degreasing material. Specifically, the regulation prohibits the use of any VOC degreasing

material that exceeds 1mm Hg at 20 degrees Celsius (0.019 psia). In addition, a person may not use VOC degreasing material in vapor degreasing unless the vapor degreasing is equipped with a condenser or a pollution control device with an efficiency of not less than 90%. This regulation also provides provisions for good operating practices and there is no requirement for a permit to construct. A person subject to COMAR 26.11.19.09 may not use a halogenated substance that is a VOC in any cold degreasing. The use of halogenated solvents is not recommended to avoid the stringent requirements set forth in 40 CFR Part 63, Subpart T.

It should be noted that unheated volatile organic compound (VOC) dispensing containers or unheated rinsing containers (i.e., parts washers) of 60 gallons (227 liters) capacity or less are exempt from obtaining an Air Quality Permit to Construct per COMAR §26.11.02.10M.

4.8.9.2 Design Guidelines for Parts Washers and Degreasers

The designer must ensure that cold and vapor degreasing machines meet the standards set forth in COMAR 26.11.19.09 and are equipped with a condenser or pollution control device with an efficiency of at least 90%. In addition, the Designer shall ensure compliance with the other VOC control requirements by maintaining good operating practices such as ensuring all parts washers and degreasers are equipped with covers, lids, or other methods of minimizing evaporative losses. Designers should also ensure that each parts washer and degreaser includes a sign with the good operating practices established and displayed to all operators.

4.8.10 Snow Melters and Portable Emission Units Permitting Process

For the purposes of this section and all subsequent subsections, “Owner” refers to the Maryland Aviation Administration (MAA), or either of BWI Marshall and/or Martin State Airports as determined by the context. “Designer” refers to any entity commissioned to design and/or specify equipment described herein for construction and/or installation at any MAA facility or location within the BWI Marshall and/or Martin State Airports.

All permit applications shall be submitted to MDE/ARMA in conjunction with and only after approval by MAA’s Division of Environmental Compliance. At project initiation, Designer must schedule an initial consultation with MAA’s Division of Environmental Compliance to discuss permitting requirements for all new air emissions sources that are planned or proposed.

4.8.10.1 Permitting Requirements for Snow Melters and Portable Emission Units

According to MDE, temporary/portable snow melters are not required to be permitted at this time. However, based on the size of the units, the snow melters

may be subject to federal requirements under 40 CFR Part 60, Subpart Dc. Subpart Dc applies to small industrial-commercial-institutional steam generating units built after June 9, 1989 and with a heat input capacity between 10 MMBtu/hr and 100 MMBtu/hr. The rule requires that daily fuel use be recorded and kept on site and that notification of construction (purchase of snow melter) and startup be submitted to EPA. In addition semi-annual fuel reports should be submitted to EPA identifying the sulfur content of the fuel and excess emissions reports shall also be submitted if applicable. Since the snow melters would be applicable to Subpart Dc, snow melters that are permanently stationed at the facility are subject to a permit to construct and would need to follow the same permitting requirements set forth above in section 4.8.3.3 according to their size.

4.8.10.2 Design Guidelines for Snow Melters

Snow melters with a heat input capacity between 10 MMBtu/hr and 100 MMBtu/hr shall meet the requirements of Subpart Dc as set forth above. The Owner shall be responsible for recordkeeping and reporting requirements under this rule.

4.8.11 Heating, Ventilation and Air Conditioning (HVAC) and Fire Suppression Equipment Containing Ozone Depleting Substances (ODS)

4.8.11.1 Requirements for HVAC Equipment Containing ODS

HVAC equipment containing refrigerants identified as ODS or fire suppression equipment containing Halon is subject to the monitoring, recordkeeping and reporting requirements of 40 CFR Part 82 – Protection of Stratospheric Ozone, Subparts F and H. This equipment is not subject to permitting by MDE. Part 82 includes requirements to have certified technicians to perform maintenance on HVAC equipment and prohibits the intentional venting or release of Class I and Class II ODS and their substitutes into the atmosphere. In addition, there are specific requirements for leak detection and repair for units containing more than 50 pounds of refrigerant per circuit and all recovery/recycling equipment used must be EPA approved. The sale of ODS is limited to certified technicians and purchases must be recorded and kept on site along with service records for the equipment.

4.8.11.2 Design Guidelines for HVAC Equipment

In order to comply with all of the requirements set forth above, it is imperative that the purchase/installation of any new HVAC equipment is reported to MAA's Division of Environmental Compliance immediately so that the Owner can ensure continuing compliance with these regulations. The Designer shall provide the manufacturer, model, serial number, refrigerant type, capacity (full charge), number of circuits, and the charge per circuit for any new HVAC equipment purchased. No permitting is required for this type of equipment.

4.9 FAA COORDINATION

4.9.1 Radar Reflectors

The FAA has installed radar reflectors throughout the airfield as part of the surface detection system. All contract documents at BWI Marshall Airport shall include the locations of radar reflectors. Radar reflector locations and removal/replacement requirements shall be coordinated with the FAA at 410-859-7252.

4.10 DESIGN PHASES AND SUBMITTAL REQUIREMENTS

For projects designed for MAA Office of Design & Construction, the following information shall be submitted as part of the required percentage design submittal. Exceptions to the submittal requirements must be approved by the MAA Project Manager.

4.10.1 Programming and Schematic Design Submittal

4.10.2 Design Development (30% Review) Submittal

4.10.2.1 Drawings

- Specifications – Table of Contents
- Cost Estimate
- Draft Design Report and Calculations
- Preliminary Phasing and Security Concerns
- Sole Source Items

4.10.3 Construction Documents (60% Review) Submittal

4.10.3.1 Drawings

- Technical Provisions and Specifications
- Cost Estimate
- Final Draft Design Report and Calculations
- Extra Materials (MROI) List

4.10.4 Construction Documents (100% Review) Submittal

4.10.4.1 Drawings

- Technical Provisions and Specifications
- Cost Estimate
- Final Design Report and Calculations

4.10.5 Bid Documents

4.10.5.1 Final Drawings

- Final Technical Provisions and Specifications
- Final Cost Estimate

4.10.6 Professional Engineer Titleblock Rules

Effective July 2, 2007, a professional engineer is required to include the following additional certification when signing and sealing plans, specifications, drawings, reports, and other documents for projects at BWI Thurgood Marshall and Martin State Airports.

“Professional Certification. I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland, License No. _____, Expiration Date: _____.”

The title block, certification, seal, and signature shall appear close to each other.

4.10.7 Electronic Non-CAD Document Deliverable Requirements

The following requirements should be used for preparation and delivery of all non-CAD related electronic documents for projects at BWI Marshall and MTN airports. This serves to outline the requirements, and the formats for delivery of Architectural, Engineering, and Construction non-CAD documents, as well as any document, which is submitted to MAA’s Office of Design & Construction in an electronic format.

The database structure mandates that the format of delivered electronic media should be strictly adhered to. Following are the specifications which apply to the submission of reports, tasks files and specifications:

Reports:

Electronic reports are to be submitted once the task manager has approved the final report. Interim submittals are only required if the duration of the project/task is longer than 90 days and substantial information is available. The final report will be submitted in a bound hardcopy format, as well as electronically in Portable Document Format (PDF) and editable electronic format (i.e. MS Word).

If a task carries more than one report, they will have to all appear as individual files on the submitted CD.

Each CD will include a CD cover and label with the following information (the word files for the standard CD label and CD cover are provided with the CAD Standards):

- Contract or Task No MAA-CO-XX-XXX or Task XXXX.XX
- Contract/Task Title: _____
- Report/Document Title: _____
- Consultant Name and Address: XXXXXXXXXXXXXXX
- **Airport Logo:** BWI Marshall and/or MTN AIRPORT
- **Submittal Type and Submittal Date:** MONTH, DAY, YEAR
- File Formats:
- CD Prepared Date
- CD # / Total in Set: X or XX

Please note that generally task numbers may be attributed to reports, however in the case that a contract number is assigned to a task, that number will need to be denoted on the label.

The root directory of the delivered CD should contain a text file named ReadMe.txt that repeats the information contained on the label as well as the following:

- Contact information for the individual responsible for submitting the document(s).
- Brief explanation of CD directory structure if subdirectories are used.
- Any other comments necessary to convey the contents of the CD.

Final Task File:

Task files are to be prepared of all pertinent letters, memos, and e-mails relating to any individual task. These should all be categorized and arranged in directories and sub directories as follows:

- Task/Subtask XXXX.XX
 - Proposals
 - Construction Cost Estimates
 - Schedules
 - Meeting Minutes
 - Permits
 - MDE
 - SHA
 - CRITICAL AREA
 - COUNTY
 - DNR
 - OTHER
 - FAA
 - Comments
 - 30%
 - 60%
 - 100%
 - Design report
 - Correspondence
 - Transmittals

- E-mails
- Letters/memos
- Reports
- Sketches/Exhibits
- Photos
- Presentations (PPT)
- Misc

Task file documents should be comprised of all received and sent documents relevant to the task. This should enable the recreation of a complete history of the Task/Contract from its inception to its completion.

Each CD will include a CD cover and label with the following information (the word files for the standard CD label and CD cover are provided with the CAD Standards):

- Contract or Task No MAA-CO-XX-XXX or Task XXXX.XX
- Contract/Task Title: _____
- Report/Document Title: _____
- Consultant Name and Address: XXXXXXXXXXXXXXX
- **Airport Logo:** **BWI Marshall and/or MTN AIRPORT**
- **Submittal Type and Submittal Date:** **MONTH, DAY, YEAR**
- File Formats:
- CD Prepared Date
- CD # / Total in Set: X or XX

Task files should be submitted electronically on CD. The CD should contain a separate directory for each of the headings listed above. The root directory of the delivered CD should contain a text file named ReadMe.txt that repeats the information contained on the label as well as the following:

- Contact information for the individual responsible for submitting the document(s)
- Any other comments necessary to convey the contents of the CD

Meeting Minutes:

Meeting minutes must be transmitted shortly after each meeting following the template and format set by the MAA. Status meeting minutes may be submitted in electronic format by e-mail. Quarterly the status meeting minutes should be compiled on one CD and submitted to the MAA task manager.

Each CD will include a CD cover and label with the following information (the word files for the standard CD label and CD cover are provided with the CAD Standards):

- Consultant: XXXXXXXXXXXXXXX
- **Status meeting Period:** **XX/XX/XXXX - XX/XX/XXXX**
- **Submittal Date:** **MONTH, DAY, YEAR**
- No. of Documents: XX
- CD # / Total in Set: X or XX

The root directory of the delivered CD should contain a text file named ReadMe.txt that repeats the information contained on the label as well as the following:

- Contact information the individual responsible for submitting the document(s)
- Brief explanation of CD directory structure if subdirectories are used
- Any other comments necessary to convey the contents of the CD

Specifications:

Engineering specifications usually accompany a CAD document, and could be part of a 30%, 60% or a 100% submittal. These submittals are mandated by the individual task managers and will also include a hardcopy for distribution purposes. The electronic version of the specifications can be transmitted via e-mail to the respective Task Manager and will be included in the final Task File CD, as specified above.

At the bid-set submittal, a CD must accompany the submitted hardcopy documents. This CD will contain the electronic format of the specifications. This CD is in addition to any pertaining CAD document which will be delivered separately.

Each CD will include a CD cover and label with the following information (the word files for the standard CD label and CD cover are provided with the CAD Standards):

- Contract or Task No MAA-CO-XX-XXX or Task XXXX.XX
- Contract/Task Title: _____
- Report/Document Title: _____
- Consultant Name and Address: XXXXXXXXXXXXXXXX
- **Airport Logo:** **BWI Marshall and/or MTN AIRPORT**
- **Submittal Type and Submittal Date:** **MONTH, DAY, YEAR**
- File Formats:
- CD Prepared Date
- CD # / Total in Set: X or XX

The root directory of the delivered CD should contain a text file named ReadMe.txt that repeats the information contained on the label as well as the following:

- Contact information for the individual responsible for submitting the document(s).
- Brief explanation of CD directory structure if subdirectories are used.
- Any other comments necessary to convey the contents of the CD.

General Requirements:

All Documents should be supplied in the following formats:

1. All Deliverables will be provided to MAA on CD R or CD R/W with the session closed to ensure maximum cross platform readability.
2. Each CD back cover will include an index, or table of contents, indicating list of documents, Title of document, and type of document (format, i.e., .doc, .xls, .pdf, etc.)
3. Each CD will include a computer generated CD cover and label containing all relevant information as discussed above for each category

4. All CDs with multiple files must be hyperlinked with a table of contents which will open individual related documents.
5. As required documents pertaining to a contract shall be provided in a folder structure with the main folder named with the contract or task number and the subfolders named by discipline or category.
6. All related files should be included, in itemized and properly labeled folders and subfolders.
7. The native format in which the document is created (i.e. doc, .xls, .tiff, etc.)
8. All documents shall also be provided in Portable Document Format (PDF), noting the following guideline:
 - Multiple page documents should be outputted in PDF as one electronically bound document (not as individual PDF pages)
 - Resolution of scanned documents must enable reproduction of the original document without loss of clarity and definition, not less than 200 dpi.
 - Color pages and large size inserts must be scanned as such enabling the reproduction of the document in its original form, as part of the main document
9. Submitted electronic files should not be compressed (i.e. ZIP).
10. Electronic deliverables (e-mails and CDs) must be virus free.
11. A task is considered closed or complete when the task manager has closed the task and final payment has been made.
12. All CAD deliverables are as currently mandated per the MAA CADD Standards.
13. Refer to the standard for CD label and CD case front and back cover design template.

4.10.8 Identification and Reporting of Confined Spaces during the Design Process

MAA requires that the creation of confined spaces resulting from the design of new facilities be minimized. The Designer shall identify and report all possible new confined spaces during the design process, so that informed consent can be obtained from MAA. This MAA Design Standard provides guidance to Designers related to potential new confined spaces.

The Designer shall be familiar with the MAA Confined Space Entry Program and requirements of the Occupational Safety and Health Administration (OSHA) Standard for Permit-Required Confined Spaces (29 CFR 1910.146), with the intent of minimizing the creation of new confined spaces, and especially permit-required confined spaces, during the design process. The Designer shall consider how the definitions for confined space and permit-required confined space apply to the components and systems developed in the design process. If a confined space is anticipated to be created by the design, then the Designer shall present possible alternatives to its creation and identify possible design features that can be incorporated to minimize permit required confined spaces.

Any new confined spaces, including those which are necessary as a course of the design (e.g. telecommunication manholes, sewer manholes) shall be identified by the Designer in the 30% design submittal/design report. The Designer shall include a section in the

report dedicated to confined spaces. This section will identify each potential confined space and discuss the anticipated hazards associated with the confined space, including an evaluation of alternatives which resulted in the selection. For example, a confined space such as the dry well of a wet well/dry well sewage pump station could be anticipated to have hazards of hydrogen sulfide and methane gases which would make the dry well a permitted confined space.

However, the design could, at some additional cost to the project, include mechanical ventilation to reduce the classification to a non-permit confined space, in contrast, the confined space classification of the wet well would likely not benefit from any type of improvement investment. In this example, the design report would indicate both the wet well and dry well as permit controlled confined spaces. The designer would then provide narrative regarding the pros, cons and cost of designing the dry well to comply with the requirements of a non-permit confined space by the addition of adequate ventilation and instrumentation etc. and a statement that the wet well will not benefit from any investment. The Designer would then make a recommendation as to whether or not the improvements are warranted on a case by case basis.

The design shall include all necessary signs for confined spaces as applicable and practical. Whenever the design includes new permit controlled spaces, the Designer shall include in the design documents adequate signage for confined space notification in accordance with OSHA requirements.

As the design is developed through the 60% and 100% submittals, the Designer shall record in these submittals specific details, and an evaluation of alternatives based on development of the findings presented in the 30% design submittal/report.

See Section 6.3 for record drawing preparation requirements.

4.11 DRAWING REQUIREMENTS

All drawing submissions to MAA shall meet the requirements of the CAD Standards Manual contained in Appendix H. A CD of the CAD Standard is available. The CD contains a template which will facilitate conformance to the new CAD Standard. Copies of the CD and/or hardcopy of the document are also available by request to the Manager of Engineering at 410-859-7768.

4.11.1 GIS Standards

For all MAA Projects, verify with the MAA Project Manager during the proposal preparation phase if GIS is applicable to the project. For all Building Permit projects, the tenant or tenant designer shall verify with the MAA Building Permit Coordinator review committee if GIS is applicable to the project. All GIS data prepared for, delivered to, used within or distributed by MAA shall conform to the GIS standards and guidelines contained in Appendix I.

4.11.2 Standard Drawings

MAA has established certain drawings that shall be incorporated within all contract documents. They are found in Appendix C. The AutoCAD files for these drawings are also included with the Design Standard CD.

4.11.2.1 General Construction and Safety Notes at Baltimore/Washington International Thurgood Marshall Airport

To ensure accurate and consistent information is included with each plan set, all designers shall use the established General Construction and Safety Notes Sheets. There are three versions of the General Construction and Safety Notes. One version is for the work that impacts the Security Identification Display Area (SIDA). Any project that requires access into the SIDA shall include this version of the notes in the construction documents. A second version of the Notes is for projects that impact the Sterile Area of the Terminal Building. The Sterile Area is considered those areas that you pass through security to access, but does not include work on the SIDA, outside of the Terminal Building. The third version is for work that is not within the secure area of the Airport. Note that non-secure areas within the Airport's main Terminal Building and extending 300 feet from the non-secure (public-side) face of the main Terminal Building, as well as public areas within ten feet of the security perimeter fence are considered restricted public areas and have specific security requirements as identified in Specification Section 010005X. Note that the Hourly Garage is exempt from the restrictions for areas within 300 feet of the terminal building.

Each version of the notes has highlighted sections within it. These highlighted sections are to be reviewed and edited as appropriate for each project.

Any changes to the notes should be submitted to the MAA Office of Design & Construction so that the changes can be incorporated into a revised note standard.

4.11.2.2 General Construction and Safety Notes at Martin State Airport

To ensure accurate and consistent information is included with each plan set, all designers shall use the established General Construction and Safety Notes Sheets.

These highlighted sections are to be reviewed and edited as appropriate for each project.

Any changes to the notes should be submitted to the MAA Office of Design & Construction so that the changes can be incorporated into a revised note standard.

4.11.2.3 MDE Standard Erosion and Sediment Control Notes and Details

MAA has established Standardized Erosion and Sediment Control Notes, Details and Sequencing Sheets for use for all Consultants/Designers contracted directly or indirectly for MAA. These sheets will be the basis for all projects to ensure standardization of all Erosion and Sediment Control drawings being prepared for MAA projects.

Background:

The Erosion and Sediment Control Package has been assimilated for use for MAA projects at BWI Thurgood Marshall and Martin State Airports. The details used are from the Maryland Department of the Environment *1994 Maryland Standards and Specifications for Erosion and Sediment Control*. Vegetative Stabilization Notes used are from the *Specifications for Performing Landscaping Activities for the Maryland Aviation Administration (Latest Edition)*, prepared by the Maryland Aviation Administration Office of Environmental Planning.

These represent the most widely-used Erosion and Sediment Control devices for design. They include the following sheets:

- Erosion and Sediment Control Notes 1
- Erosion and Sediment Control Notes 2
- Erosion and Sediment Control Plan (Border Sheet)
- Erosion and Sediment Control Details I
- Erosion and Sediment Control Details II
- Erosion and Sediment Control Details III
- Erosion and Sediment Control Details IV
- Erosion and Sediment Control Details V
- Vegetative Stabilization Notes

Details and requirements for use are to follow the information and guidelines from the following sources:

1. The Maryland Department of the Environment *2011 Maryland Standards and Specifications for Erosion and Sediment Control*.
2. *Specifications for Performing Landscaping Activities for the Maryland Aviation Administration (Latest Edition)*, prepared by the Maryland Aviation Administration Division of Environmental Planning.
3. The *Maryland's Waterway Construction Guidelines* prepared by the Maryland Department of the Environment Water Management Division issued September 1999 and revised November 2000.
4. The *Maryland Erosion & Sediment Control Guidelines for State and Federal Projects*, by the Maryland Department of the Environment Water

Management Administration Published January 1990, Revised January 2004 or latest edition.

Instructions for Use:

The following information will guide the Consultant\Designer on the use of the standardized sheets.

General: The following information on all drawing sheets needs to be completed by the Designer:

- Key Plan is to match appropriate MAA Airport and Project Location showing drawing layout.
- MDE SF # when provided by MDE.
- Project Title.
- Contract No.
- Scale (if applicable).
- Date.
- Sheet No.
- Designed.
- Drawn By.
- Checked.
- Any Revision No., Revision Dates and Revision Descriptions as necessary.

Title Sheet:

The following information needs to be completed by the Designer for BWI Marshall and MTN Airports on their respective Title Sheets:

- Project Title
- Contract Number
- AIP No. (if applicable) [AIP No. is provided for federally funded projects and shall be obtained from the MAA Director of Capital Programs]
- Site and Vicinity Maps are to match appropriate MAA Airport and Project Location
- Index of Drawings (if space is insufficient to list all drawings, use second sheet for Index of Drawings)
- Design Task Number
- Construction Task Number (if applicable) [This number generally applies to on-call construction contracts and may not be available at the time of bidding; however, the Designer shall include this number on record (as-built) drawing submissions]
- MDE SF No. (if applicable)
- Index of Drawings.
- Submission Type (30%, 60%, 90%, Bid, Conformed, Record, etc.)
- Date

Erosion and Sediment Control Notes I: This is a standard sheet used in the E/S package and therefore no additional changes are required to this sheet.

Erosion and Sediment control Notes II: Standard Erosion and Sediment Control Note 27 (Site Information): This information varies with each contract and should be completed by the Consultant.

A. Total Areas for the Facility represents the total area for each airport as follows:

BWI Marshall= 3,200 Acres
Martin State= 775 Acres

- B. Total Area of Project Site: Site Specific
- C. Area Disturbed: Equivalent to Limits of Disturbance (LOD).
- D. Area to be roofed or paved: Site Specific
- E. Total Cut: Site Specific
- F. Total Fill: Site Specific
- G. Off-Site Waste/Borrow Area Location: If a location has been provided within the plans refer to respective plan sheet(s). If a location has not been determined then add statement "TO BE DETERMINED".
 - Design Certification: Must be signed prior to MDE approval.
 - Owner's/Developer's Certification: To be signed by MAA personnel representative such as the MAA Project Manager.
 - As-Built Certification Statement: To be signed by the Contractor at completion of the project (for SWM facilities only)
 - Sequence of Construction: A general sequence of construction has been provided on the sheet for both an Initial and Final Phase for Erosion and Sediment Control. The designer is to provide the device information and a sequence at the locations where indicated "Consultant To List Devices Used On Plans Here" and "Consultant to Establish Sequencing Here"

Depending upon the complexity of the project, the Sequence of Construction shall be specific to the Construction Activity to take place. This may require additional line items which shall be numbered. Please note that on simplified projects a "Final Phase" may not be required. This will be determined on a project by project basis.

Erosion and Sediment Control Plan(s):

- These plans will be specific for each project and may include more than one plan. Scales should meet MAA requirements.
- The Sediment Control Legend is to remain on each plan sheet. Modifications can be made based upon project specifics and controls that are being used.
- In some instances more detailed Sequence of Construction may be provided on these sheets as necessary.

- Standard Erosion and Sediment Control Note 27 (Site Information): This information varies with each contract and should be completed by the Consultant.

Erosion and Sediment Control Details 1-8:

- Several sheets have been provided for use. The designer is to use only the details required for the specific project. Other details not used may be removed.
- If new or unique details are required, the designer may add them to the detail sheet. Final approval for use will be made by MDE.
- Any details not shown on these sheets and/or new details being provided should be provided to MAA for incorporation into the standardized sheets for future distribution.

Vegetative Stabilization Notes:

- This sheet reflects the information from the *Specifications for Performing Landscaping Activities for the Maryland Aviation Administration* and therefore no changes are required. However, if additional requirements are determined above and beyond requirements on this sheet, changes should be made to reflect these requirements.

Additional Drawings:

- If required, the Consultant/Designer may be required to provide additional Plan, Detail, Note, and Sequencing sheets based upon complexity and size of the project.

4.11.3 Stormwater Management Plans

In accordance with MDE, Stormwater Management Plans shall include As-Built Tabulations for new Stormwater Management Plan submittals. Tabulations and certification required by the designer and contractor are available on MDE's website. The contract documents shall state that the contractor is responsible for surveying and obtaining the as-built quantities for the table once construction has been completed.

4.11.4 Standard Survey Sheet

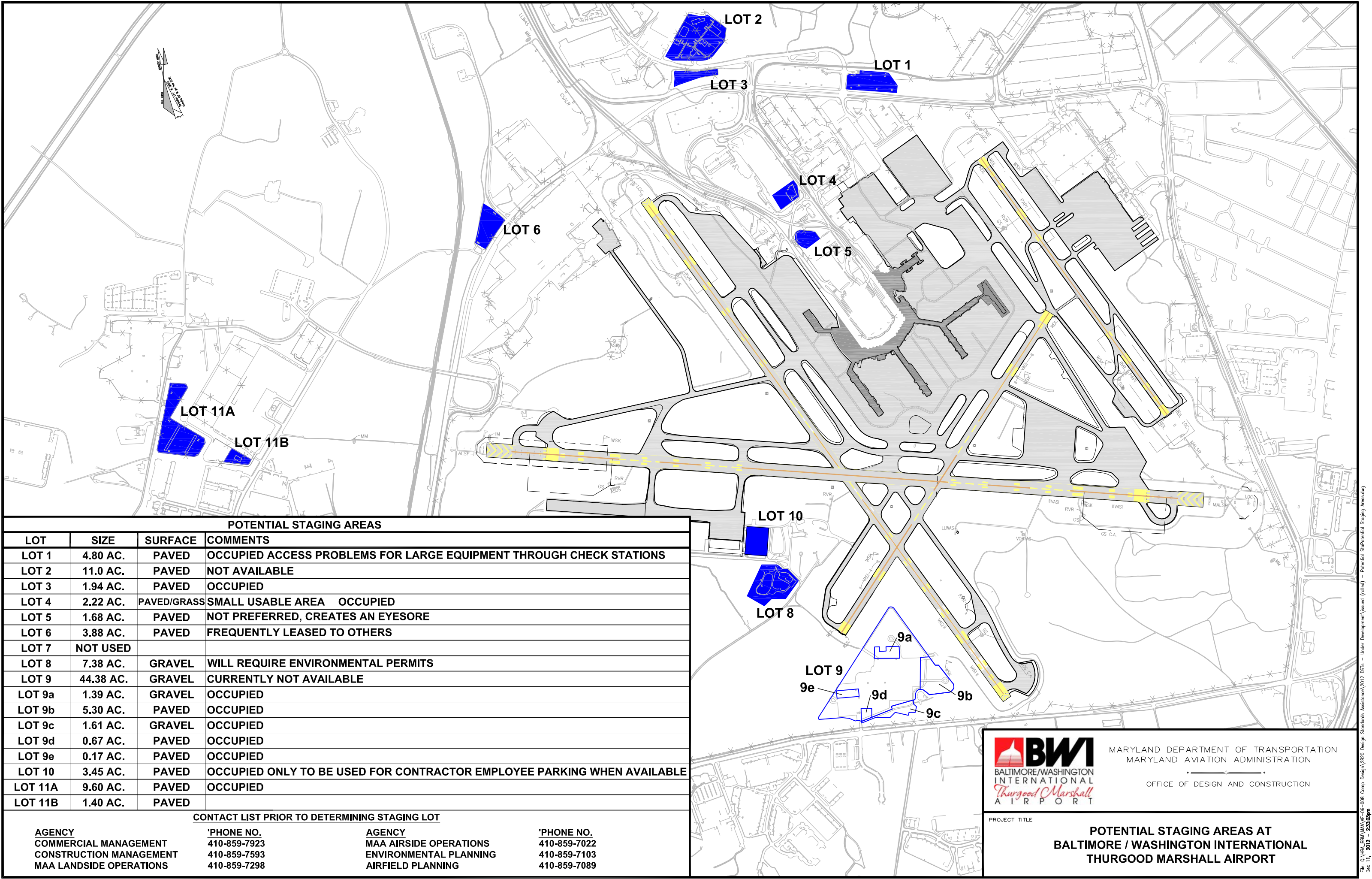
The MAA has established standard survey control for both BWI Marshall and Martin State Airports (please refer to Section 8.1.1). All drawing sets are required to include the Standard Control Drawing contained in Appendix E.

4.11.5 Quantity Sheet for FAA Projects


A Quantities Sheet is required for all federally funded projects. The Quantities Sheet shall identify federally and non-federally funded quantities.

4.11.6 Construction Staging Areas

The consultant shall identify construction staging areas within the contract documents. The designer shall coordinate on-site and off-site staging areas with the MAA Project Manager and consult each agency identified on the map to confirm the availability and applicability of the proposed on-site and off-site staging area(s). On the following page is a graphic map depicting available areas for use as off-site staging areas. The graphic includes available lot size, an indication as to whether the lot is paved and brief



POTENTIAL STAGING AREAS			
LOT	SIZE	SURFACE	COMMENTS
LOT 1	4.80 AC.	PAVED	OCCUPIED ACCESS PROBLEMS FOR LARGE EQUIPMENT THROUGH CHECK STATIONS
LOT 2	11.0 AC.	PAVED	NOT AVAILABLE
LOT 3	1.94 AC.	PAVED	OCCUPIED
LOT 4	2.22 AC.	PAVED/GRASS	SMALL USABLE AREA OCCUPIED
LOT 5	1.68 AC.	PAVED	NOT PREFERRED, CREATES AN EYESORE
LOT 6	3.88 AC.	PAVED	FREQUENTLY LEASED TO OTHERS
LOT 7	NOT USED		
LOT 8	7.38 AC.	GRAVEL	WILL REQUIRE ENVIRONMENTAL PERMITS
LOT 9	44.38 AC.	GRAVEL	CURRENTLY NOT AVAILABLE
LOT 9a	1.39 AC.	GRAVEL	OCCUPIED
LOT 9b	5.30 AC.	PAVED	OCCUPIED
LOT 9c	1.61 AC.	GRAVEL	OCCUPIED
LOT 9d	0.67 AC.	PAVED	OCCUPIED
LOT 9e	0.17 AC.	PAVED	OCCUPIED
LOT 10	3.45 AC.	PAVED	OCCUPIED ONLY TO BE USED FOR CONTRACTOR EMPLOYEE PARKING WHEN AVAILABLE
LOT 11A	9.60 AC.	PAVED	OCCUPIED
LOT 11B	1.40 AC.	PAVED	
CONTACT LIST PRIOR TO DETERMINING STAGING LOT			
AGENCY	'PHONE NO.	AGENCY	'PHONE NO.
COMMERCIAL MANAGEMENT	410-859-7923	MAA AIRSIDE OPERATIONS	410-859-7022
CONSTRUCTION MANAGEMENT	410-859-7593	ENVIRONMENTAL PLANNING	410-859-7103
MAA LANDSIDE OPERATIONS	410-859-7298	AIRFIELD PLANNING	410-859-7089



MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION

OFFICE OF DESIGN AND CONSTRUCTION

PROJECT TITLE

POTENTIAL STAGING AREAS AT
BALTIMORE / WASHINGTON INTERNATIONAL
THURGOOD MARSHALL AIRPORT

comments about the site. The consultant shall determine which lot to use as a staging area based upon the type of construction being proposed and the locality of the work.

If there is a requirement to modify or change the construction staging area after the contract documents are issued, the consultant shall follow the same procedures to identify, coordinate, and design additional construction staging areas.

4.11.7 Geotechnical Reports

When a geotechnical study is included in the scope of work for projects at BWI Marshall or Martin State Airports, the consultant shall comply with the following requirements for preparation and delivery of the geotechnical report:

The final geotechnical report shall be submitted in a bound hardcopy format, as well as electronically on a CD in bound Portable Document Format (PDF), and editable electronic format (i.e., MS Word).

If a task requires more than one report, each report shall be represented as an individual file on the submitted CD. Each CD will include a CD cover and label with the following information (the Word files for the standard CD label and CD cover are provided with the CADD Standards):

- Submittal Date
- Contract Number (if applicable)
- Contract Title (if applicable)
- Task Number
- Task Title
- Report/Document Title
- Consultant Name(s)
- Airport (BWI Marshall and/or Martin State)
- Submittal Type (Preliminary/Draft/Final)
- File Formats
- CD # and Volume

The root directory of the delivered CD should contain a text file named ReadMe.txt that repeats the information contained on the label as well as the following:

- Contact information for the individual responsible for submitting the document(s).
- Brief explanation of CD directory structure if subdirectories are used.
- Any other comments necessary to convey the contents of the CD.

4.11.8 Geotechnical Boring & Core Data

When a geotechnical study is included in the scope of work for projects at BWI Marshall or Martin State Airports, the consultant shall comply with the following requirements for preparation and delivery of geotechnical boring & core data:

A geotechnical boring/pavement core location CADD file shall be prepared in accordance with the requirements of the CADD Standards Manual contained in Appendix H. Geotechnical boring/pavement core GIS data shall be prepared in accordance with the requirements of the GIS Data Standards contained in Appendix I. The boring plan shall be prepared on a standard MAA border sheet.

Within the CADD file, each boring/core shall be included at the location where the boring/core was obtained and shall be attributed and annotated with the following information:

- a. Boring or Core Number (Boring/Core numbers shall be established as “MAA TASK NUMBER – BORING/CORE NUMBER”. For instance the fifth boring taken for MAA Design Task Number 2750.1 shall be labeled B-2750.1-5 on the drawing and on the associated boring log. The fifth pavement core for the same project shall be labeled C-2750.1-5.)
- b. Design Task Number
- c. Date the Boring/Core was taken
- d. Geotechnical Engineering firm responsible for the boring or core
- e. Coordinates and existing ground elevation of the boring

The boring and pavement core logs shall also be delivered to MAA as part of the Geotechnical Report submission described under Section 4.11.7. Additionally, each boring and pavement core log shall be submitted as individual files in Portable Document Format (PDF) and each file shall be titled with the boring or core number.

4.11.9 Construction Phasing Plans

Construction Phasing Plans shall be included for all landside tasks involving multiple phases of construction. Phasing plans shall include the following information, at minimum:

- Project Work Area (shaded/hatched) [phased work areas on the same plan sheet shall have different, distinguishable hatches, if applicable]
- Contractor access/haul routes
- Description of work
- Phase Durations and/or Total Task Duration
- Closures for roads or lanes of roads – this note shall also refer to the Maintenance of Traffic plan
- Work hours (if applicable)

- Liquidated damages if determined to be different than specified in the Comp Paving Technical Specifications

4.11.10 Maintenance of Traffic (MOT) Plans

Maintenance of Traffic (MOT) Plans are required when work requires road/lane closures. Road/Lane closures or roads otherwise impacted by the Task require approval by the agency having jurisdiction over said road; in most cases this is Maryland State Highway Administration (SHA) or the County (Anne Arundel County for BWI tasks, Baltimore County for MTN tasks.) All Tasks impacting roads, whether or not owned/maintained by the MAA, shall be coordinated with and approved by the Office of Terminal and Landside Operations.

For projects impacting SHA roads, the following SHA groups, at minimum, shall be coordinated with:

- Office of Traffic Safety (OOTS), for traffic signaling
- Office of Materials Technology (OMT), for materials testing
- District 5 Utility Permits, for any digging of utilities in Anne Arundel County
- District 4, for any digging of utilities in Baltimore County (MTN)

If MOT impacts SHA, Designers shall submit the plans and a “District Office Permit” application to the District Utility Engineer at SHA for approval. Upon approval, SHA will issue a District Office Permit. SHA does not return signed drawings upon approval.

4.11.11 Signature Requirements for Bid Set Construction Drawings

4.11.11.1 Designer of Record Signature Requirements

The drawing cover sheet shall be signed and sealed by a Maryland Licensed Design Professional (registered Professional Engineer or Architect) as the Designer of Record in the designated space. The Professional Certification shall be completed with the professional’s license number and expiration date in the designated space.

All plans in the plan set are to be signed and sealed by a Maryland Licensed Design Professional in the designated space within the title block. The Professional Certification shall be completed with the professional’s license number and expiration date in the designated space. Design Professionals shall only sign and seal plan sheets for which they are responsible for the design.

4.11.11.2 Office of Design and Construction Signature Requirements

All Tasks shall be signed by the Office of Design and Construction. Signatures from the Office of Design and Construction are only required on the drawing Cover sheet in the space provided.

4.11.11.3 Office of the Fire Marshal (OFM) Signature Requirements

The Fire Marshal must sign the drawing Cover sheet in the space provided for all Tasks.

Additionally, Life Safety plans are required to be signed by the Fire Marshal on a signature block provided on the drawing. If there are multiple Life Safety sheets, a signature is required on each individual sheet.

4.11.11.4 MTN Signature Requirements

The Cover sheet must be signed by the Martin State Airport Director in the space provided for all Tasks at Martin State Airport.

4.11.11.5 Additional Signature Requirements

Additional signatures may be required on plans in the plan set. Refer to the following DST sections for detailed requirements.

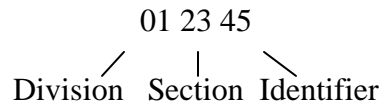
Security Bid Plan	Section 4.13
Construction Safety and Phasing Plan (CSPP)	Section 4.14
Erosion & Sediment Control Notes (Owner/Developer Certification)	Section 4.11.2.3

4.12 CONSTRUCTION SPECIFICATIONS

Technical Specifications shall be included in all construction documents prepared for the MAA. The designer should identify in writing to the MAA Project Manager (PM) inclusion of any special technical requirements in the contract specifications (i.e. pre-qualification for minimum years of experience, dollar value of past work, certifications, etc.; warranties, proprietary procurement, value engineering; etc.). MAA will approve the special requirements on a case-by-case basis.

4.12.1 Specification Format and Numbering

The MAA has adopted the American Institute of Architects (AIA) “MasterSpec®” building construction specifications system (MasterSpec), which incorporates the Construction Specifications Institute (CSI) MasterFormat™ Numbers and Titles. All specifications shall follow the MasterSpec standard six-digit numbering system:



A Table of Contents of MasterSpec divisions is included in Appendix D. Where no existing MasterSpec division or section exists, Designers shall use their best judgment to select a number to appropriately describe the item specified. All building contract specifications shall be developed using the current edition of MasterSpec.

Specifications shall generally implement the following format convention:

PART 1 – GENERAL

PART 2 –PRODUCTS

PART 3 – EXECUTION

PART 4 – METHOD OF MEASUREMENT

PART 5 – BASIS OF PAYMENT

Sections not used shall note “not used” in the body of the section.

4.12.2 MAA Standard Specifications

MAA has developed several Standard Specifications to be utilized on relevant contracts, which are included in Appendix D. MAA Standard Specifications include an “X” following its specification number. These specifications contain Notes to the Designer shown in shaded boxes, instructing the Designer to modify sections of the specification as necessary to suit the individual project. These notes and boxes shall be deleted once the note is addressed.

MAA standard procedural specifications are included as part of Division 01. Other MasterSpec Division 01 requirements must be closely coordinated with the MAA “Standard Provisions for Construction” and individual construction management requirements. Do not duplicate items in a Division 01 spec that are included in an MAA standard spec (i.e. Mobilization). MAA’s “Standard Provisions for Construction” address many of the MasterSpec Division 01 requirements, and will take precedence. Additional Division 01 items shall only be used to supplement and enhance the MAA “Standard Provisions for Construction Contracts.”

4.12.3 MAA Special Product Requirements

The MAA has developed specifications for several construction products for which special requirements and/or sole source procurement are required. On projects utilizing one or more of these products, the Designer shall include the referenced specification(s) from Appendix D in the Contract documents. For certain products, MAA has provided only a partial spec (i.e. Part 2 – Products only). Designer shall insert the provided specification language into the referenced spec section and complete the specification with information applicable to the project.

A list of products with MAA special requirements and their referenced spec sections are included in the list below. Note that additional product requirements may exist for each project, and the Designer shall coordinate with the MAA Project Manager to obtain those requirements to include in the project's Technical Specifications.

MAA Special Product Requirements

1. Door Hardware (Section 087100)
2. Building Automation Systems (BAS) (Section 230900)
3. Air Flow Monitoring System (in Meters and Gauges, Section 230519)
4. Flow Meters (in Meters and Gauges, Section 230519)
5. Power Monitors for Low Voltage Switchgear (Section 262300)
6. Panelboards (Section 262416)
7. Variable Frequency Drives (Section 262923)
8. Closed-Circuit Television (CCTV) System (Section 275400)
9. Controlled Access Security System (CASS) (Section 281301)
10. Fire Alarm System (Section 283111)
11. Flexible Response System (Section 283200)
12. Landscaping (Section 329000X)
13. Topsoil (Section 329115X)
14. Plant Installation (Section 329300X)
15. Seeding (Section 329201X)
16. Sodding (Section 329202X)
17. Mulching (Section 329203X)
18. Natural Gas Distribution (Section 335103X)
19. Passenger Boarding Bridges (Section 347713X)

4.12.4 Airfield Specifications

The Designer shall use the applicable FAA specifications for items located on the airfield which are subject to FAA review. These specifications can be found in the FAA

Advisory Circular AC 150/5370-10G – Standards for Specifying Construction of Airports. Note that several FAA specifications have been modified for MAA use, and are contained in the MAA Standard Specifications in Appendix D.

FAA Specifications shall be listed under “Division 50: FAA Specifications” in the Specifications Table of Contents. Each specification shall retain its FAA specification number for ease of FAA project review.

Example:

Division 50: FAA Specifications

L-109 Modifications and Additions to Airfield Lighting System

P-401 Plant Mix Bituminous Pavements

4.12.5 Landside Site Work Specifications

MAA has adopted the Maryland State Highway Administration (SHA) Standard Specifications for Construction and Materials for non-airfield roadway and site construction. The applicable SHA specification number may be referenced in “Part 3 – Execution” of the technical specifications for landside site work items, noting any modifications to the spec necessary for the specific project.

SHA specifications used on a contract shall be numbered using the six-digit convention below for continuity with the remaining project specifications using MasterSpec format.

Division 51: SHA Specifications

510XXX
Division / 3-digit SHA Spec No.

Example: 510508 for SHA Specification 508, Milling Hot Mix Asphalt Pavement

The current SHA Standard Specifications for Construction and Materials can be found on the SHA website, (www.roads.maryland.gov), or hard copies may be purchased by contacting:

Maryland State Highway Administration, Cashier Office
211 E. Madison Street
Baltimore, Maryland 21202
Telephone: 410-545-8490

MAA Standard Provisions (SP) will be used in lieu of the SHA’s General Provisions (GP) and Terms and Conditions (TC) provided in this document.

SHA Section 700 – Landscaping and Section 920 – Landscaping Materials are not to be used. Landscaping and Landscaping Materials for MAA construction projects are included in Appendix D.

4.12.6 Miscellaneous Specification Requirements

1. All contract milestones shall be specified in calendar days from NTP. Specifying specific dates must be approved by the MAA PM.
2. All incentives must be approved by the MAA PM.
3. Sole source and proprietary items, other than those specified by the MAA standard specifications and special product requirements contained in Appendix D, must be approved by the MAA PM.
4. Performance specifications which require the contractor to design/build shall be identified and brought to the attention of the MAA PM. The designer should provide justification for using this method.
5. Specifications which require pre-qualification of contractors and suppliers (i.e. the number of years providing specific products or services, previous project experience etc.), should be identified and brought to the attention of the MAA PM. The designer should provide justification for pre-qualification requirements.
6. Specifications which have specific warranty/maintenance requirements beyond the MAA standard of one year shall be identified. The designer should provide justification for extended/additional warranty maintenance requirements.
8. The designer shall provide to the MAA PM written documentation outlining the basis for liquidated damages. The documentation shall be provided prior to the advertisement submittal.

4.13 SECURITY PLAN AND SPECIFICATION REQUIREMENTS

4.13.1 Security Specification (010005X) at BWI Marshall

Construction projects at BWI Marshall that require work in the following locations shall include the standard specification 010005X, Security Requirements During Construction, unless otherwise noted.

- Within the secure identification display area (SIDA)
- Inside the terminal building
- Within 300 feet from the face of the terminal building
- Within 10 feet of the security fence.

The 010005X specification shall be included in its entirety. Designers shall edit/tailor the “Project Specific Requirements” and the “Method of Measurement” sections of the specification to comply with each project’s security requirements. This specification has been reviewed and approved by the Office of Airport Security (OAS) and shall not be modified, except where noted, unless approved by the OAS.

4.13.2 Security Plan

For projects at BWI Marshall meeting the criteria state above, a Security Bid Plan (SBP) with notes shall be prepared as a standard drawing with notes as part of the Contract documents and shall include the following:

1. Project specific security requirements coordinated in detail with Project Phasing
2. Project Phases and the duration of each phase.
3. Provision of an internal secure perimeter system where possible. Any materials required to establish the perimeter shall be detailed on the SBP and specified in Specification Section 010005X to ensure there is no confusion of pay items with Temporary Construction Items.
4. Guard locations.
5. Access points/SIDA entrance/security guard locations. The designer shall make note of anticipated processing times at access points, if any inspections should be anticipated, etc. The designer shall make note that the Contractor shall consider the processing time when computing his bid price for this item.
6. Delivery Routes
7. Identification of worksites and definition of geographical work areas.
8. Locations/phases where an escort from MAA Operations is required.
9. Any other job specific security items.
10. Signature Block on each sheet to be signed by the Director of Airport Security

The OAS shall review and approve all Security Bid Plans during design. If a changed security condition is proposed (i.e. security fence relocation), the Transportation Security Administration (TSA) requires a forty-five (45) calendar day review period of the SBP. Consider that more than one submittal may be required when scheduling the submittal.

Upon approval of the SBP by all parties, a meeting shall be set up with the OAS to obtain final signatures on the SBP to become part of the contract documents.

4.13.3 Security Specification (010006X) at MTN

All construction projects at MTN, whether airside or landside, shall include the standard specification 010006X, Security Requirements During Construction at MTN. The 010006X Specification for MTN is included in Appendix D.

Because security requirements at MTN are not as stringent, there is no direct payment for 010006X. Security requirements shall be considered incidental to Item 010004X, Temporary Construction Items or Division 01, General Requirements.

4.14 CONSTRUCTION SAFETY AND PHASING PLANS

Projects receiving funding from the Airport Improvement Program (AIP) or the Passenger Facility Charge (PFC) program must prepare a Construction Safety and Phasing Plan (CSPP). All CSPP shall be prepared in accordance with the latest FAA Advisory Circular, 150/5370-2 and approved and signed by the Director of Airport Operations for BWI Marshall Projects and the Chief of Airport Operations at Martin State Airport for all MTN projects. The document shall be prepared based on a joint effort between MAA Operations, the ATCT, MAA Office of Design and the Designer.

4.14.1 CSPP Review Checklist

4.14.1.1 Drawings

Construction Safety and Phasing Plans shall be submitted for FAA review as outlined in Section 4.2. The Designer shall attach Construction Safety and Phasing Plan Review Checklist from AC 150/5370-2, current edition, to the drawings. The checklist is also included in Appendix B.

The following information needs to be completed by the Designer for BWI Marshall and MTN on their respective Construction Safety and Phasing Plans:

- Airport Name/LOCID/Associated City
- State
- AIP No. (Include if available)
- Date
- Signature block for Operations
- Checkmark for addressed items (Yes, No, N/A)
- Comments, special conditions, other (if applicable; If there are no additional comments, remove the Additional Comments from the sheet.)

4.14.1.2 Design Reports/Narrative

If applicable to the project, the Designer shall include an 8.5x11 copy of the Construction Safety and Phasing Plan Review Checklist (located in Appendix B), and “additional comments, special conditions, others” in all submissions of the design report. The information included should be identical to what is on the Construction Safety and Phasing Plan Review Checklist drawing sheet. The design report and narrative may be the same, and shall include (at a minimum) the information required in FAA AC 150/5370-2, current edition. Aside from the

required information, any information related to BWI/MTN unique operations should be included in the respective narratives.

The following information needs to be completed by the Designer for BWI Marshall and MTN on their respective Construction Safety and Phasing Plans and the information included in the design report:

- Airport Name/LOCID/Associated City
- State
- AIP No. (Include if available)
- Date
- Checkmark for addressed items (Yes, No, N/A)
- Comments, special conditions, other (if applicable; If additional space is required, provide additional sheets titled “Additional Comments”)

4.14.2 Design Progress Milestones

As design progresses, an effort shall be made to meet with the construction manager (CM) at the 60% level (or whenever the CM is selected) to review the phasing sequence and constructability of the project. The CM should agree in principal on the construction phasing prior to the pre-bid meeting. Meeting minutes will be adequate to determine at least one meeting has been held with the CM and preliminary consensus has been achieved. Once the design has stabilized (or the 90% level), the designer shall engage FAA in the SMS/SRM process. This process involves a detailed presentation (PPT format) of the phasing to a selected FAA panel.

4.14.3 Sample CSPP

FAA AC 5370-2F (www.faa.gov) has sample CSPP plans that the FAA suggests using as a guide. Seven (7) full-size copies of the MAA-approved CSPP, narrative and applicable specifications shall be submitted to the MAA planning department for distribution to the FAA-WADO for final distribution/review.

4.14.4 Specific Design Requirements

4.14.4.1 Placement of Construction Barricades

CSPP shall require that no spaces be permitted between adjacent barricades.

4.15 COST ESTIMATING

4.15.1 Development of Cost Estimates

Since the MAA utilizes various funding sources for construction projects, the following procedure outlines the requirements for development of construction cost estimates, and

supplemental requirements for preparation of quantity plan sheets, tabulation of bids and bid forms.

1. "Design Contingencies" should be included in all construction cost estimates. The percentages should be determined by the design consultant for the individual project components and should be higher for early budget estimates and decreased as the design progresses. The final Engineer's Estimate should not have any design contingency.
2. In addition to the design contingencies discussed above, all estimates should have a "Miscellaneous Work Allowance" added after the subtotal to account for change orders. The amount of Miscellaneous Work Allowance has generally ranged between five (5) and ten (10) percent but should be coordinated with the MAA Project Manager.
3. All estimates shall include line items as described in the Security Requirements During Construction specification relating to the project (i.e., airside, terminal, MTN, etc.). Refer to the applicable Security Requirements During Construction specification in Appendix D for the basis of payment and method of measurement of specific line items when determining costs for the estimate.
4. Design contingencies and construction contingencies should be listed as separate line items.
5. Once a project component has been identified in the budget or subsequent estimates, it must be carried forward as a line item in all future estimates. When work is added to the project scope, an additional line item should be included in the estimate to cover that work. Back-up for each line item should be attached.
6. For projects with Federal (AIP) or PFC funding, eligible and non-eligible costs should be separated. For estimates with these costs, a narrative should be attached, briefly outlining which costs are non-eligible and why.
7. For unit price contracts, the quantities for the various line items with different funding sources should be calculated and shown separately in the Quantity plan sheets and Tabulation of Bids.
8. For lump sum contracts, language should be added in the bid forms requiring the Contractor to furnish MAA with a breakdown of the total bid into the project components as necessary to allow the determination of eligible and non-eligible costs under different funding sources.
9. All cost estimates shall be program costs which shall include both construction costs and soft (design and construction management) costs.

The MAA standard format for cost estimates should be used for preparing all estimates. It is found in Appendix B (The cost estimate form has been modified with the 2009 Design Standards). Percentages shown in the cost estimate form for contingencies, overhead and profit, etc. are samples. It is the designer's responsibility to select the correct percentage and apply the correct formulas within the spreadsheet.

4.15.2 Liquidated Damages

The designer shall provide to the MAA written documentation outlining the basis for liquidated damages. The documentation shall be provided prior to the advertisement submittal.

4.16 DESIGNATED SUB-CONTRACTOR BIDDING PROCEDURES

The Maryland Aviation Administration maintains several vendors under contract to provide design and installation services on specific systems at the airport. If a construction project requires participation of such a "Designated Sub-Contractor" on a project at Baltimore/Washington International Marshall and Martin State Airports, it shall be the designer's responsibility to coordinate and ensure the following:

- 1) Determine what existing airport systems are within the scope of the design and may require alteration. Coordinate with MAA to determine which systems have vendors under contract to provide alteration, maintenance, or similar services that would be required to be performed under the proposed design. A partial list of sample systems is provided below:
 - Fire Alarm System
 - Controlled Access Security System (CASS)
 - Closed Circuit Television System (CCTV)
 - Multi-User Flight Information Display System (MUFIDS) and Baggage Information Display System (BIDS)
 - Building Automation and Control (METASYS)
 - Distributed Antenna System (DAS)
 - Public Address System
 - Automated External Defibrillators (AED)
 - Flexible Response System
 - Wall Mounted Advertisement
 - Public Telephones
 - Parking Access and Revenue Control Systems (PARCS)
 - Air Navigation Systems (NAVAIDS)
 - Utilities (Gas, Power, and Communication)
 - Airfield Lighting Control System
 - Airlines (Equipment and Wiring Systems Owned by Airlines)
 - FAA (Equipment and Facilities Owned and Operated by FAA)
 - TSA (Equipment and Facilities Owned and Operated by TSA)

- Master Clock System
- Noise Monitoring and Analysis System
- Artificial Turf

In addition, the designer shall add a section to the Engineer's Report titled "Designated Sub-Contractors" and state whether the construction project requires participation of Designated Sub-Contractors. If so, the consultant shall identify and list the vendor(s) and the respective system(s) that are impacted under the project. The consultant shall include a summary of the scope of services and fee estimates received from vendor(s) in the referenced section of the Engineer's Report.

- 2) Coordinate, as necessary, the requirements of the design, the preparation of a scope of services to clearly define the work proposed, and the responsibilities of the owner, designer, contractor, and designated sub-contractor.
- 3) Verify with the Office of Procurement that Sole Source documentation is/is not required.
- 4) Reflect the scope and responsibilities in the contract documents.
- 5) Secure written final scope and cost proposal from the designated sub-contractor.
- 6) It shall be a requirement to have all final scope and cost proposals submitted to MAA from every vendor required for a given project prior to proceeding with advertisement. This requirement may be waived on a case by case basis with prior written approval of the MAA Task Manager.

4.17 MAINTENANCE, REPAIR AND OPERATING ITEMS (MROI)

Maintenance, Repair and Operating Items (MROI) were formerly known as "attic supplies" or "attic stock." During the design phase of a project, Designers shall coordinate with MAA to determine if MROI is required, and if so, the type and quantity items needed. Designers shall not specify MROI unless requested in writing by the MAA. MROI shall be included as an agenda item for discussion in the project's design review meetings. All projects requiring MROI shall include in the construction documents standard specification Section 010003X, Maintenance Repair and Operating Items. Section 010003X is included in Appendix D.

4.17.1 MROI Approval Form

Designers are required to fill out the "MROI Approval" form in Appendix B if the project includes MROI to be turned over to MAA. Items that are anticipated to be salvaged must be listed on the form and noted that it is a salvaged item. This list shall include:

- Applicable specification section of the item – this is not the Section 010003 that specifies MROI.

- Material/Product description – similar materials shall be listed together, e.g., carpet, ceiling tiles, ceramic tiles.
- Quantity – a specific quantity and measurable unit is required. A percentage of materials is not acceptable.
- Unit – SY, CY, Each, etc.
- Person Requesting – MAA employee or representative who requested the item.

All equipment turned over to MAA shall be accompanied by any and all operating/service/maintenance manuals, equipment specifications, and vendor information such as where obtained, spare part sources, etc.

The designer shall obtain necessary signatures on the “MROI Approval” form prior to advertisement. This form shall be included in the project’s final design report. If no Design Report is prepared for the project, a scanned copy of the signed “MROI Approval” form shall be emailed to the MAA Task Manager for inclusion in the task file.

4.17.2 Signature Requirements for MROI

A signature from the following MAA Offices shall be obtained for all “MROI Approval” forms:

- Office of Design and Construction – signed by MAA Task Manager
- Office of Capital Programs – signed by Director
- Office of Procurement – signed by Procurement Officer

If the MROI specified includes items requested by the Office of Maintenance & Utilities (OMU), then a signature from the Director/Deputy Director of OMU is required. If there are no items requested by OMU, then the Designer shall write “N/A” and initial the signature line for OMU confirming that the MROI listed on the form are not applicable to OMU.

If the MROI specified includes items requested by the Office of Airport Technology (OAT), then a signature from a Director of OAT is required. If there are no items requested by OAT, then the Designer shall write “N/A” and initial the signature line for OAT confirming that the MROI listed on the form are not applicable to OAT.

4.17.3 MROI List Form

After all parties have agreed to the type and quantity of MROI required for the project and signatures on the “MROI Approval” form are obtained, the Designer shall fill out the “MROI List” form in Appendix B to include in the contract specifications. The items included in the “MROI List” form shall be identical to the items listed in the “MROI Approval” Form. If during the approval process, items were not approved, the Designer shall not include those items on the “MROI List” form for bid.

The purpose of the “MROI List” is to clearly identify in one place items to be turned over to MAA as required throughout the contract specifications. The completed “MROI List” form shall be placed in the contract specifications directly behind specification 010003X. Blank lines shall be provided to allow for any MROI generated during construction. A blank “MROI Record of Delivery” form shall be placed behind the “MROI List” in the specifications. The “MROI Record of Delivery” is to be filled out by the contractor for each item delivered to the MAA as MROI, and includes information such as product description, contract requirement, quantity, price, and date delivered. The completed “MROI Record of Delivery” forms will be submitted to the MAA Division of Construction Manager on the date of MROI delivery. See specification 010003X for additional details.

4.18 COMPREHENSIVE PAVING AND COMPREHENSIVE INTERIOR/EXTERIOR MODIFICATIONS CONTRACT DESIGN PROCEDURE

Comprehensive Paving Contracts (Comp Paving) and Comprehensive Interior/Exterior Modifications Contracts (Vertical Comp) at BWI Marshall and Martin State (MTN) Airports are on-call construction contracts for which MAA makes multiple awards under one contract. Each successful bidder is issued the Technical Provisions for the overall Contract which include General Information, Technical Specifications (Comp Paving only), Wage Rates, and Bid Forms. After award, competitive bids are solicited from the selected contractors as “Tasks” are advertised.

Comp Paving tasks involve airside and landside paving projects and typically do not include terminal/building work. Tasks under a Comp Paving contract range from small to large, usually involving paving, pavement patching, crack sealing, pavement marking, structure adjustments, sign installation, and other construction flatwork.

Vertical Comp projects are for work on buildings, utilities, and other airport facilities and typically do not include flatwork such as paving. Tasks under a Vertical Comp contract usually involve construction and/or repair services including electrical, mechanical, architectural, demolition, roofing, painting and finishes.

Designs of Comp Paving and Vertical Comp tasks shall comply with all applicable sections of this DST Manual. The following sections describe the design procedure for a Task to be bid under Comp Paving and Vertical Comp Contracts at BWI Marshall and MTN. Text which does not specify either Comp Paving or Vertical Comp is applicable to both.

4.18.1 Technical Provisions

Procurement templates have been developed for Comp Paving and Vertical Comp Tasks and shall be used to create the Technical Provisions specific to each Task. The information to be provided in the template is discussed below. The populated template shall be bound in one (1) complete volume. The templates are available for download on AIRPortal > Designer Tools.

4.18.1.1 Part I – General Information

Designers shall develop the General Information in the format provided in the template and submit this at each submittal phase. Refer to Section 4.18.5, Deliverables.

General Information shall be a narrative of the Task, summarizing major items for contractor consideration and awareness for bid. The items shall include at minimum:

- Contract Summary – table with information fields to be filled in by Designer
- Referenced Documents – for Comp Paving tasks, reference overall contract technical specifications
- Description of project
- Special Construction Requirements – include information such as Project Duration, Liquidated Damages, Phasing Requirements (if applicable), Security Requirements (if applicable)
- List of Drawings

The information included in the Special Construction Requirements is not limited to the items listed above. The Designer shall determine if there are other specific items that should be brought to the contractor's attention and include them with the narrative.

4.18.1.2 Part II – Technical Specifications

Comp Paving

Each Contractor awarded a Comp Paving contract is issued the Technical Specifications that apply to all Tasks, airside and/or landside, constructed under the contract. The technical specifications are also available on AIRPortal. Additional supplemental specifications may be required and should be issued with each individual Task as described below.

Designers shall review and evaluate the Comp Paving Technical Specifications to determine if the Task being designed requires language/specifications above and beyond those given. If a Comp Paving Technical Specification is determined to be applicable but needs supplemental information, the Designer may include this information as additional notes on the Task drawings. If additional technical specifications are deemed necessary for the Task, the Designer shall develop the appropriate specifications and submit them to MAA in Part II of the Technical Provisions.

In general, the Comp Paving technical specifications are more suitable for landside tasks than for airside tasks. Each specification shall be reviewed by the Designer to ensure compatibility with each task. Several airside specifications have been included in the contract; however, additional specifications may be required.

In the event that additional specifications are required, Designers shall note that MAA has developed certain Standard Specifications which are included in Appendix D. These specifications shall be used if applicable when additional specifications are needed for the Task. Refer to DST Section 4.12, Technical Specifications.

If the Comp Paving Specifications are deemed adequate and no supplementary specifications are required, the Design shall not in Part II “Not Applicable.”

Vertical Comp

There are no Technical Specifications issued to Contractors that apply to all Vertical Comp Tasks. Each individual Task shall have the appropriate specifications developed, tailored to the Task’s specific scope of work.

In addition to the applicable technical specifications tailored to the scope of work, Designers shall also include MAA Standard Specification items for each Task where relevant. See DST Section 4.12, Technical Specifications, and Appendix D for MAA Standard Specifications.

Designer shall prepare remaining Technical Specifications following the most current listing of sections included in Construction Specifications Institute (CSI) MasterFormat Division Numbers (6-digits) and Titles, and Section Format organization. Note that MasterFormat 95 and Section numbering (5-digits) is not acceptable.

Method of Measurement and Basis of Payment

Technical Specifications shall be developed in accordance with Section 4.12 and shall include sections for Method of Measurement and Basis of Payment sections.

The Comp Paving Technical Specifications do not include sections for Method of Measurement or Basis of Payment. Designers shall include additional notes on the Task drawings to indicate if work and/or materials are incidental to a specific Item. This shall be a requirement for all pay items, regardless of whether they are from the Comp Paving Technical Specifications or from supplemental specifications prepared by the Designer.

4.18.1.3 Part III – Wage Rates

Wage rates are provided in the Technical Provisions issued to the Contractor upon award of a Comp Paving or Vertical Comp contract. The wage rates do not need to be provided again if the Task specific Technical Provisions.

4.18.1.4 Part IV – Bid Forms

Bid Forms are provided in the overall Technical Provisions of both contracts and do not need to be provided again for each Task.

However, a Bid Tabulation form is required for each Task. Designers shall develop the Bid Tabulation form with which the contractors will use to submit Unit or Lump Sum prices to MAA. Designers shall determine each item of work and the quantity of each item necessary to complete the Task.

A blank Bid Tabulation form is provided in the template found on MAA's AIRPortal > Designer Tools, in Microsoft Word format. Rows can be added or deleted for items depending on the complexity of the work.

4.18.2 Contract and Task Number

4.18.2.1 Construction Contract and Task Numbers

All Tasks shall be identified by the Comp Paving or Vertical Comp contract number, in the format MAA-CO-XX-XXX, as well as its unique Task number, on the drawings and in the template for the Technical Provisions in the designated spaces. Designers shall obtain the Task numbers from the MAA Task Manager during the 100% design stage at the latest, prior to submitting 100% documents.

4.18.2.2 A/E Contract and Task Numbers

The A/E contract number is not required on the documents.

The A/E Task number is not the same as the construction Task number. A/E Task numbers are assigned to the Designer by the MAA's Task Manager. The A/E Task number is required on the drawing cover sheet and the cover sheet of the Technical Provisions.

4.18.3 Task Durations and Submittal Review

Task durations shall be established during design and documented in the contract documents. In instances when duration is less than 30 days, the designer shall be aware that the product submittal review period as defined in the Standard Provision SP-8.06 is reduced from 21 calendar days to 10 calendar days. For projects requiring materials with a lengthy procurement time, utility relocations, a large number of product submittals or

other similar situations, Designer shall consider specifying a “Phase 0” to account for the duration of these activities prior to the start of construction in the field.

4.18.4 Liquidated Damages

The amount of liquidated damages shall be evaluated for each task to be completed under a Comp Paving or Vertical Comp contract. The Designer shall state the liquidated damages amount(s) in Part I – General Information section of the Technical Provisions. Designers shall note whether liquidated damages are being assessed per phase, for the overall project duration, or both.

4.18.5 Deliverables

Designers shall deliver each design submittal to the MAA Task Manager. Pre-bid submittals such as 60%, 100%, etc. will be distributed by the MAA Task Manager to the Fire Marshal, Construction Manager, and other MAA stakeholders for review. Bid documents are also delivered to the MAA Task Manager for their review and delivery to the MAA Manager, Division of Construction.

The following items shall be submitted to the MAA Task Manager at each submittal level:

- Task Drawings
- Engineer’s Estimate of Construction Costs
- Technical Provisions
- Engineer’s Design Report, if required

The number of hard copies and CDs to be distributed for review shall be coordinated with and determined by the MAA Task Manager prior to the first design submission. This count shall be maintained for the remaining pre-bid design submissions (i.e., 60%, 100%, etc.) unless otherwise directed by the MAA Task Manager.

CDs shall be formatted in accordance with the design standard for electronic document preparation; however folders 01_Instructions to Bidders and 02_Standard Provisions need not be included on the CD. Utilize the Comp Paving or Vertical Comp procurement template for the 03_Technical Provisions folder.

The number of hard copies and CDs to be submitted for Bid solicitation shall vary for each contract depending on the number of contractors bidding. Confirm the number of hard copies and CDs with the MAA Task Manager prior to bid submission.

CDs for Bid solicitation shall contain PDFs of the drawings, Technical Provisions, and Certified Engineer’s Estimate. PDFs of the Bid Documents shall display all applicable signatures required in Section 4.11.11.

4.18.6 Pre-Bid Meetings

The Construction Manager will schedule Pre-Bid meetings for each Task. Designers shall attend the Pre-Bid meetings unless instructed otherwise by the MAA Task Manager.

4.18.7 Conformed Documents

At the direction of the MAA Task Manager, Designers shall provide Conformed Documents for Comp Paving/Vertical Comp Tasks in accordance with Section 5.2, Conformed Construction Documents, and in accordance with the design standard for electronic document preparation. Conformed documents shall be submitted to the MAA Document Manager in accordance with Section 5.2.

4.18.8 Record Documents

Designers shall provide Record Documents for all Tasks to the MAA Document Manager in accordance with Section 6.3.

4.19 CONSTRUCTION DURATIONS AND BLACKOUT DATES

Construction durations shall be estimated during the design phase and documented in the Contract Documents. The Designer shall coordinate with MAA Operations to determine the appropriate work hours and dates of work permitted for the project. Annual construction blackout dates occur when airport traffic is expected to be higher than usual and therefore no construction activity is to take place. Blackout dates for consideration and discussion are listed below.

BWI Marshall:

President's Day weekend (Sat – M)
Spring Break/Easter (full week prior to Easter)
Memorial Day weekend (Sat – M)
Fourth of July and adjacent weekend
Labor Day weekend (Sat – M)
Thanksgiving (M – Su)
Christmas & New Year's (weekend prior to Christmas – weekend after New Year's)

Martin State:

All dates listed above
Weekends

Designers shall determine the applicable construction blackout dates for each project on a case-by-case basis with the Task Manager and the MAA office with operational responsibility (i.e. Airport Operations, Terminal and Landside Operations, Parking and Transportation, etc.) based on the type of work, location of the project, as well as the year's calendar.

CHAPTER 5 BIDDING AND PROCUREMENT

5.1 GUIDELINES FOR THE CONSTRUCTION PROCUREMENT PROCESS

5.1.1 General

1. The Designer shall obtain the schedule, contract number, and official title from the Office of Procurement.
2. All permit approvals must be obtained prior to advertisement unless a waiver is granted by the Deputy Executive Director, Facilities Development and Engineering.

5.1.2 Procurement Review Group (PRG)

1. If the estimated cost of the project exceeds \$50,000, the Office of Procurement shall be contacted by the Designer (at 100% design) to have the project placed on the Procurement Review Group's agenda to determine MBE/DBE goals for the project.
2. The following items shall be provided by the Designer to the Office of Procurement at least 10 days prior to the PRG meeting:
 - a. General Information Section (Part I).
 - b. Scope of Work and purpose of the project.
 - c. Engineer's Estimate identifying subcontractable tasks.
 - d. Contractor Self-Performance Goal.
 - e. A description of the type of work that will be the responsibility of the prime contractor.
 - f. Completed Wage Rate Form (if wage rates are required – see below).
3. The Designer shall attend the PRG meeting.

5.1.3 Technical Provisions

1. Technical Provisions shall be prepared by the Designer in accordance with MAA standard templates. Templates are available from the Office of Procurement for Small Business Reserve, State Funded, and Federally Funded projects.
2. Parts I and IV shall be completed and submitted by the Designer to the Office of Procurement for review just prior to finalizing the Technical Provisions for bid.
3. Wage Rates (Part III):
 - a. State Funded and PFC Funded Projects - Wage rates are required for State funded contracts in excess of \$500,000. State wage rates will be requested from the Maryland Department of Labor, Licensing and Regulation (DLLR) by the Office of Procurement. All pertinent information needed to request the wage rates shall

be forwarded by the Designer to the Office of Procurement at least 10 days prior to the PRG meeting.

- b. Federally Funded Projects - Wage rates are required for all contracts that involve Federal funding. Wage rates for Federally funded contracts shall be Davis Bacon Act Wage Determinations and will be obtained by the Designer on-line at www.wdol.gov.
 - c. If wage rates are not required, the Table of Contents and the Part III fly sheet shall indicate that wage rates are not applicable/required.
4. The Designer shall forward the final Notice to Contractors to the Office of Procurement a minimum of two (2) days prior to the advertisement date.

5.1.4 Pre-Bid Conference and Site Inspection

- 1. The Office of Procurement will schedule the pre-bid conference and the site inspection. The date(s) and time(s) of the pre-bid conference and site inspection will be included in the Technical Provisions.
- 2. The Designer shall attend the pre-bid conference and site inspection and prepare the meeting minutes for incorporation into Addendum No. 1.

5.1.5 Addenda

- 1. The Designer shall prepare Addendum No. 1. Addendum No. 1 shall be issued within seven (7) days of the deadline for receipt of the Contractor's questions and shall include, at a minimum, the following:
 - a. Pre-Bid Meeting Minutes.
 - b. Pre-Bid Meeting Attendance Sheet.
 - c. Minority Business Enterprise Goals and Requirements for Construction Contracts, Good Faith Efforts, and Trucking Requirements.
 - d. Responses to Contractor's Questions.
 - e. Plan holder list.
- 2. Additional addenda shall be prepared by the Designer as required.
- 3. All addenda shall include an Acknowledgement of Receipt.
- 4. The last addendum shall be issued a minimum of seven (7) days prior to the bid opening.

5.1.6 Bid Tabulation and Notice of Recommended Award (NORA)

1. After the bid opening, the Designer shall prepare a bid tabulation including all bids that were received and the Engineer's estimate. On Federally funded projects, the bid tabulation shall include eligible and non-eligible items.
2. Based on the bid tabulation, the Designer shall prepare a Notice of Recommended Award and forward it to the Office of Procurement.
3. Justification must be prepared by the Designer if the Engineer's estimate is more than 10% above or below the apparent low bid.
4. If advertisement was allowed prior to receipt of all permits, the Office of Procurement shall coordinate approvals with the MAA Project Manager prior to issuing the Notice to Proceed.

5.1.7 Conformed Construction Documents

1. The Designer shall submit Conformed Construction Documents to MAA's Manager of Engineering and MAA's Manager of Construction in accordance with Section 5.2, Conformed Construction Documents.

5.1.8 Pre-Construction Meeting

1. The Designer is not required to attend the Pre-Construction meeting unless requested by the Office of Procurement and the MAA Project Manager.

5.2 CONFORMED CONSTRUCTION DOCUMENTS

Unless otherwise directed by MAA's Project Manager, the designer shall provide Conformed Documents incorporating all changes to the drawings and specifications that have been developed during the solicitation.

The following shall be submitted to MAA's Document Manager:

- 1 – Two (2) full size sets of drawings
- 2 – Two (2) half size sets of drawings
- 3 – Two (2) specification books
- 4 - One (1) CD of pdf files of the drawings and specifications

The electronic documents will follow the standard described for submittal of electronic documents as per Section 4.10.7 Electronic Non-CAD Document Deliverable Requirements in the MAA Design Standards as well as the requirements as outlined in the MAA CAD Standards.

1. All Conformed Documents shall be delivered to the Document Manager in the MAA Office of Design and Construction.


2. No one but the Document Manager is authorized to receive Conformed Documents for MAA.
3. Coordinate with the Document Manager at 410-859-7933 or via email for the delivery of Conformed Documents. Request the Document Manager's email from the MAA Task Manager.
4. DO NOT leave Conformed Documents at the Document Manager's desk or with anyone else if he is not at his desk.
5. Only full/complete set(s) of Conformed Documents will be accepted. Do not deliver partial sets unless specifically requested by MAA.
6. All documents shall be prepared in accordance with the latest MAA Design Standard (DST). Documents not conforming to the DST will be returned for correction.
7. All documents are to be submitted with a Letter of Transmittal addressed to the Document Manager. The Letter of Transmittal shall include relevant information such as Contract Number, Title, A/E Task Number, and a complete list of documents included in the set of Conformed Documents being delivered.
8. Copy the MAA Task Manager on the Letter of Transmittal.
9. Have the Document Manager sign the Letter of Transmittal. Consultants shall keep a copy of the signed Letter of Transmittal for future reference.
10. The Document Manager will distribute the Conformed Documents to the appropriate individuals at MAA.

CHAPTER 6 CONSTRUCTION ADMINISTRATION**6.1 SHOP DRAWING/SUBMITTAL REVIEW****6.1.1 MAA Office of the Fire Marshal (OFM) – Authority for Fire Code Enforcement**

The Authority Having Jurisdiction (AHJ) for enforcement of fire related codes, standards, and laws on MAA owned or leased facilities and properties is the MAA OFM. Questions involving interpretation or enforcement of fire related codes and standards shall be directed to the OFM.

6.1.2 OFM Review Comments

During construction, the Construction Manager will forward a copy of the appropriate shop drawing/submittals to the Fire Marshal at the same time they are sent to the Designer. The Construction Manager will then schedule a meeting one week later with the Fire Marshal, Designer, Construction Manager, and MAA Division of Facilities Construction. At that meeting, all shop drawing issues will be addressed, and a decision will be rendered as to the status of the submittal and noted on the MAA stamp shown below. The shop drawings/submittals will be returned to the Construction Manager at that time for further action.

	Maryland Aviation Administration
AIRPORT FIRE & RESCUE DEPARTMENT FIRE PREVENTION DIVISION	
<input type="checkbox"/> REJECTED WITH NOTED COMMENTS	
<input type="checkbox"/> REVISE AS NOTED AND RESUBMIT () AS-BUILT'S	
<input type="checkbox"/> APPROVED WITH RED LINED REVISION	
<input type="checkbox"/> APPROVED AS SUBMITTED <u> / / </u>	
BY:	

The shop drawing/submittal review meeting will also provide an opportunity for the Designer, Construction Manager, and Fire Marshal to review contract revisions and modifications.

6.1.3 Design Changes

Designers shall NOT use the shop drawing/submittal review process to implement revisions to the original design and construction documents. Revisions to the design should be implemented by Field Revisions.

6.2 REQUEST FOR INFORMATION

The consultant shall review and respond to all Request for Information (RFIs) within the time frames specified in the Construction Documents.

6.3 RECORD DRAWING PREPARATION

At the close of every project, the MAA will provide the Designer with the as-built markups from the contractor. The following requirements should be followed when preparing Record Drawings.

Deliverables shall include:

- 1 set of prints (2 sets if AIP funding is used in the project)
- 1 set of reproducible mylar plots
- 2 CDs with electronic files

Drawings shall include:

- Revision block labeled "Record" with date of issue.
- The disclaimer Record Drawing Stamp (on the following page) placed on each sheet (including the title sheet) and applicable boxes should be checked.
- Every drawing with file name clearly located within the sheet border.

CD covers/labels shall include:

- The contract number, title, date, A/E Task number, and any other pertinent information on the CD insert.
- CD inserts formatted per *CD INSERTS*.

Electronic Files on the CD shall include:

- Autocad DWG as well as PDF drawings prepared per the Electronic Deliverables Section in MAA's CAD Standard.
- PDF and DOC files of the contract technical specifications prepared per the Electronic Deliverables Section in MAA's CAD Standard.
- PDF file of the Design Report (if applicable for the project)
- Any addenda issued during the bidding process in PDF format. Changes to the original contract documents via addenda are to be included separately only for verification purposes. The changes made during addenda should have been incorporated into the conformed set. If for some reason, a conformed set was not issued, the addenda shall be incorporated into the record drawing DWG files.
- All RFIs and Shop Drawings/Product Submittals in PDF format.

- Contractor as-built markups in PDF format.

All fonts must be available in the MAA standard font library. The MAA standard font library includes all fonts delivered with AutoCAD.

6.3.1 Identification and Reporting of Confined Spaces

As part of the Designer Phase 3 Services, the Designer shall identify all confined spaces and signage requirements for confined spaces created during the course of the design and include this information on the record drawings. All permit controlled confined spaces shall be clearly designated as such on the record drawings.

The Designer shall also document all new confined spaces and provide the MAA Risk Management Department Coordinator and MAA Project Manager with a completed **Confined Space Entry Evaluation Form** for each new confined space. The form can be found in the Section 7 of the MAA Confined Space Entry Program (RM-1910.146) contained in the MAA Workplace Safety Manual.

6.3.2 Maintenance of Record Drawings and Specifications for projects containing SSI

Record drawings and specifications shall be maintained for all MAA projects containing SSI in accordance with established MAA procedures for the productions of project record drawings. All project record drawings and specifications shall be marked in accordance with this DST and consolidated for storage in a secure area. The following notation shall be included in the header of SSI record drawings in place of the protective marking:

Sensitive Security Information – Record Drawings

The following notation shall be included in the header of SSI record specifications in place of the protective marking:

Sensitive Security Information – Specifications

6.3.3 Procedure for Delivery of Record Documents

The Designer shall comply with the following procedure when delivering Record Documents to MAA:

1. All Record Documents shall be delivered to the Document Manager in the MAA Office of Design and Construction.
2. No one but the Document Manager is authorized to receive Record Documents for MAA.

3. Coordinate with the Document Manager at 410-859-7933 or via email for the delivery of Record Documents. Request the Document Manager's email from the MAA Task Manager.
4. DO NOT leave Record Documents at the Document Manager's desk or with anyone else if he is not at his desk.
5. Only full/complete set(s) of Record Documents will be accepted. Do not deliver partial sets unless specifically requested by MAA.
6. All documents shall be prepared in accordance with the latest MAA Design Standard (DST). Documents not conforming to the DST will be returned for correction.
7. All documents are to be submitted with a Letter of Transmittal addressed to the Document Manager. The Letter of Transmittal shall include relevant information such as Contract Number, Title, A/E Task Number, and a complete list of documents included in the set of Record Documents being delivered.
8. Copy the MAA Task Manager on the Letter of Transmittal.
9. Have the Document Manager sign the Letter of Transmittal. Consultants shall keep a copy of the signed Letter of Transmittal for future reference.

SUBMISSION NOTE:

"THESE RECORD DRAWINGS DATED... AND TITLED "RECORD" HAVE BEEN DEVELOPED FROM

☐ RFI/FIELD CHANGES

☐ CONFORMED DRAWINGS

☐ AS-BUILT MARKUPS

AND MAY NOT REPRESENT THE FINAL PROJECT, AS CONSTRUCTED, IN EVERY DETAIL. THE RECORD DRAWINGS HAVE BEEN PREPARED BASED ON INFORMATION SUPPLIED BY OTHERS AND THE ENGINEER HAS NOT VERIFIED THE ACCURACY OR COMPLETENESS OF THE INFORMATION."

SUBMISSION NOTE:

"THESE RECORD DRAWINGS DATED... AND TITLED "RECORD" HAVE BEEN DEVELOPED FROM

☐ RFI/FIELD CHANGES

☐ CONFORMED DRAWINGS

☐ AS-BUILT MARKUPS

AND MAY NOT REPRESENT THE FINAL PROJECT, AS CONSTRUCTED, IN EVERY DETAIL. THE RECORD DRAWINGS HAVE BEEN PREPARED BASED ON INFORMATION SUPPLIED BY OTHERS AND THE ENGINEER HAS NOT VERIFIED THE ACCURACY OR COMPLETENESS OF THE INFORMATION."

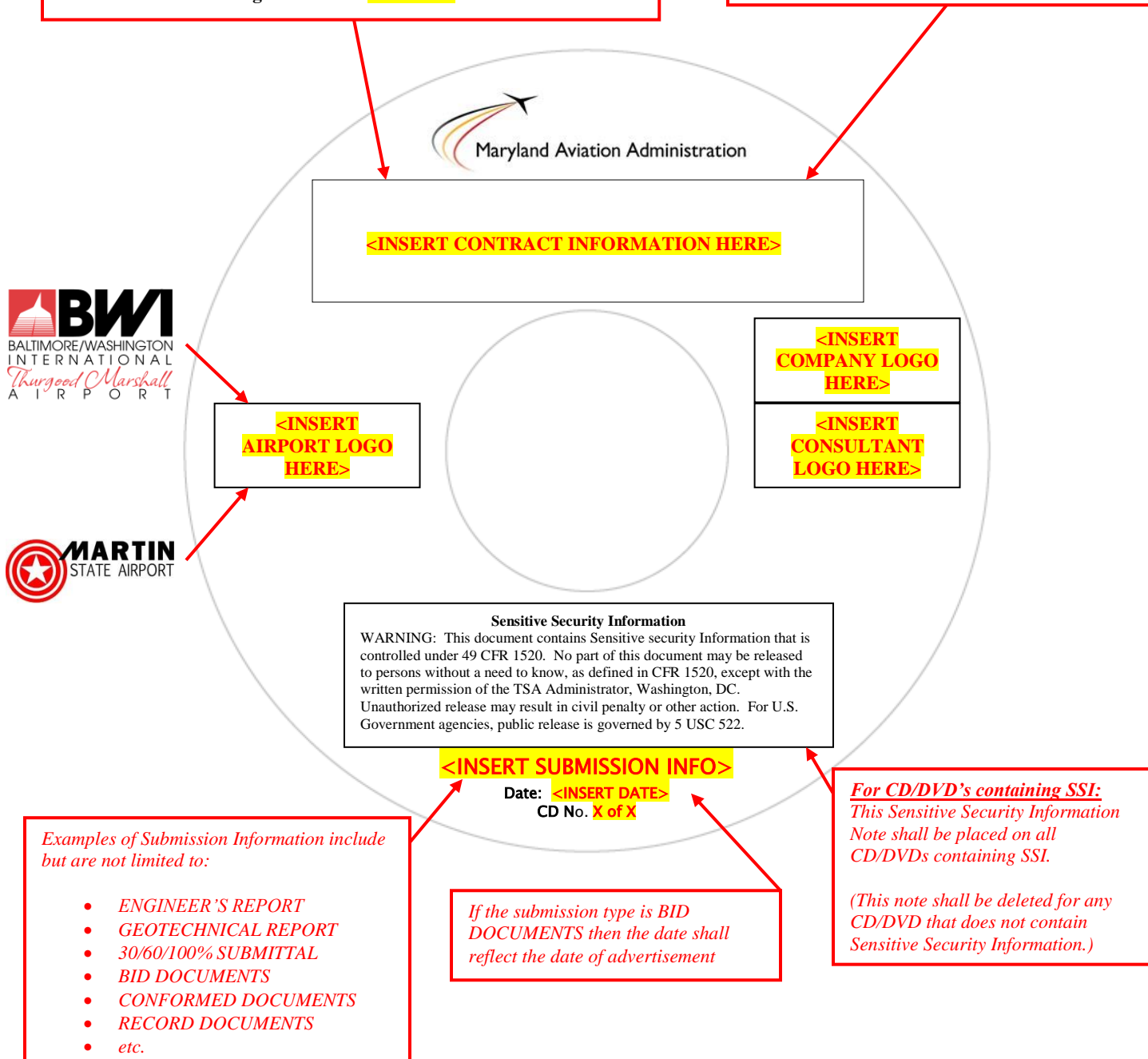
Sample CD/DVD Disk Label:

**For CD/DVD's containing -
Construction Contract Documents**

Construction Contract No.: MAA-CO-**XX-XXX**
Construction Contract Title: **<INSERT TEXT HERE>**
Construction Task No.: **XXX <INSERT IF APPLICABLE>**
Construction Task Title: **<INSERT TEXT HERE IF APPLICABLE>**
Design Task No.: **XXXX.XX**

**For CD/DVD's containing -
Design Reports, PowerPoint Presentations, etc.**

Design Task No.: **XXXX.XX**
Design Task Title: **<INSERT TEXT HERE>**
Design Contract No.: MAA-AE-**XX-XXX**
Design Task Title: **<INSERT TEXT HERE>**



NOTE: CD/DVD label for all submissions shall have a plain white background (NO GRAPHIC)

SECTION III: DESIGN CRITERIA**CHAPTER 7 GENERAL REQUIREMENTS****7.1 CODE REQUIREMENTS**

The Designer shall design the project to comply with the MAA Design Standards, codes and standards as listed in Appendix G, and the requirements of this chapter. The Designer scope of work may require compliance with other codes and standards not identified in the MAA Design Standards. As such, the Designer shall identify the additional codes and standards specific to a particular project in accordance with the requirements of Chapter 4 and Chapter 7, Section 7.1.1.

7.1.1 Fire Protection Design Information

All design drawings and reports for new buildings, additions, and renovations must include the following fire protection design information, at a minimum:

1. A complete list of currently applicable adopted fire and life safety related codes, regulations and standards that apply to the project.
2. "Height and Area" calculations that demonstrate conformance with the required type(s) of construction, in accordance with IBC Table 503 and IBC Sections 506 or 507.
3. Code classification(s) of the type(s) of construction for the new work and existing building (if applicable) in accordance with Chapter 6 of the IBC.
4. Locations and ratings of all fire rated walls, floor-ceiling assemblies, roof-ceiling assemblies, fire rated columns, and other structural elements.
5. Complete floor plan(s), showing egress route(s) and measured travel distance(s) to each required exit.
6. Details of fire rated assemblies for walls, floor-ceilings, roof-ceilings, columns, beams, and other fire rated structural elements.
7. Clear designation of locations of all fire rated walls and the intended fire endurance ratings being specified.
8. Occupant load(s) and egress capacity calculations.
9. Smoke control calculations, if applicable.
10. Exit and egress code requirements that are being met. (For example: exit access travel distance limits, dead end corridor limits, minimum numbers of exits required.)

11. A complete door schedule, with door fire ratings, door hardware, frame types, glazing sizes and types, and identifying door numbers.
12. Interior finish schedules, including flame spread and smoke development ratings, for interior finishes and trim.
13. A schedule of fire damper locations, sizes, and an installation mounting detail.
14. Locations of fire alarm pull stations, horns and strobes, and fire extinguishers.
15. Type(s) of automatic fire suppression and detection systems for specific areas and spaces, as required. Fire Protection Schedule shall include the MAA-Valve No., Zone control location, Fire Alarm VT and WF point numbers.
16. Locations of fire standpipe systems.
17. Locations of fire hydrants.

A sample listing of the minimum required fire protection design information that is to be shown on the plans is as follows:

NOTE: THE INFORMATION BELOW IS A “SAMPLE ONLY” AND SHOULD BE USED AS GUIDANCE AND MODIFIED TO MEET THE SPECIFIC PROJECT REQUIREMENTS.

APPLICABLE CODES, REGULATIONS, AND STANDARDS

This project is designed to conform with the following applicable fire related codes and standards:

1. *International Building Code, (list applicable Edition)*
2. *International Mechanical Code, (list applicable Edition)*
1. *International Energy Conservation Code, (list applicable Edition)*
2. *NFPA 13, Automatic Sprinklers (list applicable Edition)*
3. *NFPA 14, Standpipes (list applicable Edition)*
4. *NFPA 20, Fire Pumps, (list applicable Edition)*
4. *NFPA 70, National Electrical Code, (list applicable Edition)*
5. *NFPA 101, Life Safety Code, (list applicable Edition)*
6. *Uniform Federal Accessibility Standards 36 CFR Part 1191: Americans with Disabilities Act, Accessibility Guidelines for Buildings and Facilities*
7. *Environmental Protection Agency Regulations*
8. *Occupational Safety and Health Administration Standards*

BUILDING CONDITIONS INFORMATION

1. *Building Use Classification.*
 - a. *Use Group B, Business (IBC 304, 2006)*
 - b. *Business Use (NFPA 101-3.3.168.3, 2006)*
2. *Building Construction.*
 - a. *Existing structure construction type: II A, (IBC Table 601).*
 - b. *Fire suppression: Existing automatic sprinkler system installed in accordance with IBC 903.3.1.1.*

OCCUPANT LOAD CALCULATIONS

1. **Computed occupant load for Business Use (IBC Table 1004.1.1 and NFPA 101, Table 7.3.1.2):**

2,500 SF x (1 Person/100 Gross SF) = 25 people.

2. **Actual occupancy load: Office area: 20 people.**

EXIT DOOR REQUIREMENTS

1. **Minimum number of exit locations.**
 - a. **For B Use, less than 50 persons, with a maximum travel distance of less than 75 feet: 1 exit is required (IBC Table 1015.1).**
 - b. **Number of exit doors provided: 2.**
2. **Minimum exit width: 0.15 inches per person (IBC Table 1005.1).**
 - a. **Required width: XX people x 0.15 inches/per person = XX inches.**
 - b. **Minimum door width required at each exit door opening: 32 inches (IBC 1008.1.1)**
 - c. **Exit width provided: 36 inches.**
3. **Door requirements (IBC 1008 and NFPA 101, Chapter 7)**
 - a. **All doors serving an occupant load of 50 or more shall swing in the direction of egress.**
 - b. **Door latch shall release when subjected to a 15-pound force.**
 - c. **Door shall be readily openable from “occupied” side without use of a key.**

EXIT ACCESS TRAVEL.

1. **Maximum length of access travel for business occupancies.**
 - a. **Business Use Group with sprinkler system (IBC Table 1016.1): 350 FT.**
 - b. **Business Use Group with sprinkler system (NFPA 101, 27-2.6): 300 FT.**
2. **Actual length of travel distance to an exit.**
 - a. **From the most remote point A: 57 FT maximum actual travel distance.**

EMERGENCY SIGNS AND LIGHTING.

1. **Illuminated exit signs are required throughout facility (IBC 1011).**
 - a. **Exit signs are required over every exit door.**
 - b. **Supplementary (directional) signs are required whenever door signs are not readily visible from occupied areas.**
 - c. **Emergency power source is required to illuminate signs for 90 minutes after loss of primary power (IBC 1011.5.3).**
2. **All means of egress are required to be illuminated by artificial light (IBC XXX).**
 - a. **Minimum illumination level required is 1-foot candle at floor (IBC1006.2).**
 - b. **Emergency power source is required to illuminate exit paths for 90 minutes after loss of primary power (IBC 1006.1).**

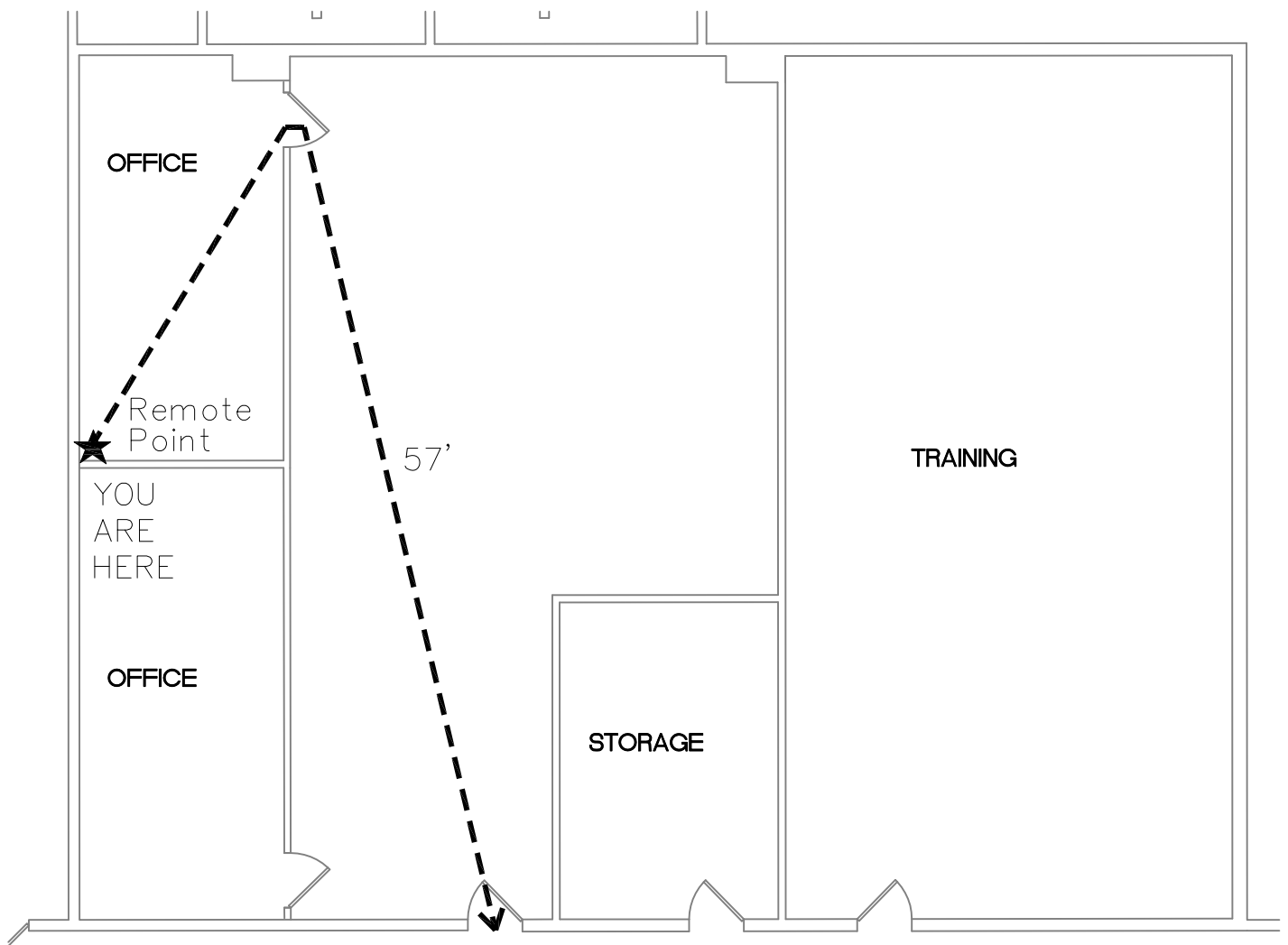
ADDITIONAL REQUIREMENTS

HANDICAPPED ACCESSIBILITY (36 CFR Part 1191)

1. **Doorways shall have a minimum clear opening of 32 inches from face of door in 90-degree position and face of stop in frame. (Approximately 33 ½” minimum net door width, nominal 36” width door).**

FIRE RESISTIVE RATINGS FOR INTERIOR FINISH AND TRIM

1. **Exit Access Corridors – Minimum Class II, 26-75 flame spread.**
2. **Rooms or Enclosed Spaces – Minimum Class III, 76-200 flame spread.**
3. **Interior Trim – Maximum of 10% Class I, II, or III where limited above.**
4. **Floors – Minimum requirement of DOC FF-1.**



USE GROUP: BUSINESS W/ SPRINKLER SYSTEM
ALLOWABLE TRAVEL DISTANCE: 300'
ACTUAL TRAVEL DISTANCE: 57'

7.1.2 Terminal Evacuation Plans

The MAA Office of Design & Construction, in coordination with the OFM is only responsible for assisting in the development, approval, and location of all written Evacuation Plans and drawings. Responsibility for submitting written Evacuation plans and drawings to MAA for review and approval shall be the Designer of Record under MAA Capital Program projects, and the tenant organization and/or the tenant organization's General Construction Contractor under the MAA Building Permit process. Upon approval of the Evacuation plans and drawings, and as directed by MAA, the General Construction Contractor for the Capital Program project or the tenant organization shall be responsible for the placement of the Evacuation Plan Drawings.

7.1.3 Identification and Reporting of Confined Spaces During the Design Process

The Designer shall be familiar with the MAA Confined Space Entry Program and requirements of 29 CFR 1910.146 regarding confined spaces. The Designer shall avoid creation of new confined spaces, if possible, and present alternatives to evaluate options to avoid them.

The Designer shall be responsible for complying with the requirements of Section 2.1.2 Confined Space Requirement for Designers and 4.10 regarding confined spaces. The Designer shall be responsible for documenting all confined spaces in accordance with Section 6.3, Record Drawing Preparation.

7.2 RUNWAY, TAXIWAY, AND TAXILANE CLOSURES

7.2.1 Runway 10-28 and 15R-33L Intersection Closure

Construction of utilities within the safety areas of the intersection of Runways 10-28 and 15R-33L, which will require simultaneous closure of both major runways, will not be permitted. Alternate routes or methods, such as crossing one runway point at a time and remaining clear of the adjacent runway safety area, should be used. The Director of the Office of Design & Construction must approve any project that requires closure of both runways.

This allows BWI Marshall to maintain airport capacity during utility construction by keeping at least one major runway open. It provides additional periods of time for accessing work areas for utility installation, which would be limited if both runways required closing. It also alleviates closures of both major runways for subsequent maintenance, emergency repairs, periodic inspections, tie-ins, etc. These types of occurrences are even more problematic, as they may be unscheduled and occur at peak times.

7.3 USE OF LIFTS WITHIN THE TERMINAL BUILDING

The following information shall be added to construction documents for any construction that may require the use of lifts on the terminal floor tiles at BWI Marshall:

All man-lifts to be used on or transported across the ceramic, porcelain, and/or terrazzo floor tile in the terminal shall conform to the following requirements:

- 1) All lifts shall be equipped with pneumatic tires.
- 2) All lifts shall be transported and parked on $\frac{3}{4}$ " plywood protection panels at all times.

7.4 SAFETY AND SECURITY DURING CONSTRUCTION

Refer to Section 4.11.2 and Appendix C for the Standard Construction Safety and Notes Sheets.

7.4.1 Traffic Cones

Twelve inch (12") traffic controlling cones shall not be used for projects at BWI Marshall and Martin State Airports. State Highway Administration (SHA) studies have found that larger cones decrease accident rates. For slower traffic, 18" cones shall be used. For highway and nighttime traffic, 28" cones shall be used. In addition, during nighttime work, 28" cones must have reflective collars. This information may be obtained from SHA's Traffic Control Booklet #6.

7.4.2 Dust Control

Additional consideration should be given to dust control during construction. Utilize sound engineering judgment in the development of dust control plans and specifications.

CHAPTER 8 SITE DEVELOPMENT

8.1 GENERAL SITE WORK AND UTILITIES

8.1.1 Survey Control

8.1.1.1 BWI Marshall Airport Surveying Monuments

A network of 4 survey control points have been established at BWI Thurgood Marshall Airport to provide a reliable and accessible system of control for all surveys performed on the airport. Please refer to Appendix E.

Consultants shall use the BWI Thurgood Marshall Airport Survey Control for all design and construction projects. All project surveys must be tied to the BWI Thurgood Marshall Airport Survey Control Network shown on the Survey Control Drawing and described in the Survey Control Manual. All contract drawing sets must contain the BWI Thurgood Marshall Airport “Survey Control” Plan Sheet and a 2nd geometric layout sheet containing the specific geometric layout and coordinate data for the project. The geometric layout sheet shall also include any and all points set by the contractor for the specific project stating traverse closures and indicating which BWI Thurgood Marshall Airport control points were used.

The survey control for BWI Thurgood Marshall Airport is based horizontally on the Maryland State Plane Coordinate System which is tied to the North American Datum of 1983, 2007 adjustment (NAD 83 / 2007), and vertically on the North American Vertical Datum 1988 (NAVD 88). The primary control stations supplied in the manual meet or exceed 1st order horizontal survey control accuracies and 1st order vertical accuracies as indicated on the individual monument recovery sheets. All monuments are cast in place concrete, 48” deep with aluminum disks stamped “BWI Thurgood Marshall Airport – Survey Control,” and include a point ID. All secondary control meet or exceed 3rd order horizontal accuracies as indicated on the individual monument recovery sheets. In addition to the primary and secondary control networks, there are five (5) 1st order benchmarks.

All monuments are described on monument recovery sheets. Each monument recovery sheet contains “How to Reach” descriptions for each control point, coordinates, elevations and pictures of each monument as well as reference sketches. The scale factor given on the recovery sheet is the measure of the linear distortion that has been mathematically imposed on ellipsoid distances so they may be projected onto a plane. Stability ratings for each monument are also stated on the individual recovery sheets.

Elevations of monuments are based on the North American Vertical Datum of 1988 (NAVD 88). Elevations are derived from differential leveling performed in

2007 using NGS methods for establishing 1st order vertical benchmarks. This leveling project is included in NGS' National Spatial Reference System. Elevations are in US Survey Feet.

The Consultant is responsible for quality control checking of all new and existing monumentation prior to using the monuments in accordance with standard survey practices.

NGS monumentation that has been damaged or destroyed should be reported to NGS via their web page at http://www.ngs.noaa.gov/ngs-cgi-bin/recvy_entry_www.prl. In the event that the actual marker is separated from its setting, you can report the point as destroyed. To do so, please send the report on the destroyed mark as an email to Deb Brown (Deb.Brown@noaa.gov). If you send this email, please do not submit the current form, Deb Brown will submit the report for you. In addition, please submit proof of the mark's destruction via actual disk, rubbing, photo, or digital picture (preferred) to Deb Brown:

Deb Brown, N/NGS143
National Geodetic Survey, NOAA
1315 East West Highway
Silver Spring, MD 20910

If you did not find the actual marker, then you should enter notes concerning evidence of its possible destruction as text records and select "Not recovered, not found" as the condition of mark.

Also, please immediately notify the Director of the Office of Design & Construction, Maryland Aviation Administration, to report damaged or destroyed monumentation.

8.1.1.2 Martin State Airport Surveying Monuments

A network of 9 survey control points, including 3 points established by NGS, have been established at Martin State Airport to provide a reliable and accessible system of control for all surveys performed on the airport. Please refer to Appendix E.

Consultants shall use the Martin State Airport Survey Control for all design and construction projects. All project surveys must be tied to the Martin State Airport Survey Control Network shown on the Survey Control Drawing and described in the Survey Control Manual. All contract drawing sets must contain the Martin State Airport "Survey Control" Plan Sheet and a 2nd geometric layout sheet containing the specific geometric layout and coordinate data for the project. This drawing shall also include any and all points set by the contractor for the specific project stating traverse closures and which Martin State Airport control points were used.

The survey control for Martin State Airport is based horizontally on the Maryland State Plane Coordinate System which is tied to the North American Datum of 1983 (NAD 83), and vertically on the North American Vertical Datum 1988 (NAVD 88). Data supplied in the manual meets or exceeds 1st order horizontal survey control accuracies and is equal to or less than 3rd order vertical accuracies as indicated on the individual monument recovery sheet. All monuments are cast in place concrete, 48” deep with aluminum disks stamped “Martin State Airport – Survey Control”, and with a point ID.

All monuments are described on monument recovery sheets. Each monument recovery sheet contains “How to reach” descriptions for each control point, coordinates, elevations, and pictures of each monument as well as reference sketches. The scale factor given on the recovery sheet is the measure of the linear distortion that has been mathematically imposed on ellipsoid distances so they may be projected onto a plane. These monuments were set in the fall of 2005 and have a stability rating of “C” points subject to surface motion.

Elevations of monuments are based on the North American Vertical Datum of 1988 (NAVD88). Elevations are derived from GPS observations of NGS benchmark stations MARTAIR AZ (a third order vertical monument), CLOVER (a second order vertical monument), GIS58 (a third order vertical monument), and GIS70 (a third order vertical monument). Elevations are in U.S. Survey Feet.

The consultant is responsible for quality control checking of all new and existing monumentation prior to using the monuments in accordance with standard survey practices. Please notify the Airport Operations Manager of Martin State Airport (410-682-8826) and the Director of MAA’s Office of Design & Construction of damaged and destroyed monumentation immediately.

8.1.2 Site Preparation

1. In all disturbed areas which do not receive pavement, landscaping, or structures, the areas shall be topsoiled a minimum of 3”, seeded and mulched or sodded.
2. Temporary Support of Excavation: Construction documents should refer to the Interim Standard Provisions Addenda, SP-6.09 for specifications on Temporary Support of Excavation.
3. Designers shall be sensitive to construction means and methods when developing the design and construction documents. For example, in the area of the terminal MAA would ask the Designer to evaluate whether pile driving would cause damage to the exterior glazing. Also for example, in areas with existing utilities and sensitive FAA equipment, MAA would ask the Designer to evaluate whether certain demolition equipment would cause equipment failure and recommend any restrictions on construction means and methods.

8.1.3 Underground Utility Trenches, Utility Markings, and Manhole/Handhole Covers/LIDS

8.1.3.1 *Underground Utility Markings*

The design and construction of all projects at BWI Marshall and Martin State Airports shall include the requirement to mark all temporary (regardless of duration) and permanent underground utilities with detectable utility warning devices in accordance with the following requirements:

In paved areas (asphalt or concrete) mark the underground utility with 6" wide detectable tape positioned at a maximum 3"- 6" deep below the bottom of asphalt or concrete.

In unpaved areas mark the underground utility with 6" wide detectable tape positioned at a maximum 8" - 12" deep below top of ground.

1. Buried Underground **Non-metallic** Utilities:

- a. All temporary and permanent buried underground non-metallic utilities shall be marked with appropriately colored detectable utility warning tape placed over the utility at the depth indicated above.
- b. Additionally, all temporary and permanent buried underground non-metallic utilities shall also be marked with a steel reinforced copper clad tracer wire placed with and at the same depth as the utility. The tracer wire shall be continuous (thru) and shall be brought into and be accessible at all valves, handholes, manholes, and other access points along the length of the utility. Should the tracer wire be terminated at these locations, 5 or more feet of spare wire shall remain and be coiled.

2. Buried Underground **Metallic** Utilities:

- a. All temporary and permanent buried underground metallic utilities shall be marked with appropriately colored detectable utility warning tape placed over the utility at the depth indicated above.

3. Underground **Non-metallic** Utilities installed by directional drilling or other trenchless technologies:

- a. All temporary and permanent underground non-metallic utilities installed by trenchless technologies such as directional drilling, jack and bore, etc, shall include the placement of an appropriately colored steel reinforced copper clad tracer wire placed with and at the same depth as the utility. The tracer wire shall be continuous (thru) and shall be extended beyond

the limits of the trenchless installation and be brought into and be accessible at all valves, handholes, manholes and other access points along the length of the utility. Should the tracer wire be terminated at these locations, 5 or more feet of spare wire shall remain and be coiled.

4. Underground **Metallic** Utilities installed by directional drilling or other trenchless technologies:

- a. Metallic utilities installed by trenchless technology shall not be marked for the extent of the trenchless installation but they shall be marked in accordance with the requirements of Paragraph 2, Buried Underground **Metallic** Utilities, for all portions of the utility installed by conventional trenching.

5. Utility Marking Materials shall conform to the following requirements:

- a. Detectable Utility Warning Tape:

The detectable tape shall be 6" wide and 5.0 mil thick, continuously inscribed with a description of the utility (Gas, Water, Electric, etc.), color coded to meet the American Public Works Association (APWA) uniform color code system as listed below and shall include a metallic foil coating that is detectable by utility locating equipment.

RED	Electric Power Lines, Cables, Conduit and Lighting Cables
YELLOW	Gas, Oil, Steam, Petroleum or Gaseous Materials
ORANGE	Communication, Alarm or Signal Lines, Cables or Conduit
BLUE	Potable Water
GREEN	Sewers and Drain Lines
PURPLE	Reclaimed Water, Irrigation and Slurry Lines
PINK	Temporary Survey Marking
WHITE	Proposed Excavation

- b. Steel Reinforced Copper Clad Tracer Wire:

Tracer wire shall be a 12 AWG, Extra-High-Strength Copper-Clad Steel conductor (EHS-CCS), insulated with a 45 mil, high-density, high molecular weight polyethylene (HDPE) insulation, and rated for direct burial use at 30 volts. EHS-CCS conductor must be a 21% conductivity for locatability purposes. Break load shall be a minimum of 1,150 pounds. HDPE insulation shall be Restriction of Hazardous Substances (RoHS) compliant and utilize virgin grade material. Insulation color shall meet the APWA uniform color code system, as listed above, for identification of buried utilities.

Tracer wire shall be installed in the same trench and inside bored holes and casing with pipe during pipe installation. It shall be secured to the pipe as required to insure that the wire remains adjacent to the pipe. The tracer wire shall be securely bonded together at all wire joints with an approved watertight connector to provide electrical continuity, and it shall be accessible at all trace wire access points. The contract shall require the tracer wire to be tested for continuity prior to acceptance of the utility.

6. Recommended product Manufacturers:

- a. Acceptable tracer wire products for buried installations include the following products or an approved equal:

Copperhead conventional tracer wire produced by Copperhead Industries, LLC (www.copperheadwire.com), or DURAtace™ Produced by Duratrace (www.duratracewire.com)

- b. Acceptable tracer wire products for trenchless technology installations include the following products or an approved equal:

SoloShot™ EHS produced by Copperhead Industries, LLC (www.copperheadwire.com), or DURAtace™ DD Produced by Duratrace (www.duratracewire.com).

- c. Acceptable detectable utility warning tape products for underground utility markings installations include the following products or an approved equal:

6" wide and 5.0 mil thick, continuously inscribed with a description of the utility (Gas, Water, Electric, etc.), color coded to meet the American Public Works Association (APWA) uniform color code system and shall include a metallic foil coating that is detectable by utility locating equipment produced by Stranco, Inc. (www.strancoinc.com) or Rhino Marking and Protection Systems (www.rhinomarkers.com).

7. Recording of Marking Technique Used: CAD and GIS data that records the location of utilities should provide an indication where one of the marking techniques described above was installed and, if so, which type and manufacturer's product was used.

- a. As-built or record CAD should include a superscript number on any annotations used to label utility features in the drawing where a marking technique was used (i.e. 6" PVC Drainage Line). A schedule of corresponding notes on the same or a separate sheet, should list all such notes indicating the method of marking used, the manufacturer name, and product name or model number.

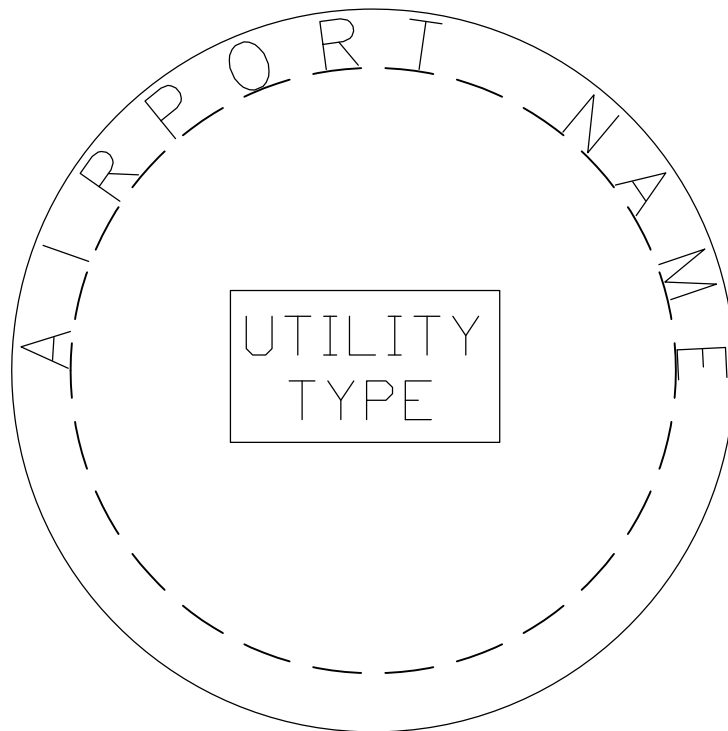
- b. As a requirement of the As-Built submittal, GIS data submitted with subsurface utilities should record the use of, manufacturer name, and product or model in the description attribute (e.g. “Marked with Copperhead Industries’ SoloShot™ EHS tracer wire).

8.1.3.2 Manhole/Handhole Covers/Lids

All new and replacement manhole/handhole covers/lids shall include customized cover/lid surface lettering as follows:

All Airport manhole/handhole covers/lids shall include the name “BALTIMORE/WASHINGTON INTERNATIONAL AIRPORT” or “MARTIN STATE AIRPORT” and the type of utility: “ELECTRIC”, “STORMWATER”, “SANITARY SEWER”, “WATER”, “GAS”, “TELEPHONE.” Lettering shall be Helvetica, medium, capitalized, and 1 ½ inches in height.

"ELECTRIC"
"STORMWATER"
"SANITARY SEWER"
"WATER"
"GAS"
"TELEPHONE"



NOTE: LETTERING SHALL BE HELVETICA, MEDIUM,
CAPITALIZED AND 1-1/2 INCHES IN HEIGHT.

8.1.4 Water Mains

8.1.4.1 Backflow Prevention

Refer to Chapter 14 Plumbing for Backflow Prevention requirements.

8.1.4.2 Corrosion Protection for Water Valve Repair (New and Replacement Valves)

Valves and bolt assemblies for all new and replacement water valves shall be required to be protected from corrosion in accordance with the following specification and details.

A. Water Valve Notes and Specifications for New and Replacement Valves

New valves shall be non-rising stem, high pressure, resilient-seated gate valves sized to match existing, AWWA C509, ductile-iron body and bonnet with bronze or ductile iron gate, resilient seats, bronze stem and stem nut, 250-PSIG minimum working pressure, 400 PSIF test pressure, interior coating according to AWWA C550, and mechanical joint ends. All valves shall be standardized to close when turned in the clockwise direction "Right Handed". The basis of design is Mueller Valve Model A2360 Series Resilient Wedge Gate Valve or approved equal.

10. Valves shall be gates valves conforming to the American Waterworks Association.
11. Epoxy coated inside and out.
12. Fasteners exposed to backfill must be T304 stainless steel.
13. O-ring seals.
14. Solid sleeves shall be ductile iron 250-PSIG minimum working pressure design.

Coat mechanical coupling and valve bolts in accordance with specifications and details below.

B. Specifications for Coating of Bolts and Mechanical Joints-Gate Valve Assemblies for New and Replacement Valves

1. External Coating System for Mechanical Couplings

- a. Mechanical joints/flanges shall receive an exterior tape wrapping in the field as indicated in detail below. The coating applicator shall abide by and follow all manufacturer's application specifications for the coating system. All components of the coating system shall be manufactured by a single supplier to assure compatibility of

individual components. The coating system shall be manufactured by Trento Corporation or an approved equal.

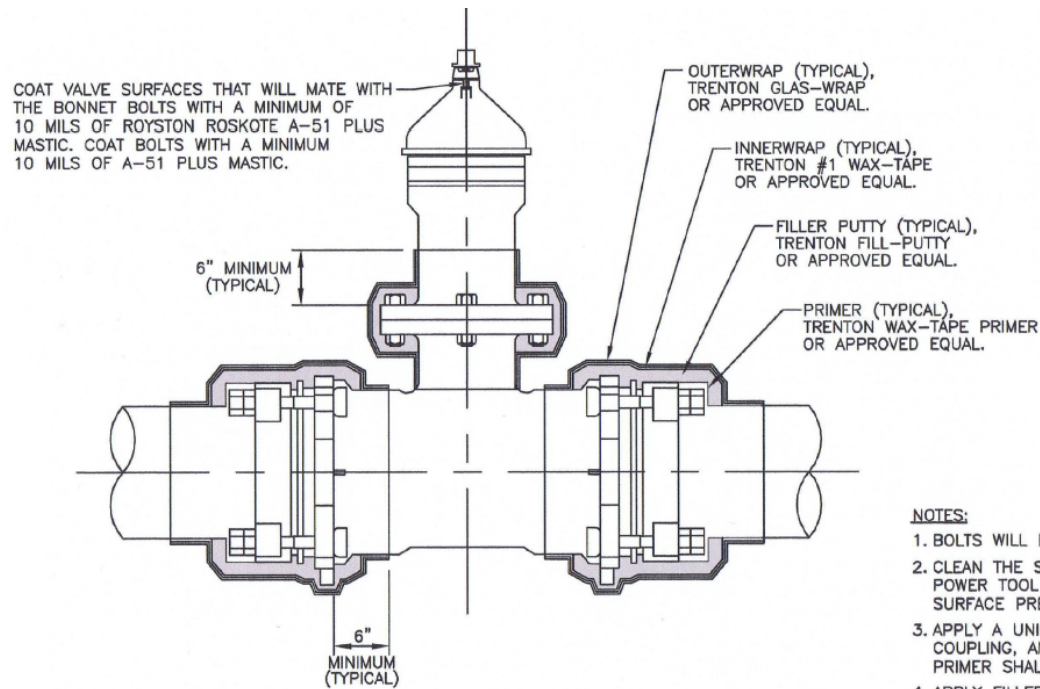
b. Materials

- (i) Primer: A blend of microcrystalline wax, plasticizer, and corrosion inhibitors having a paste-like consistency, designed to displace moisture, penetrate rust and wet the surface, ensuring adhesion of the tape. The primer shall be Trenton Wax-Tape Primer or approved equal.
- (ii) Filler Putty: A cold applied anti-corrosive moldable filler material used to even the contours of irregular fittings and surfaces. The filler putty shall have the following properties:
 - a. Specific gravity: 1.15
 - b. Density: 24 cu in/lb
 - c. The filler putty shall be Trenton Fill-Putty or approved equal. Filler putty shall be used at all irregular surfaces to provide a smooth surface for the application of the innerwrap and outerwrap.
- (iii) Innerwrap: A non-woven, non-stitch bonded synthetic fabrix saturated with a blend of microcrystalline wax, plasticizer, and corrosion inhibitor (no clay fillers). The inner tape shall have the following properties:
 - a. Thickness: 70 to 90 mils
 - b. Dielectric strength: 170 volt/mil
 - c. The innerwrap shall be Trenton #1 Wax-Tape or approved equal.
- (iv) Outerwrap: A white, resin-coated, woven fiberglass fabric. The outerwrap shall be the following properties:
 - a. Thickness: 0.005 inch
 - b. Tensile strength (per one inch width): 85 lb min
 - c. Tape width: 6 inches
 - d. The outerwrap shall be Trenton Glas-Wrap or approved equal

c. Application of Coating Materials

- (i) The mechanical couplings either side of the vale, including all components shall be fully coated for a minimum of 6 inches on either side of the coupling.

- a) Clean the surface of the coupling, and all of its components by power tool cleaning in accordance with SSPC-SP3. Follow all surface preparation recommendations of the coating manufacturer.
- b) Apply a uniform coat of the primer to the external surface of the coupling, and all of its components including; bolts, nuts, etc. The primer shall extend a minimum of six inches on either side of the coupling.
- c) Apply filler mastic to all irregular surfaces of the coupling, with special attention to the bolts, to assure a smooth profile for application of the inner tape coating.
- d) Apply innerwrap to the coupling, and its components in a spiral fashion with a minimum overlap of 55%. The innerwrap shall extend a minimum of six inches on either side of the coupling.
- e) Apply outerwrap to the coupling and its components in a spiral fashion with a minimum overlap of one inch. The outerwrap shall be applied with sufficient tension to provide continuous adhesion of the outerwrap tape.

**NOTES:**

1. BOLTS WILL BE TYPE 304 STAINLESS STEEL.
2. CLEAN THE SURFACE OF THE COUPLING, AND ALL OF ITS COMPONENTS BY POWER TOOL CLEANING IN ACCORDANCE WITH THE SSPC SP3. FOLLOW ALL SURFACE PREPARATION RECOMMENDATIONS OF THE COATING MANUFACTURER.
3. APPLY A UNIFORM COAT OF THE PRIMER TO THE EXTERNAL SURFACE OF THE COUPLING, AND ALL OF ITS COMPONENTS INCLUDING; BOLTS, NUTS, ETC. THE PRIMER SHALL EXTEND A MINIMUM OF SIX INCHES ON EITHER SIDE OF THE COUPLING.
4. APPLY FILLER MASTIC TO ALL IRREGULAR SURFACES OF THE COUPLING TO ASSURE A SMOOTH PROFILE FOR APPLICATION OF THE INNER TAPE COATING.
5. APPLY INNERWRAP TO THE COUPLING, AND ITS COMPONENTS IN A SPIRAL FASHION WITH A MINIMUM OVERLAP OF 55%. THE INNERWRAP SHALL EXTEND A MINIMUM OF SIX INCHES ON EITHER SIDE OF THE COUPLING.
6. APPLY OUTERWRAP TO THE COUPLING, AND ITS COMPONENTS IN A SPIRAL FASHION WITH A MINIMUM OVERLAP OF ONE INCH. THE OUTERWRAP SHALL BE APPLIED WITH SUFFICIENT TENSION TO PROVIDE CONTINUOUS ADHESION OF THE OUTERWRAP TAPE.

COATING OF MECHANICAL COUPLING AND VALVE BOLTS

N.T.S.

8.1.5 Sanitary Sewers

If existing conditions prohibit gravity flow then lift station/ejector pits are to be included in the design. Lift stations and ejector pits should be located outside the footprint of the building structure the restroom is within. In addition, secondary containment of the lift station and ejector pit should be considered to limit overflow into adjacent areas during system failure.

If a lift station or ejector pit is required, this **MUST** be brought to the attention of the MAA Office of Design & Construction during the design process. The exact requirements of the design will then be provided for inclusion in the project construction documents.

SEWAGE EJECTOR PIT DESIGN: All projects with sewage ejector pits should be designed with the ejector motors, pumps, impellers and related equipment outside the actual “sewage pit.” One acceptable method is to construct a wet/dry side pit. All motors, pumps, impellers, and equipment would be installed on the dryside with pipe connections to the wet/dry side (sewage pit side). The dryside of the pit would be sealed tight to prevent water and sewer gases infiltration. Other concepts will require the approval of the MAA Office of Design & Construction project manager and the Division of Maintenance. Refer to 11.4.1 Restroom Design for further information on sewage ejector pit design.

8.1.6 Electric/Phone/Telecommunications

8.1.6.1 Parking Facility Public Telephones

Parking facilities shall be equipped with public telephones. The Contractor should install the concrete pad and necessary conduits at the phone location. The telephone company (currently Verizon) should pull wiring and install housing and telephone.

8.1.7 Miscellaneous Site Elements

8.1.7.1 Electrical Structure Drains

An Electrical Structure Drain (ESD) shall be provided as a drainage design alternative for electrical manhole (MH) and handhole (HH) structures where other preferred alternate drainage measures may not be possible to facilitate drainage away from the Electrical and Communications (E/C) Infrastructure Systems.

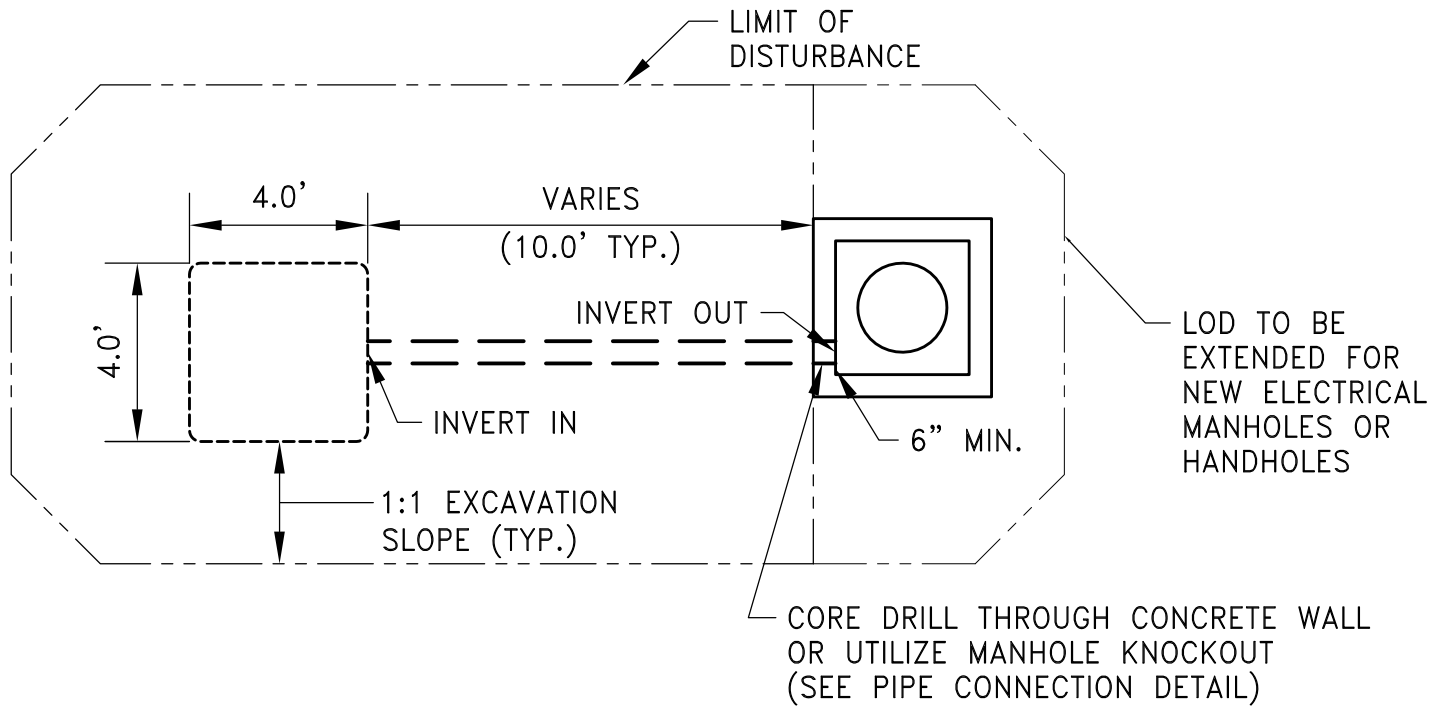
Qualifying Preferred Alternate Drainage Measures are the following:

- Install 6" Polyvinylchloride (PVC) drainage pipe from E/C MH or HH directly into a drainage MH in close proximity provided inverts permit positive drainage.
- Install 6" PVC drainage pipe from E/C MH or HH directly into drainage pipe in close proximity provided inverts permit positive drainage.

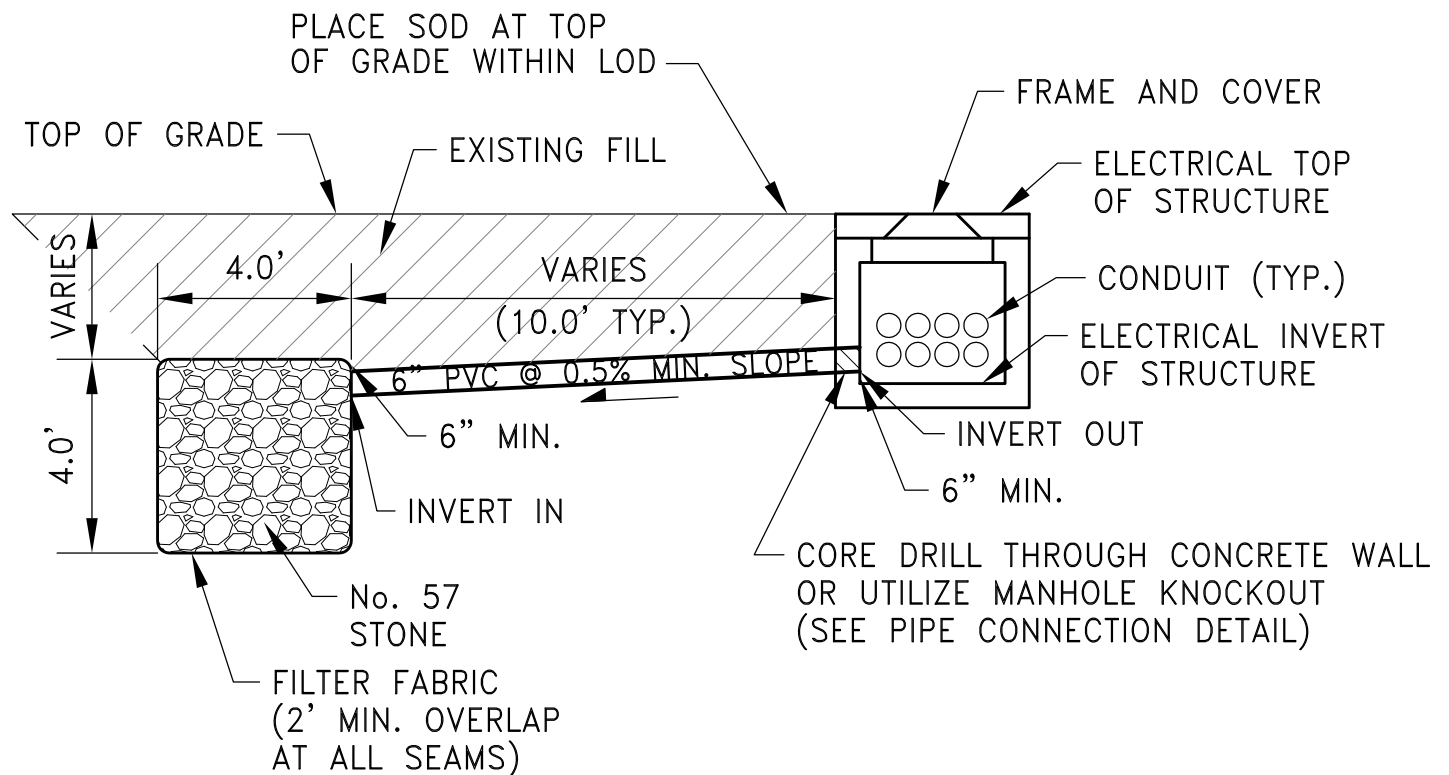
ESD(s) shall be installed in locations where space is available and where other preferred drainage measures cannot be provided in grass areas. For proposed E/C ductbank installations the design consultant shall provide either adequate space for ESD installations at an E/C structure or design the ductbank plan and profile to allow for the E/C ductbank infrastructure to drain to a low point at a MH or HH where an ESD can be installed.

Many design measures have been taken in the past to prevent water from entering the E/C infrastructure at lighting conduits, manholes, handholes, etc., however water has entered the E/C infrastructure despite those efforts, and design measures need to be taken to remove the water that has both entered in the past and will continue to enter in the future. For existing E/C ductbank runs, ESD(s) need to be installed at ductbank profile low points at E/C MH(s) and HH(s) where space is provided.

The following details depict the plan and section view of a typical ESD, section view of a typical pipe connection detail, and the plan view of a typical rodent screen detail.



ELECTRICAL STRUCTURE DRAIN DETAIL (PLAN) N.T.S.

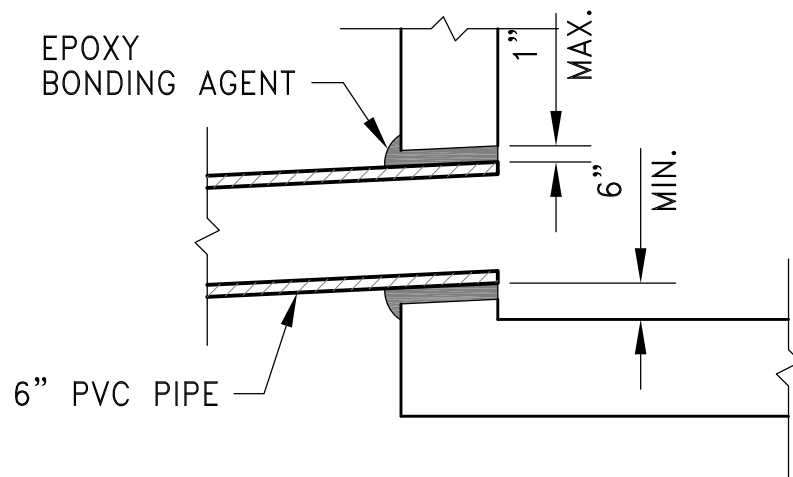


NOTE:

DEPTH OF DRAIN WILL VARY DEPENDING ON STUCTURE – 8' TO 9' FOR MANHOLES, AND 4' TO 5' FOR HANDHOLES.

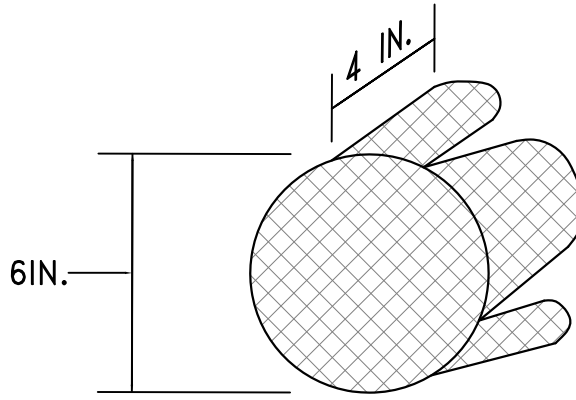
ELECTRICAL STRUCTURE DRAIN DETAIL (SECTION)

N.T.S.



PIPE CONNECTION DETAIL

N.T.S.



RODENT SCREEN

A REMOVABLE RODENT SCREEN SHALL BE CONSTRUCTED AT THE END OF ALL ELECTRICAL STRUCTURE DRAINS AS SHOWN. COMMERCIALY AVAILABLE GALVANIZED HARDWARE SCREEN IS TO BE SNUGLY FITTED INSIDE EACH OUTLET PIPE. THE SCREEN IS TO HAVE THE CAPABILITY OF BEING REMOVED AND REINSTALLED FOR MAINTENANCE OPERATIONS. THE SCREEN WIRES SHALL BE WELDED AT A SPACING IN EACH DIRECTION OF $\frac{3}{8}$ - TO $\frac{1}{2}$ -INCHES. THE COST OF THE SCREEN IS TO BE INCLUDED IN THE COST OF THE DRAIN.

8.1.7.2 *Bollards*

All bollards installed at BWI Marshall and Martin State Airports shall be concrete filled galvanized schedule 40 pipe not less than six (6) inches in diameter, painted yellow. Bollards shall be covered with a yellow, 1/8" thick HDPE bollard post cover, security fastened to the bollard in accordance with the manufacturer's recommendations. Sleeve height shall be from the top of the surrounding pavement to the top of the exposed pipe. Two red, reflective, 1-inch thick recessed bands shall be located within the top 18" of the bollard cover. Bollard cover manufacturer shall provide at least five (5) year warranty against warping, cracking, and fading.

Bollard placement shall be designed to protect buildings and other valuable assets from vehicular and mobile equipment impact without impeding access to the protected asset. Assets to be protected included, but are not limited to, above ground tanks, platforms, loading bridge foundations, generators, guard booths, baggage handling systems, etc. In the instance of fire hydrants and standpipes, the provision of, and location of, bollards will be subject to approval by the MAA Fire Marshal and bollards shall not be located in front of, or within three (3) feet of a fire hydrant steamer connection.

8.1.7.3 *Power Gate Loops*

The installation of the gate loop wire inside a plastic conduit pipe shall be mandatory when new pad concrete is poured.

8.1.8 Use of HDPE Pipe

1. HDPE Pipe is acceptable for underground use at BWI Marshall and MTN Airports for Sanitary Force Main, Natural Gas Distribution, communications conduit, and for electrical system directional bore. HDPE Pipe is prohibited for use with potable water and Fire Protection Water Systems or with glycol recovery drain/force main piping. HDPE Pipe is also prohibited for use inside railroad right-of-way.
2. Material Requirements:
 - a. High Density Polyethylene (HDPE) Pipe and Heat Fusion Fittings shall conform to AWWA C906, PE 3408. Pipe and fittings shall have a minimum standard dimension ratio (SDR) of eleven (11) rated for 160 psi and have a nominal ductile iron pipe size. Butt Fusion Fittings shall meet the requirements of ASTM D-2153 AND ASTM D-3261.
 - b. Use Butt Fusion Joining Technique for joining pipe segments and pipe fittings in accordance with the pipe manufacturer's written specifications. Mechanical couplings are not permitted for joining segments of HDPE pipe underground. Flange or other pipe adapters for connection to valves or

dissimilar pipe materials inside vaults or underground shall be as recommended by HDPE Pipe Manufacturer.

- c. Contractor shall certify that all joining operations are conducted by personnel trained by the joining equipment manufacturer. Certification shall be provided to the Resident Engineer prior to construction.
3. High Density Polyethylene Pipe (SDR 11) is furnished with inside diameters less than nominal pipe size which needs to be considered when determining pipe flow and velocity capabilities.
 4. All underground natural gas and sanitary force main installations must be buried with at least 36-inches of cover from top of pipe to finished grade. Pipe bedding shall consist of a minimum of 4" depth of compacted sand, peagravel, or small diameter clean aggregate placed all around HDPE Pipe with select backfill above to bottom of pavement subgrade. Tape continuous length of No.12 AWG Copper insulated tracer wire to top of pipe and install 6-inch wide by 5 mils thick detectable warning and identification tape centered directly above pipe.
 5. Testing:
 - a. Sanitary Force Main: Conduct piping tests before joints are covered. Fill pipeline 24 hours before testing and apply test pressure to stabilize system. Perform Hydraulic Test with pressure at 150 PSI for two hours. There should be no leakage. Remake leaking joints with new materials and repeat test until leakage is stopped.
 - b. Natural Gas Distribution: Conduct air pressure test per NFPA 54 on the gas system piping for at least 24 hours. Test pressure shall be 100 PSI. During the test, the entire system shall be completely isolated from all compressors and other sources of air pressure. Locate and repair leaks found and retest line until pressure holds for 24 hour test period.

8.2 AIRFIELD CIVIL/SITEWORK

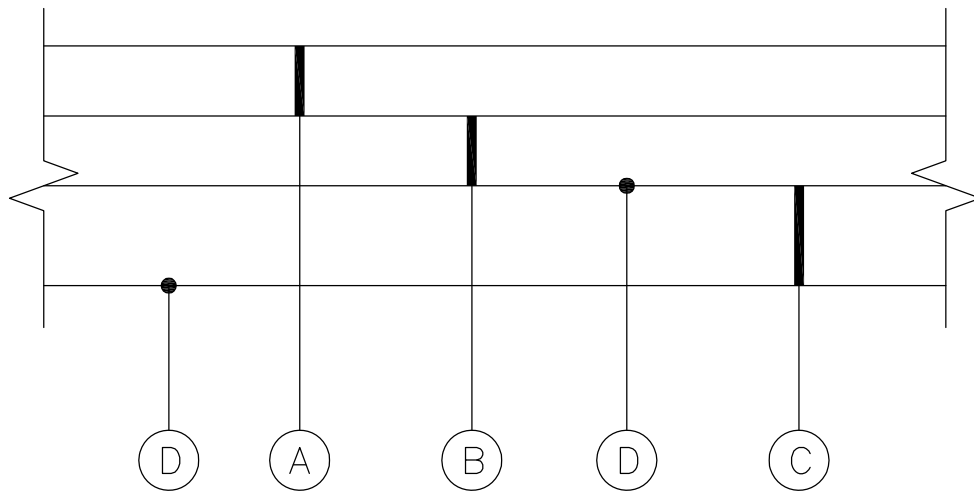
8.2.1 Pavement Design

1. The preferred pavement mixes used on the airside shall be the following:

Airside (P-401) Pavement Lift Thicknesses

Maximum Aggregate Size	Lift Thickness
1/2"	1.0 to 2.0"
3/4"	1.5 to 3.0"
1"	2.0 to 4.0"
1-1/4"	3.0 to 5.0"

2. The design and construction of all Martin State (MTN) Airport projects shall include the requirement of placing an additional layer of AASHTO #3 Stone under the design pavement section. The AASHTO #3 stone shall not be considered part of the structural pavement. Due to the excessive amount of unsuitable material located at MTN, MAA requires the consultant place a minimum of 12" of AASHTO #3 Stone and filter fabric over the entire paved area. The unsuitable material shall be removed and backfilled as determined by the engineer. AASHTO #3 Stone shall then be placed at a depth determined by the engineer prior to the placement of the subbase material. In addition, the engineer shall require filter fabric to be placed below and above the section of AASHTO #3. Refer to exhibit on the following page titled "*MARTIN STATE AIRPORT SECTION*" dated April 2005.



TYPICAL SECTION

NOT TO SCALE

LEGEND

- (A) PORTLAND CEMENT CONCRETE / BITUMINOUS ASPHALT PAVEMENT *
- (B) CRUSHED AGGREGATE BASE COURSE *
- (C) NO. 2 STONE *
- (D) FILTER FABRIC

* DEPTH TO BE DETERMINED BY THE ENGINEER

3. Subbase and Base Course: Cement Treated Base Course materials shall not be used in the design and construction of flexible pavements in projects at BWI Marshall or Martin State Airports.

8.2.1.1 Federal Aviation Administration (FAA) Specification Incentives

There are no incentive payments for either P-401 or P-501.

8.2.2 Pavement Marking

8.2.2.1 Heat Applied Preformed Thermoplastic Markings

All permanent pavement markings on the airfield at both BWI Marshall and Martin State Airport shall receive permanent heat applied preformed thermoplastic markings where permitted by the latest edition of Federal Aviation Administration Advisory Circular AC 150/5340-1, Standards for Airport Markings and Federal Specification 150/5370-10, Item P-620, Runway and Taxiway Painting.

All markings approved and listed for heat applied permanent preformed thermoplastic in the latest edition of Federal Aviation Administration Advisory Circular AC No: 150/5340-1, Standards for Airport Markings and Federal Specification 150/5370-10, Item P-620 Runway and Taxiway Painting shall receive permanent preformed thermoplastic markings. These include but are not limited to hold position markings, surface hold position signs, and taxiway centerline and edge lines. The material shall have a thickness of 65-mil, have a reflective glass beads refractive index of 1.5 or greater, and meet the requirements from the latest edition of Federal Specification 150/5370-10, Item P-620 Runway and Taxiway Painting.

The Designer shall specify in the contract documents that only trained and certified installers apply these markings.

8.2.2.2 Waterborne Paint

All permanent pavement markings on the runways at both BWI Marshall and Martin State Airport, with the exception of black markings, shall be waterborne paint containing glass beads.

Paint shall be waterborne in accordance with Federal Specification TT-P-1952E, Type I or Type II depending on usage [Type I has a standard drying time (no pick-up when tested in accordance with ASTM D 711), Type II may be used for striping where faster curing is desirable]. Paint shall be furnished in [white (37925), yellow (33538 or 33655), red (31136), black (37038), and pink (1 part red – 31136 to two parts white – 37925)] in accordance with Federal

Standard Number 595. Black paint should be used to outline a border at least six inches wide around markings on all pavements. Black and red paints shall not contain glass beads.

Glass beads shall meet the requirements for Federal Specification TT-B-1325D, Type III. Glass beads shall be treated with all compatible coupling agents recommended by the manufacturers of the paint and reflective media to ensure adhesion and embedment. Designers shall include in the construction documents the requirement glass beads shall be installed in the first application of paint.

8.2.3 Emergency Vehicle Access/Fire Lanes/Fire Hydrants and Fire Department Connections

Adequate emergency vehicle access and unobstructed access to fire protection system connections and equipment shall be provided at all facilities on the airport property, regardless of the facility ownership or lease/tenancy arrangements. Emergency vehicle access roadway shall be a minimum of 20 feet wide with surface and turning radii suitable for fire department apparatus and an unobstructed vertical clearance of not less than 13'-6" shall be maintained along the entire length of the roadway. No road level obstruction, such as vehicle parking, walls and fences shall be permitted in any portion of the emergency vehicle access. Clearances, markings, warning signs, etc., shall be provided for designated fire lanes, fuel hydrants, fire hydrants and fire department standpipe and sprinkler connections.

The design shall restrict standing or parking a vehicle within 15 feet of a fire hydrant (COMAR Subtitle 10, 21-1003 (m)). This shall include free standing or wall hydrants as well as fire department connections for automatic sprinkler and standpipe systems. As required by the OFM, approved signs, approved roadway surface markings, or other approved notices shall be provided and maintained to identify fire department access roads and/or access to fire hydrants and fire department connections or to prohibit the obstruction, thereof, or both. Where fire hydrants are subject to vehicular damage, hydrants shall be protected with bollards.

Signing and marking for fire hydrants and fire department connections shall be in accordance with COMAR Subtitle 10, 21-1003 (m), NFPA 1, Chapter 18, and Anne Arundel County Code (<http://www.aacounty.org/Fire/FireMarshal/FMOCODE/FireLanes.cfm>) and as follows:

8.2.3.1 Fire Hydrants and Fire Department Connections in Travel Lanes

All designated fire hydrant fire lanes shall be clearly marked in one of the following manners:

1. Vertical curbs six inches in height shall be painted yellow on the top and side, extending the length of the designated fire lane. The pavement adjacent to the

painted curbs shall be marked with block lettering a minimum of 18 inches in height and with a three-inch brush stroke reading "NO PARKING – FIRE LANE". Lettering shall be yellow and spaced at no more than 50-foot intervals.

2. Rolled curbs or surface without curbs shall have a yellow six-inch-wide stripe painted extending the length of the designated fire lane. The surface adjacent to the strip shall be marked with block lettering a minimum of 18 inches in height and with a minimum three-inch brush stroke reading "NO PARKING – FIRE LANE". Lettering shall be yellow and spaced at no more than 50-foot intervals.
3. Fire lane signs which shall be as follows (see exhibit on following page):
 - a. Reflective.
 - b. Red letters on white background.
 - c. Lettering sizes as shown.
 - d. A minimum of 12 inches wide by 18 inches tall.
 - e. Bottom of sign shall be installed 7 feet above grade.
 - f. Sign may be placed on a building when approved by the fire chief in coordination with the building official.
 - g. When posts are required for signs, they shall be a minimum of two-inch galvanized steel or 4 x 4 inch pressure treated wood.
 - h. Signs shall be placed so they face the direction of vehicular travel.

8.2.3.2 Fire Hydrants and Fire Department Connections in Non-Travel Lanes (Parking Lots)

All designated fire hydrant fire lanes shall be clearly marked in one of the following manners (see exhibit on following page):

1. Markings shall extend 15 feet on either side of fire hydrant/connections.
2. Outer line shall extend 3 feet from face of curb.
3. All striping shall be a minimum of 6-inch lines.
4. Chevron lines shall be spaced at 6 foot intervals.
5. Shall be marked with block lettering a minimum of 18 inches in height and with a minimum three-inch brush stroke reading "NO PARKING – FIRE LANE". Lettering shall be yellow and spaced at no more than 50-foot intervals.
6. Fire lane signs shall be placed as shown.

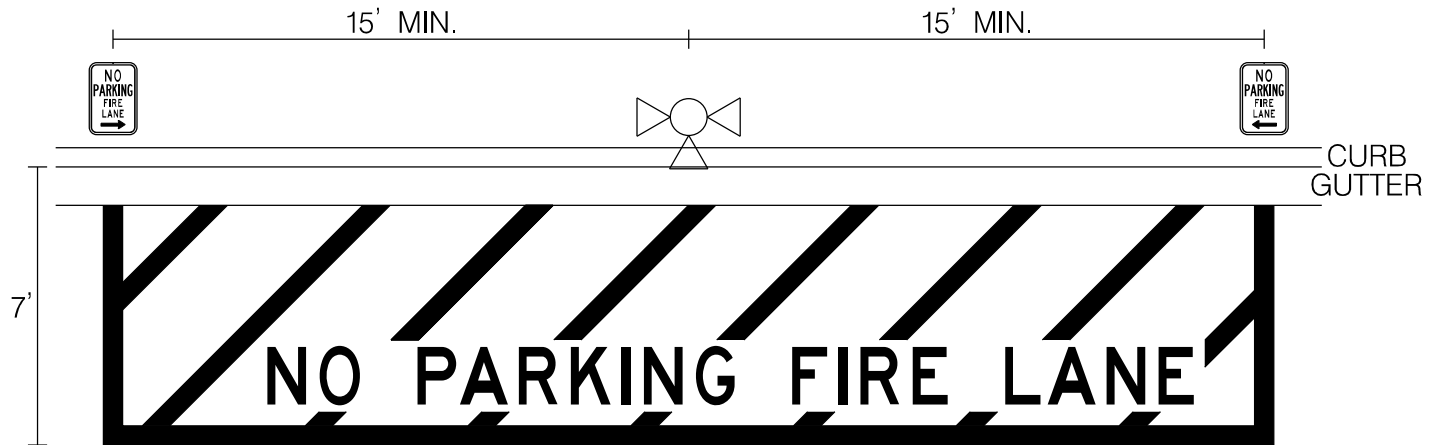
8.2.3.3 Fire Hydrants and Fire Department Connections at Face of Buildings or Other Structures

All designated fire hydrant fire lanes shall be clearly marked in one of the following manners (see exhibit on following page):

1. A 15-foot x 10-foot minimum area shall be marked.
2. Shall be marked with block lettering a minimum of 18 inches in height and with a minimum three-inch brush stroke reading “NO PARKING – FIRE LANE”. Lettering shall be yellow.

Coordination with the OFM is required during facility planning and design development stages. Fire lane layouts shall be included on the design drawings. Where design or construction activities will temporarily or permanently obstruct an existing emergency vehicle access, an alternative access must be provided during the time of the obstruction that is reviewed and approved in writing by the OFM and included in the design drawings.

HYDRANT PROTECTION MARKING NON-TRAVEL LANES



- ALL STRIPING – MINIMUM 6" THICK LINES, YELLOW PAVEMENT MARKINGS WITH GLASS BEADS. WHEN ON CONCRETE PAVEMENT PLACE ON BLACK BACKGROUND
- OUTER LINE – 3' FROM FACE OF CURB OR EDGE OF ROAD
- CHEVRON – 3' SPACING C / C, 45° ANGLE
- NO PARKING FIRE LANE GRAPHIC – MINIMUM 18" HIGH
- PLACE FIRE LANE SIGNS AS SHOWN

FIRE LANE SIGN R7-1 MOD.



- SIGN MATERIAL AND LETTERING SHALL BE REFLECTIVE
- GRAPHICS AND BORDER SHALL BE RED ON WHITE BACKGROUND
- BOTTOM OF SIGN SHALL BE INSTALLED 7 FT ABOVE GRADE
- ARROW SHALL POINT IN ONLY ONE DIRECTION TOWARD THE FIRE LANE

HYDRANT PROTECTION MARKING AT FACE OF BUILDING OR STRUCTURE



- ALL STRIPING – MINIMUM 6" THICK LINES, YELLOW PAVEMENT MARKINGS WITH GLASS BEADS. WHEN ON CONCRETE PAVEMENT PLACE ON BLACK BACKGROUND
- CHEVRON – 3' SPACING C / C, 45° ANGLE
- NO PARKING FIRE LANE GRAPHIC – MINIMUM 18" HIGH
- PLACE FIRE LANE SIGNS AS SHOWN

8.2.4 Aircraft Parking Marking

To provide safety and uniformity on the ramps and aprons at BWI Marshall Airport, all aircraft gate and RON markings shall adhere to the following standards. If a Tenant requires a gate marking in addition to or different than those specified in this standard, they shall submit a building permit/installation permit for the intended change or modification (such as envelope shape, line widths, and colors). Upon BWI Marshall Airport Operations' approval and receipt of an installation permit for the intended modification, Airlines may install their specific standard gate marking.

8.2.4.1 Loading Bridge Gates

It is required that all Loading Bridge Gates comply, at minimum, with the following marking standards.

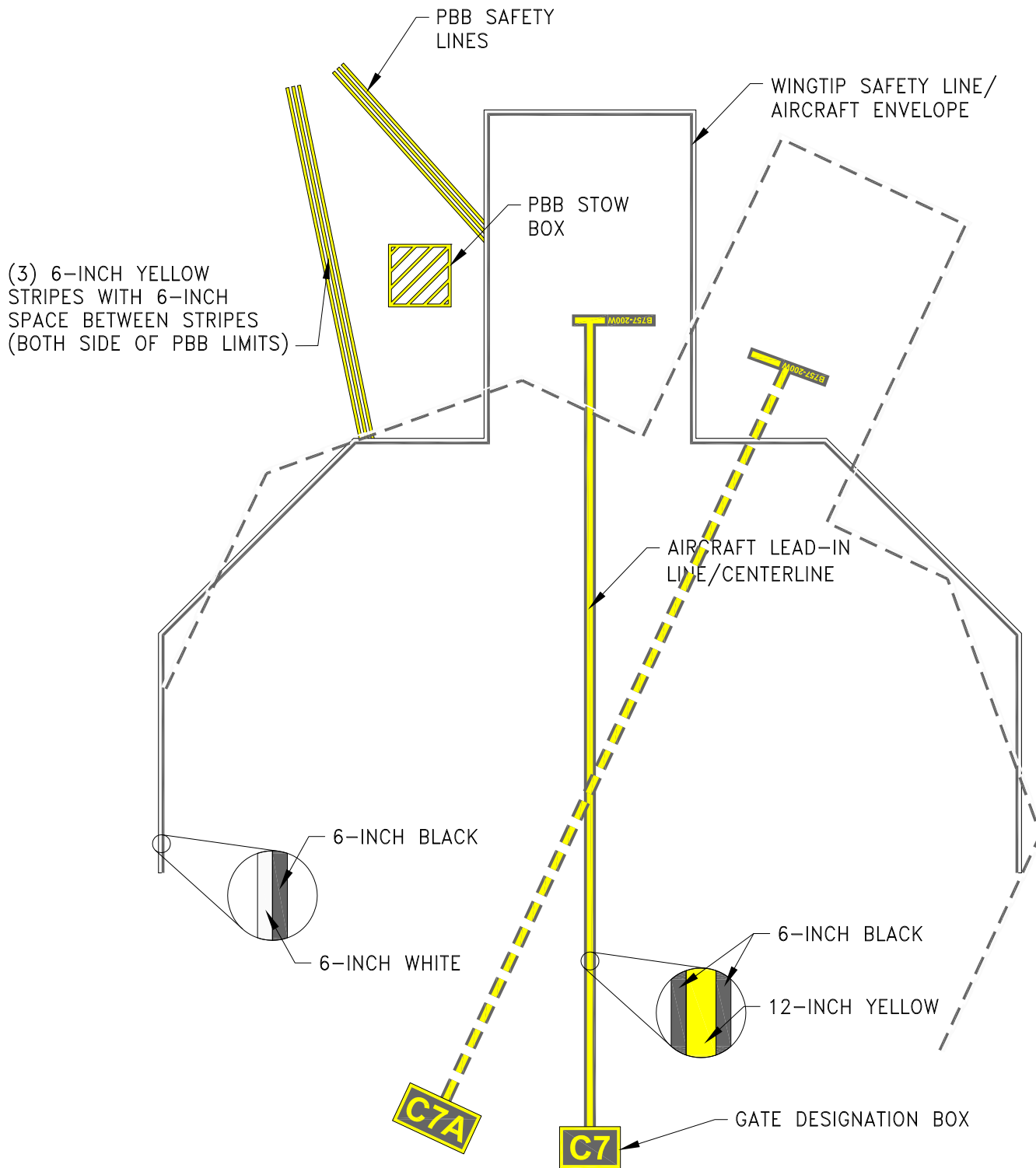
1. Wingtip Safety Line or Aircraft Envelope shall be 6-inch white with 6-inch black highlight on the inside or aircraft side of the stripe.
2. Aircraft Lead-in Lines or Centerline Marking shall be 12-inch yellow with 6-inch black outline on both sides (See Aircraft Parking Marking I Exhibit).
3. Nose Wheel Stop Bars shall be 12-inch thick, 5-foot wide yellow with 6-inch black outline on all sides.
4. Text defining the aircraft type at a given Nose Wheel Stop Bar shall be 12-inch tall yellow letters with black background. Text shall be justified to the left when located on the right side of the stop bar and justified to the right when located on the left side of the stop bar.
5. The Gate Designation Box at the end of the lead-in line shall include the pier designation and gated number with 4-foot tall yellow letters, black background, and 4-inch minimum width stroke. The black background shall extend a minimum of 12-inches beyond the extremities of the letters. It shall be encompassed with 6-inch yellow and 6-inch black outlines. (See Aircraft Parking Marking II Exhibit)
6. Passenger Boarding Bridge (PBB) safety lines shall include three (3) 6-inch yellow stripes with 6-inch spacing between stripes. No black outlines are required on either side of the PBB Safety Line.
7. PBB Stow Box shall be 6-inch yellow, 10-foot by 10-foot square, with 6-inch yellow stripes at a 45 degree angle (no black outline).
8. An alternate centerline and envelope may be required when a gate or RON position can accommodate different aircraft groups or sizes under different scenarios. The secondary, or less used set of marking, shall then be dashed. The widths and colors for the lead-in lines and aircraft envelope remain constant; however the marking shall be altered to 10-foot long stripes with 10-foot long spaces. (See Aircraft Parking Marking II Exhibit).

8.2.4.2 Remain Overnight (RON) Marking

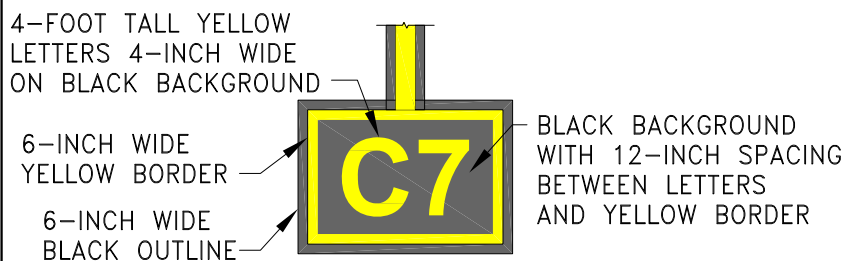
It is required that all Non-Loading Bridge Gates and RON only parking positions comply, at minimum, with the following marking standards.

1. Wingtip Safety Line or Aircraft Envelope shall be 6-inch white with 6-inch black highlight on the inside or aircraft side of the stripe.
2. Aircraft Lead-in Lines or Centerline Marking shall be 12-inch yellow with 6-inch black outline on both sides (See Aircraft Parking Marking I Exhibit).
3. Nose Wheel Stop Bars shall be 12-inch thick, 5-foot wide yellow with 6-inch black outline on all sides.
4. Text defining the aircraft type at a given Nose Wheel Stop Bar shall be 12-inch tall yellow letters with black background. Text shall be justified to the left when located on the right side of the stop bar and justified to the right when located on the left side of the stop bar.
5. The Gate Designation Box, if applicable, at the end of the lead-in line shall include the pier or RON pad designation and position number with 4-foot tall yellow letters, black background, and 4-inch minimum width stroke. The black background shall extend a minimum of 12-inches beyond the extremities of the letters. It shall be encompassed with 6-inch yellow and 6-inch black outlines. (See Aircraft Parking Marking II Exhibit)
6. An alternate centerline and envelope may be required when a gate or RON position can accommodate different aircraft groups or sizes under different scenarios. The secondary, or less used set of marking, shall then be dashed. The widths and colors for the lead-in lines and aircraft envelope remain constant; however the marking shall be altered to 10-foot long stripes with 10-foot long spaces. (See Aircraft Parking Marking II Exhibit).

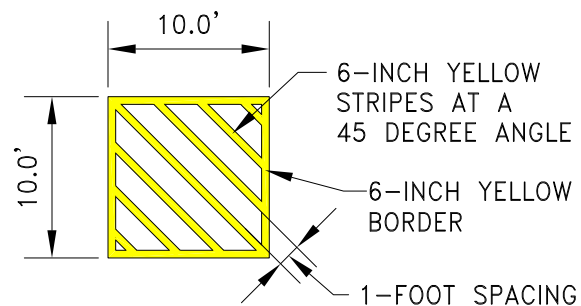
All pavement marking shall comply with MAA Design Standard Section 8.2.2 Pavement Marking.



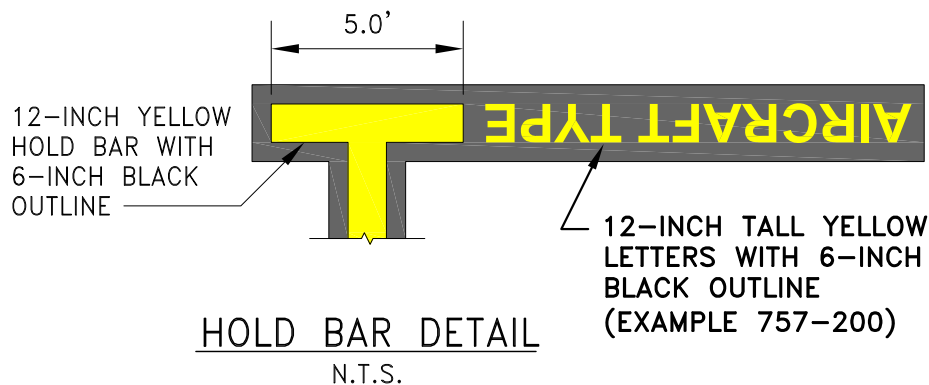
MAA TYPICAL AIRCRAFT ENVELOPE
AS SHOWN



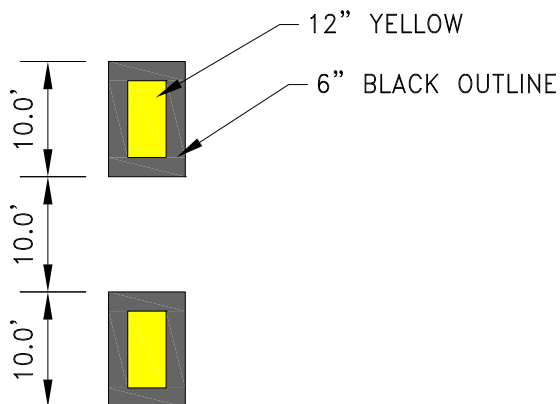
GATE DESIGNATION
BOX DETAIL
N.T.S.



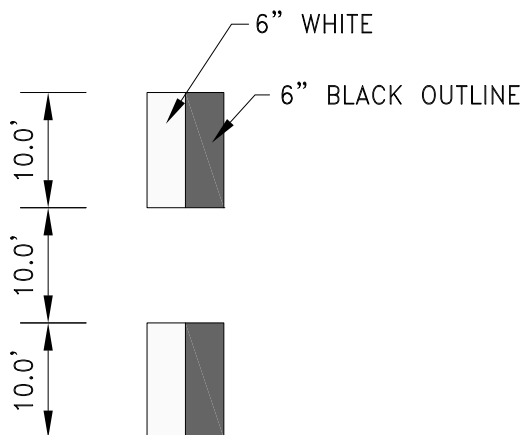
PASSENGER BOARDING
BRIDGE STOW BOX
N.T.S.



HOLD BAR DETAIL
N.T.S.



DASHED LEAD-IN LINE/
CENTERLINE MARKING
N.T.S.



DASHED AIRCRAFT
ENVELOPE MARKING
N.T.S.

8.3 LANDSIDE CIVIL/SITEWORK

8.3.1 Roadways and Parking

8.3.1.1 Concrete Curb

Only Combination Curb and Gutter shall be used as per MDSHA Standard 620.02. Straight Curb shall not be used under any circumstances.

8.3.1.2 Pavement Markings on Landside Pavements

Pavement markings on all landside pavements shall conform to the latest version of the applicable Maryland State Highway Administration (MDSHA) specification as outlined below. These specifications can be found on the MDSHA website under “Supplemental Specifications and Provisions” <http://www.sha.maryland.gov/pages/ssp.aspx?PageID=854&lid=SSPJUL2008>. The specifications, when applicable, shall be inserted in the contract documents.

1. Landside Asphalt Pavements

- a. Thermoplastic pavement markings conforming to MDSHA Standard Specifications for Construction and Materials Section 553 – Lead Free Reflective Thermoplastic Pavement Markings.
 - The manufacturer’s recommendations shall be followed for the duration between installation of the asphalt pavement and application of the thermoplastic pavement markings.
 - Thermoplastic pavement markings shall not be placed over existing pavement marking tape on existing asphalt pavement. The existing tape shall be removed prior to placement of the thermoplastic pavement markings.
- b. Alternatively, inlaid permanent preformed pattern reflective pavement marking materials conforming to MDSHA Standard Specifications for Construction and Materials Section 559 – Permanent Preformed Patterned Reflective Pavement Markings, may be used.

2. Landside Concrete Pavements

- a. Permanent preformed contrast pattern reflective pavement markings materials conforming to MDSHA Standard Specifications for Construction and Materials Section 559 – Permanent Preformed Patterned Reflective Pavement Markings.
 - Existing contrast pavement markings shall be removed per MDSHA standard specifications for Construction Materials

SECTION 565 – REMOVAL OF EXISTING PAVEMENT MARKINGS with high pressure water blasting or other manual removal methods as outlined.

3. Landside Legends and Symbols

- a. Heat applied permanent preformed thermoplastic pavement markings meeting MDSHA Standard Specifications for Construction and Materials Section 556 – Preformed Thermoplastic Pavement Markings.

4. Parking Lots

- a. All markings shall be thermoplastic pavement markings as described in Landside Asphalt Pavement above and conforming to MDSHA Standard Specifications for Construction and Materials Section 553 – Lead Free Reflective Thermoplastic Pavement Markings.
- b. Crosswalks, messaging, and symbols shall be heat applied permanent preformed thermoplastic pavement markings conforming to MDSHA Standard Specifications for Construction and Materials Section 556 – Preformed Thermoplastic Pavement Markings.

5. Parking Garages

- a. Lane, stall, and numbering markings shall use solvent based Low VOC Acrylic Traffic Marking Paint which is a conventional dry (non-heat applied) acetone based paint for use on concrete and asphalt pavements.
- b. Crosswalks, messaging, and symbols shall be heat applied permanent preformed thermoplastic pavement markings conforming to MDSHA Standard Specifications for Construction and Materials Section 556 – Preformed Thermoplastic Pavement Markings.
- c. Consolidated Rental Car Facility (CRCF) Garage – The CRCF Garage is an exception and shall use solvent based Low VOC Acrylic Traffic Marking Paint which is a conventional dry (non-heat applied) acetone based paint for use on concrete and asphalt pavements for all markings including lane, stall, numbering, crosswalks, messaging, and symbols.

8.3.2 Pavement Design

The preferred pavement mixes used on the landside shall be from this list:

1. 9.5 mm PG 64-22 Level 2

2. 9.5 mm PG 64-22 Level 2 HPV
3. 9.5 mm PG 64-22 Level 4
4. 9.5 mm PG 64-22 Level 4 HPV
5. 9.5 mm PG 76-22 Level 4
6. 9.5 mm PG 76-22 Level 4 HPV
7. 9.5 mm PG 76-22 Level 4 GAP
8. 12.5 mm PG 64-22 Level 2
9. 12.5 mm PG 64-22 Level 2 HPV
10. 12.5 mm PG 64-22 Level 4
11. 12.5 mm PG 64-22 Level 4 HPV
12. 12.5 mm PG 76-22 Level 4
13. 12.5 mm PG 76-22 Level 4 HPV
14. 12.5 mm PG 76-22 Level 4 GAP
15. 19.0 mm PG 64-22 level 2
16. 19.0 mm PG 64-22 Level 4
17. 25.0 mm PG 64-22 Level 2
18. 25.0 mm PG 64-22 level 4

Landside (Superpave) Pavement Lift Thicknesses

Nominal Aggregate Size	Lift Thickness
9.5 mm	1.0 to 2.0"
12.5 mm	1.5 to 3.0"
19.0 mm	2.0 to 4.0"
25.0 mm	3.0 to 5.0"

8.3.3 Landscaping

The MAA Office of Planning and Environmental Services has developed Landscaping, Topsoil, Seeding, and Sodding specifications for MAA owned and operated Airports. The specifications are found in Appendix D and should be used in the design and construction of projects at BWI Marshall and Martin State Airports. Design of Forest Conservation Plans and exceptions to the specifications must be coordinated with the Manager, Division of Environmental Planning.

CHAPTER 9 PASSENGER BOARDING BRIDGES

9.1 GENERAL

The information below outlines the basic requirements for Passenger Boarding Bridge (PBB) design for MAA projects. It is important to note that ALL PBBs at BWI Marshall are owned by the MAA and therefore must be consistent with MAA's basic parameters so that maintenance and operation of the bridges are simplified. The initial steps in design and procurement of the PBBs are as listed below. In addition, please refer to the PBB Standard Specification included in Appendix D for further details regarding PBB design.

9.2 INITIAL STEPS

9.2.1 Step One – Programming

The design consultant shall establish the Aircraft Fleet Mix that will be utilizing each existing or proposed passenger boarding bridge (PBB) in coordination with the following MAA Departments:

- Design – The assigned Task Manager will assist and coordinate the definition and extent of the project effort.
- Airport Operations – The representative will coordinate current and proposed use and schedule for the gate where the bridge will be installed and highlight any unique issues associated with each gate installation (schedule, fleet mix, existing conditions, etc).
- Commercial Management – The representative will assist with airline coordination and development with the fleet mix requirements and typical accessories (Section 9.4) that are to be included. Typically, the fleet mix should have the most flexibility between the airline projected to use the gate and the needs of Operations. All parties shall be consulted in order to arrive at a design solution that most efficiently addresses the consensus of needs for the airport while meeting all of the code requirements in the process.
- Planning/Fire Marshal – The representative will assist with approval of holdroom sizing requirements.
- Maintenance and Utilities – The representative will assist with the electrical sub-metering requirements.

9.2.2 Step Two – Site Evaluation

The design consultant shall inspect and evaluate existing and proposed site conditions that may impact the operational capabilities of each PBB. Some of the limiting site conditions that may be encountered are the following:

- Obstacles on or adjacent to the terminal or PBB that may inhibit the PBBs rotation (i.e. – light poles, building soffits and overhangs, trash compactors, access to garage or person doorways, pantograph mounting brackets, etc.).
- Obstacles on or adjacent to the terminal or PBB that may inhibit the PBBs extension and/or retraction (i.e., PC Air Units, 400 Hertz Units, Roof Mounted Vents, etc.).

In the event an existing foundation is being modified or a PBB is being relocated, the existing site condition, bolt pattern, systems, etc. shall be inventoried and confirmed prior to commencing design.

9.2.3 Step Three – Design

The design consultant shall select a standard PBB Model/Size that will accommodate the fleet mix of aircraft for each gate which can be used as the prototype for purposes of bidding. The PBB sizing shall be based on and meet the requirements as outlined in Section 9.3 Requirements.

As part of Step Three a design report is to be provided with signed and sealed calculations as required. The report shall include site plans for each gate showing the proposed fleet mix, swing of each gate including minimum and maximum PBB lengths, and any additional information for future reference.

9.3 REQUIREMENTS

9.3.1 Slope and Code Requirements

The operation of a PBB shall satisfy American Disabilities Act (ADA) slope requirements for enplaning and deplaning passengers from each aircraft in the fleet mix for each respective gate. Each tunnel of the designed and specified PBB shall not exceed a 1/10 or 10 percent slope. At BWI Marshall the slope of each tunnel of a PBB shall be calculated by subtracting the center of cab elevation from the center of rotunda elevation, and dividing by the horizontal distance from the center of the cab to the center of the rotunda. The cab elevation shall equal the sill height of the aircraft.

$$\text{PBB Slope} = \frac{\text{RE} - \text{CE} - (\text{T} - 1) * 0.5}{\text{X}}$$

Where: RE = Rotunda Elevation
CE = Cab Elevation
T = Number of Tunnels
X = Distance from Center of Cab to Center of Rotunda

Typically projects installing and/or modifying PBBs should be designed and specified to allow the operation of the PBB(s) to access the forward two (2) left passenger (L1 and

L2) doors of the aircraft where applicable. However, the designer should confirm these parameters with the departments mentioned above prior to completion of the design.

The operation of a PBB shall satisfy National Fire Protection Agency (NFPA) 415 requirements outlining the protection and safety of the passengers utilizing the PBB. PBB's shall conform to Section 12.4.10 of the Life Safety Code.

9.3.2 Structural Analysis

A structural analysis of the PBB foundation must be performed. The design consultant shall verify the adequacy of any existing foundation for any relocations, additions, modifications, etc. For new installations, the foundation system shall be designed with the intended PBB to be used based on Step 3 above. The analysis and/or design shall be signed and sealed by a professional engineer registered in the state of Maryland.

9.3.3 Contract Technical Specification

The installation of a PBB regardless if new or relocated, shall have a Technical Specification. The standard technical specification, Section 347713X Passenger Boarding Bridges is included in Appendix D. It is important to note the technical specification needs to have the following acceptance testing and pavement marking:

Contractor Testing Requirements

The operation of a PBB shall undergo a test for the most demanding aircraft docking procedures to ensure proper mating of the PBB to the aircraft. Temporary tape shall be utilized for the stop bar and lead-in lines for the aircraft test park. Following a successful test, the final pavement marking for the aircraft may then take place.

Pavement Marking

The operation limits of a PBB shall be outlined by pavement marking to indicate the limits of travel to enhance the safety of persons on the apron hardstand and protect the PBB from vehicular conflicts. The pavement marking shall consist of three (3) 6-inch wide yellow reflectorized stripes separated by two (2) 6-inch spaces. The marking shall encompass and allow for the PBB to be extended to its furthest docking position, allow for the PBB to be contracted to its storage or staging position, while providing the necessary clearances for the oversized baggage slide and other hardware attached to the PBB at all times during its swept path. The limits depicted by the marking shall coincide with the limit switches set in the PBB itself. As a result, the pavement markings shall be set in the field after the PBB operations at each individual gate have been accepted and set. The quantity of marking is estimated by the design consultant based on the anticipated PBB movements outlined above, and presented to the contractor in square footage of marking required for bidding purposes. The limits of the pavement marking shall be as-built by the contractor in the field and provided back to the engineer of record and owner.

9.3.4 Remove and Dispose of Bridge

If a bridge is to be removed and disposed, the MAA Office of Maintenance and Utilities (OMU) shall be notified so that usable parts can be salvaged prior to the removal (See PBB specification in Appendix D).

9.4 TYPICAL ACCESSORIES

The following accessories are typically included and installed on a PBB and shall be discussed and confirmed with the Task Manager during the design effort and specified by the design consultant. As the MAA owns the PBB, they do not typically provide for or own the preconditioned air units or 400 Hz systems at domestic gates. Designer is to confirm whether these items are to be provided.

9.4.1 Pantograph or Cable Conveyance System

Any new or relocated PBB shall be provided with a cable conveyance system of sufficient capacity to accommodate PC Air and 400 Hz units for the design aircraft fleet mix at the gate for which the PBB is intended. At a minimum, one four-inch (4") diameter aluminum pantograph will be provided, with length to cover the movable sections of the PBB for routing power to the PC Air and 400 Hz units. (See PBB Specification in Appendix D).

9.4.2 Telephone

The PBB manufacturer shall make provisions for telephone service. There shall be one telephone outlet integrated in the cab area of the PBB. As a result, the design consultant shall coordinate with MAA's Office of Airport Technology and shall provide adequate information in the plans and specifications to ensure that telephone service is provided at the PBB (See PBB Specification in Appendix D).

9.4.3 Pre-Conditioned Air

The MAA does not typically provide Pre-Conditioned Air (PCA) units at domestic gates as previously noted. PCA units are typically owned by the airlines. If a PBB with a PCA unit is being relocated, the airline who owns the gate is to remove and reinstall on the PBB placed at the gate. This includes new or relocated PBBs.

PCA units installed on PBBs require structural and electrical load calculations to ensure the electrical loads can be supported by both the PBB and the electrical infrastructure. As a result, the design consultants shall provide adequate information in the plans and specifications to ensure that the load requirements, the power requirements, and contractual arrangements are satisfied. For additional requirements including utility metering installation requirements, refer to Section 9.5 Pre-Conditioned Air and 400 Hertz Systems and Associated Loading Bridge Requirements Section 18.1.2 Total Harmonic Distortion (See PBB Specification in Appendix D). The Designer shall locate

the units based on the combined geometry of the PBB and aircraft layout to ensure that there are no conflicts with the equipment placement.

9.4.4 400 Hertz Point-of-Use

The MAA does not typically provide 400 Hertz (Hz) units at domestic gates as previously noted. 400 Hz units are typically owned by the airlines. If a PBB with a 400 Hz unit is being relocated, the airline who owns the gate is to remove and reinstall on the PBB placed at the gate. This includes new or relocated PBBs.

400 Hz Point-of-Use (POU) units installed on PBB(s) require structural and electrical load calculations to ensure the loads can be supported by both the PBB and the electrical infrastructure. As a result, the design consultant shall provide adequate information in the plans and specifications to ensure that the load requirements, the power requirements, and contractual arrangements are satisfied. For additional requirements including utility metering installation requirements, refer to Section 9.5 Pre-Conditioned Air and 400 Hertz Systems and Associated Loading Bridge Requirements Section 18.1.2 Total Harmonic Distortion (See PBB Specification in Appendix D). The Designer shall locate the units based on the combined geometry of the PBB and aircraft layout, and capability to accommodate regional jets to ensure that there are no conflicts with the equipment placement.

9.4.5 Electrical Submetering

Electrical submetering is on all existing PBBs. Electrical submetering shall be checked for on existing gates during design, added to new gates, and coordinated with the MAA Project Manager during design.

9.4.6 Adjustable Cab Floor (Articulating Cab Floor (ACF))

All BWI Marshall PBBs shall be Regional Jet (RJ) capable. PBBs to be utilized for mating to regional jets shall be equipped with an adjustable cab floor to allow proper mating to the regional jet aircraft while preserving the ability of the PBB to be utilized for wider bodied aircraft. RJ capable bridges include the following:

- Floor flap adjustment for RJ doors.
- Fold out hand rails necessary for extension into the RJs with retractable air stairs.
- Additional cushion on PBB for contact mating of bridge and aircraft fuselage.

The design consultant shall provide the minimum and maximum height ranges required to be serviced at each individual gate by the PBB. The designer shall identify to the MAA Project Manager and identify in the design report any restriction to larger aircraft using the PBB as a result of the RJ usage.

9.4.7 Task Lighting

Task Lighting installed on PBBs shall consist of two (2) floodlight fixtures. The first floodlight fixture shall be mounted 4 feet above the top of the PBB on the right side of the PBB to illuminate the apron area in the swept path of the PBB. The second floodlight fixture shall be mounted 10 feet above the left side of the PBB on the left side of the PBB to illuminate the apron area adjacent to the aircraft (See Typical Task Light Fixture Mounting Detail).

The floodlight fixtures require structural and electrical load calculations to ensure the added structural and electrical loads can be supported by both the PBB and the electrical infrastructure (See Task Lighting Mounting Detail - Elevation on the following pages). All calculations shall be signed and sealed by a professional engineer for the respective design responsibility and included in a design report. Task Lighting installations shall contain two (2) LED 60-minute rotary timers to minimize lighting costs (See Task Lighting Wiring Diagram on the following pages) (See PBB Specification in Appendix D).

9.4.8 Solid Tires

Solid Rubber Tires shall be included in the specification requirements for all BWI Marshall PBBs.

9.4.9 Gate Identification Signs

Three Sided Gate Identification Signs shall be installed on new or relocated PBBs (See PBB Specification in Appendix D).

9.4.10 Baggage Slides

Automated baggage slides are not to be provided with new (or relocated) bridges. The designer shall coordinate with MAA Commercial Management to confirm. The designer shall also coordinate with Commercial Management to confirm current accessories located at each gate (i.e. - cover, motorized lifting platform, etc.) and airline preferences, if any.

9.4.11 Subflooring

Subflooring on new PBB's shall be galvanized/galvanealed smooth steel or three quarter inch (3/4") marine grade plywood.

9.4.12 Finished Flooring

Cab flooring shall be of ribbed rubber (see Specification PBB-100 in Appendix D for additional detail). Carpet shall be installed on the flooring of the PBBs (See

Specification PBB-100 in Appendix D). Per NFPA 415, carpet shall meet the requirements for Class-I carpet flame spread rating.

Designers shall specify an additional 10% of carpet quantity in each contract to be used as MROI (a.k.a. attic stock). The amount shall be confirmed with MAA Office of Maintenance and Utilities – Division of Contract Support. (Refer to DST Section 4.17, Maintenance, Repair and Operating Items (MROI)).

9.4.13 Exterior Finishes

Surface preparation, primer, and finish coat for the PBBs shall be provided (See PBB Specification in Appendix D).

9.4.14 Canopy

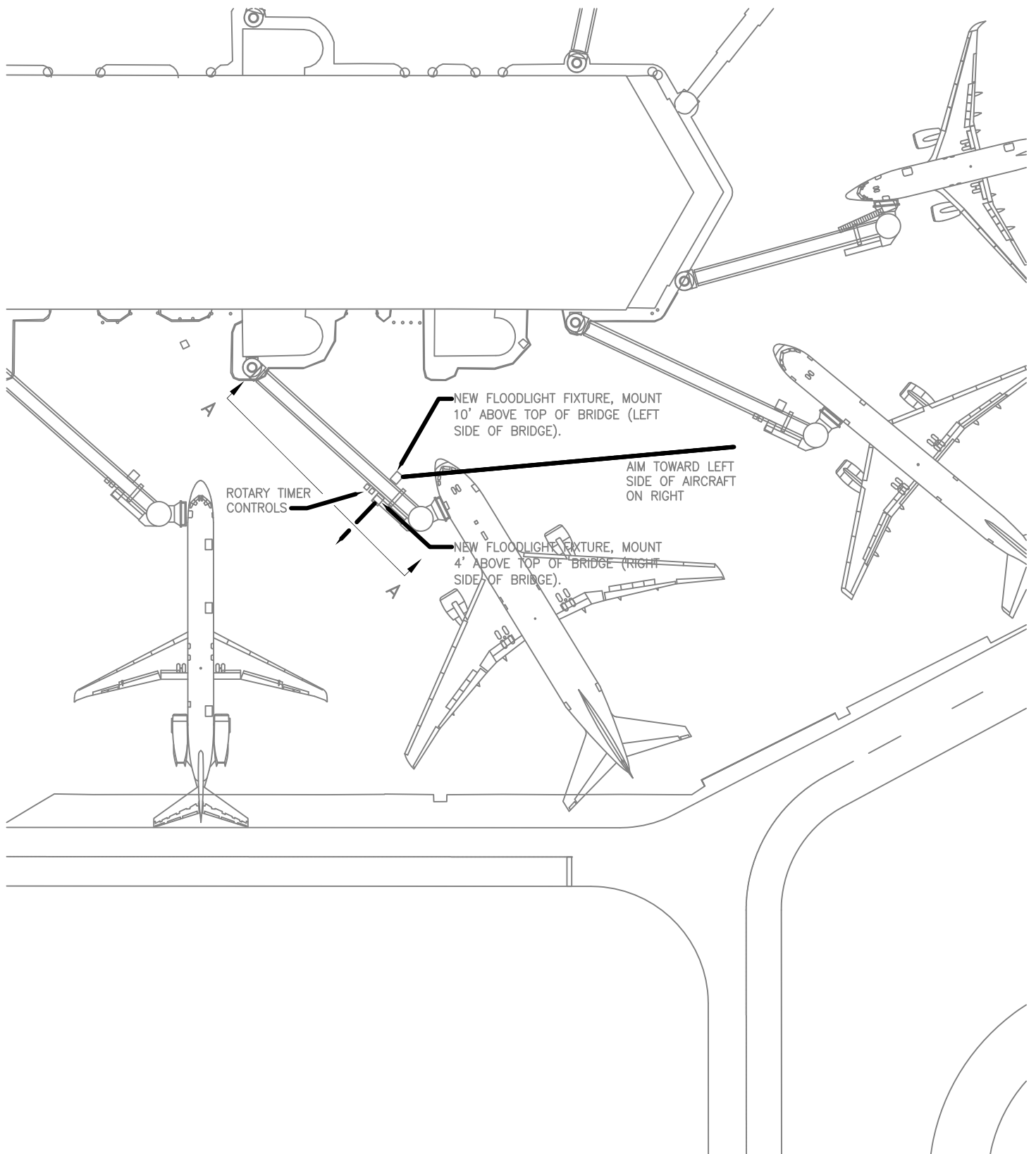
In order to satisfy NFPA 415, the PBB canopy is required to be lowered to mate with the aircraft fuselage. To ensure the PBB operator lowers to the canopy, the PBB manufacture shall include the lowering of the canopy in the sequence of operation, or program an alarm to sound as a reminder. (See PBB Specification in Appendix D).

9.4.15 Occupancy Sensors

Occupancy Sensors shall be installed on new or relocated PBBs to automatically turn off the interior lights and exhaust fans when the PBB is not in use.

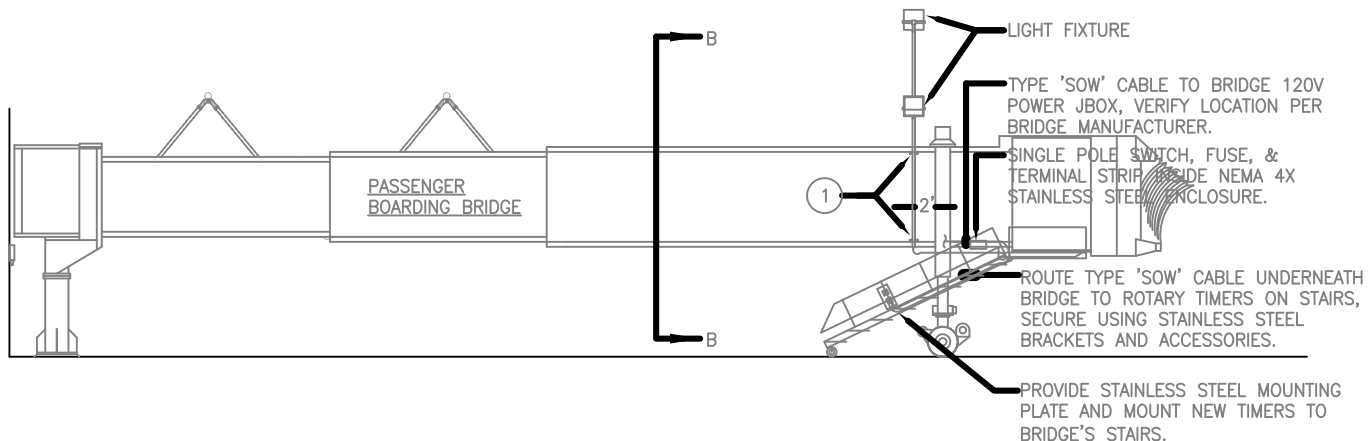
9.4.16 Relocated Bridge

If a bridge is to be relocated from one (1) location to another, the bridge shall be reviewed for code compliance and refurbished to meet current codes.



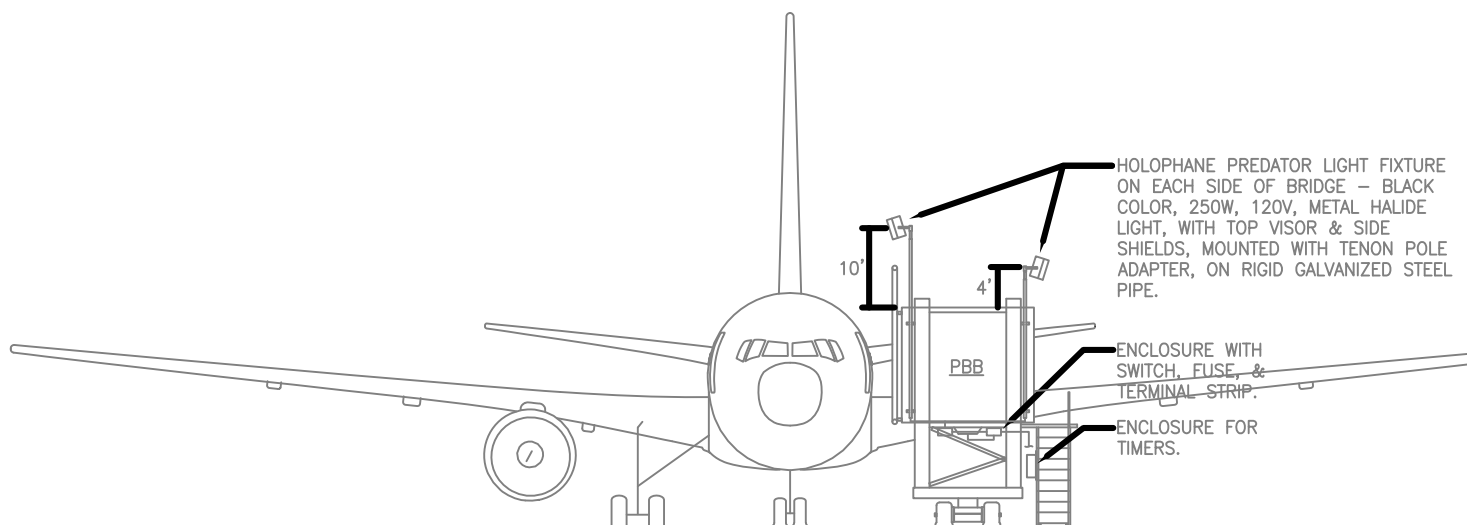
TYPICAL TASK LIGHT FIXTURE MOUNTING DETAIL

SCALE: 1" = 60'-0"



ELEVATION VIEW AA – TYPICAL TASK LIGHT FIXTURE MOUNTING DETAIL

NOT TO SCALE



ELEVATION VIEW B-B

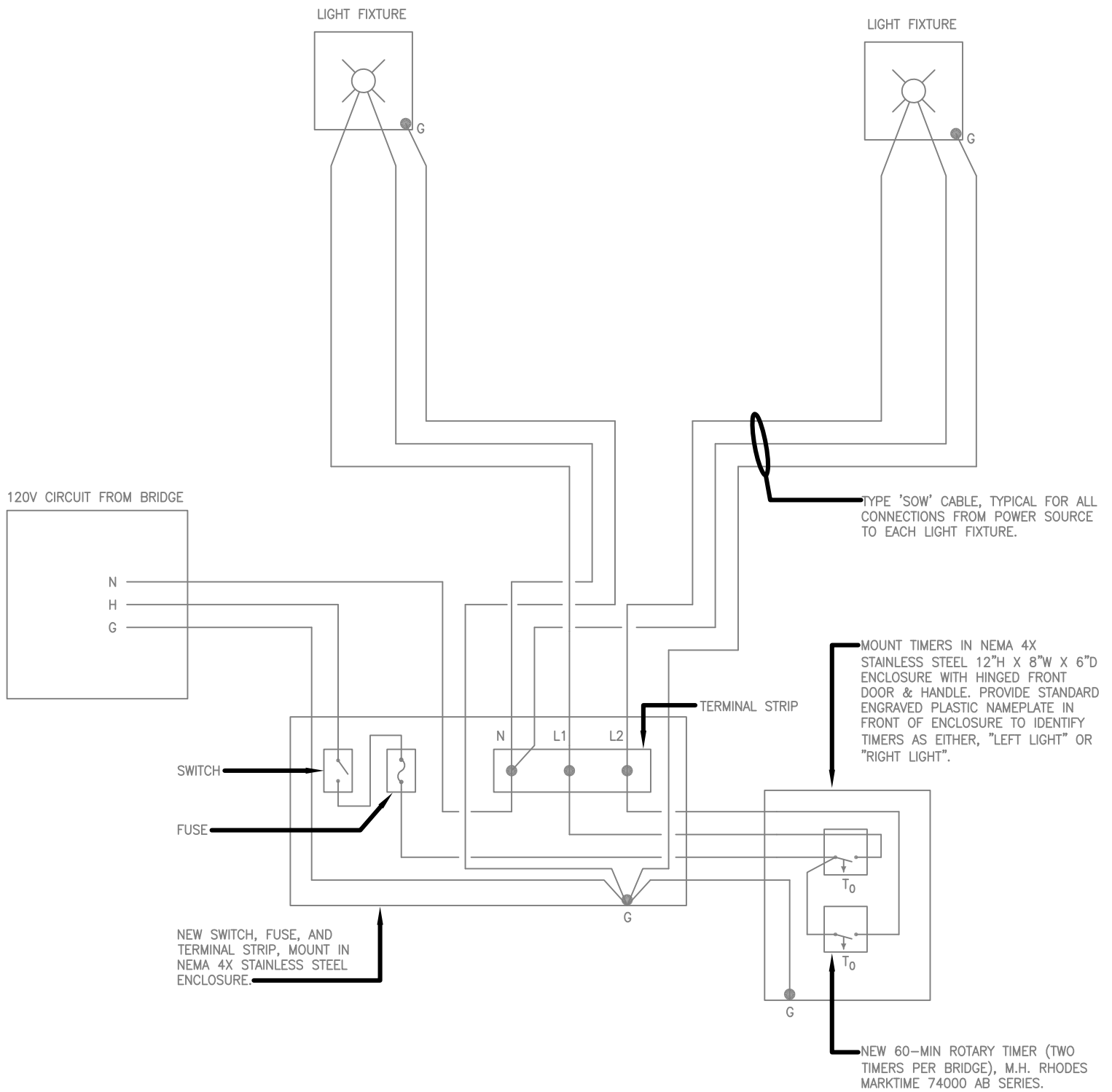
NOT TO SCALE

GENERAL NOTES:

1. COORDINATE WITH THE BRIDGE MANUFACTURER TO PROVIDE A 120V CIRCUIT FOR THE TASK LIGHTING FIXTURES. DO NOT CONNECT TO BRIDGE CONTROL CIRCUIT.
2. PROVIDE NOTES ON DRAWINGS FOR CONTRACTOR TO COORDINATE ADJUSTMENT OF AIMING.
3. PROVIDE TYPE 'SOW' CABLES FOR ALL WIRING ON BRIDGE.

DRAWING NOTES:

1. PROVIDE LIGHT POLE OF ADEQUATE LENGTH AND SIZE TO SUPPORT FIXTURE AT REQUIRED HEIGHT WITHOUT OVERSTRESS OF POLE FROM APPLIED LOADS. THE POLE SHALL BE ADEQUATELY ANCHORED TO THE PASSENGER BOARDING BRIDGE (PBB) FRAMING. ANCHORAGE TO THE PBB SHALL NOT OVERSTRESS OR OTHERWISE WEAKEN THE STRUCTURAL INTEGRITY OF THE PBB OR ANY OF ITS COMPONENTS. ALL COMPONENTS OF THE LIGHT POLE MOUNTING AND ANCHORAGE SHALL BE GALVANIZED AND ALL MODIFICATIONS TO THE PBB SHALL BE TREATED FOR CORROSION PROTECTION. ALL NEW MEMBERS, BRACKETS, CONNECTIONS, BOLTS AND /OR WELDS SHALL COMPLY WITH THE APPLICABLE SECTIONS OF THE IBC AND AISC AND AWS REQUIREMENTS.



9.5 PRE-CONDITIONED AIR AND 400 HERTZ SYSTEMS AND ASSOCIATED LOADING BRIDGE REQUIREMENTS

An airline (tenant) assigned gates on a preferential use basis will be responsible for the installation and maintenance of PC and 400 Hz equipment on its preferential use passenger boarding bridges. Upon terminating the preferential use of the gate, the airline shall remove, at its sole expense, the PC Air and 400 Hz equipment.

MAA, which owns and assigns the common use gates, will be NOT responsible for the installation and maintenance of the PC Air and 400 Hz equipment on the common use passenger boarding bridge(s). MAA will determine the need and timetable for providing this equipment.

9.5.1 Design and Construction Requirements

1. Loading Bridge Requirements: Loading Bridges shall be specified to readily accept PC Air and 400 Hz equipment. In circumstances where the PC Air and 400 Hz equipment is to be installed at a later date, the loading bridge shall be specified to allow installation of the heaviest Point of Use (POU) equipment which satisfies the largest aircraft requirements of that gate.
2. All PC Air and 400 Hz equipment for preferential use and common use gates shall be designed and constructed to include separate metering, allow separate billing of electrical usage, and connection to MAA's METASYS Building Management System.
3. All PC Air and 400 Hz equipment installed at existing gates and passenger boarding bridges shall be POU units.
4. All PC Air and 400 Hz equipment installed at newly constructed terminals and concourses shall be POU units. Centralized systems will be considered by MAA when the installer can meet the following requirements:
 - a. Demonstrates through cost benefit analysis the viability of the central system.
 - b. Agrees to lease all areas associated with the central system equipment.
 - c. Satisfies all concerns related to location of equipment in the building and on the aircraft ramp, line-of-sight issues, aesthetic issues, real estate issues, and operational issues.
 - d. For centralized PC Air, the glycol loop piping shall be constructed with soldered or welded joints (not threaded), and will be placed in the lower level only, keeping it out of public spaces. All main supply piping for the glycol loop shall be located in the interior of the building.
 - e. For 400 Hz systems, all main supply conduits and wires shall be located in the interior of the building, except for branch conduit and wire needed for connection to the passenger boarding bridge.

5. 400 Hz systems are known to produce harmonics. In order to mitigate the harmonic effects, each piece of 400 Hz equipment must comply with the following performance criteria:
 - a. Harmonics content: total harmonic distortion of the input current wave form, as measured at the input terminals, shall be 30% of the lower whenever load is 50% of rated output or higher.
 - b. Power factor: the power factor measured at the input terminals shall be 90% or higher whenever load is 50% of rated output or higher.
6. All PC Air and 400 Hz units shall be located on the underside of the passenger boarding bridges when possible. In situations where the PC Air unit prohibits the PBB from lowering to the required height to mate to an RJ Aircraft, the unit may be required to be installed on top of the PBB. No ground mounted units are permitted.
7. Minimum height restrictor brackets shall be placed on all vertical lift columns to protect bridge-mounted equipment.
8. Installation of the PC Air and 400 Hz equipment on the passenger boarding bridge should not affect the structural integrity, operation, or the warranty of the passenger boarding bridge.
9. Building Permit Approval: An airline (tenant) installing PC Air and 400 Hz equipment at its preferential use gate(s) will be required to obtain an MAA building permit. Notwithstanding the other requirements of the building permit process, the airline will be required to coordinate the installation of PC Air and 400 Hz equipment with MAA's passenger boarding bridge repair and maintenance contractor. MAA's contractor will review and inspect the installation. In addition, catalog cuts and data for all proposed equipment should be submitted to MAA for review and approval.

9.5.2 Metering

This design standard is intended to require that all electrical power used for bridge power 400 Hertz, ground power and Pre-conditioned Air for boarding bridges be metered.

Provision of 400 Hertz and Pre-Conditioned Air at loading bridges that do not currently have them shall be a shared responsibility between MAA and the tenant. The tenant shall be responsible for providing the equipment as necessary, installing panels, wiring, and conduits, disconnect switches, and related equipment to provide the electrical infrastructure necessary to support the improvements.

The tenant shall obtain a building permit for the proposed improvements. The MAA shall be responsible for providing metering of the additional electrical service and modifications to the accounting system necessary to reflect the proposed service. Coordination of the timing of the improvements shall be the responsibility of the tenant.

The airport currently has a centralized metering data collection system. The meters required will be tied into the existing system, so that the Maryland Aviation Administration can charge these tenants to recover costs incurred by the airport for providing electrical power.

Electrical power is used at boarding bridges in three ways:

1. To position bridges up to aircraft doors, and maintain bridges at an elevation matching the door height while the aircraft is parked at the gate (Bridge Power).
2. To provide ground power to operate electrically powered aircraft equipment, which uses power at 115 volts, alternating 400 times per second (400 Hertz), or in some cases at 28 volts Direct Current (DC).
3. To provide heated or cooled air to aircraft, called “Pre-conditioned Air” or PC Air (PCA).

Existing loading bridges at BWI Marshall are outfitted with Bridge Power and various combinations of 400 Hertz and PCA units, powered in varying ways as outlined below:

Gates at Terminal A/B have a common circuit for Bridge Power and PCA at each gate. 400 Hertz is provided from a centralized system utilizing two motor generator sets.

Some bridges on Piers C, D, and the International Terminal have bridge-mounted 400 Hertz units, so called “Point of Use” or POU units. Some bridges are equipped with PCA units.

The existing bridge-mounted installations include the following arrangements:

- Bridge Power only, no PCA or 400 Hertz
- Same circuit for Bridge Power, PCA and bridge-mounted 400 Hertz (POU)
- Same circuit for Bridge Power and PCA (or 400 Hertz)
- Individual circuits for Bridge Power, PCA and/or 400 Hertz

Loading Bridge Metering Requirements:

New or renovated loading bridges shall have individually metered circuits for:

- a) Bridge Power
- b) PCA (if equipped on bridge)
- c) 400 Hertz (if equipped on bridge, whether POU or Centralized)

The meter for each circuit shall be one of the following listed below and be fully compatible with the existing Square-D TMSCE (Tenant Metering Software Commercial Edition), Version 2.5 or higher and the System Management Software (SMS).

- a) High Density Metering (HDM) enclosure with PM750 meters (one meter per circuit). Provide 120V control power to HDM enclosures as necessary.

b) Enhanced Enercept Meter, rated for circuit.

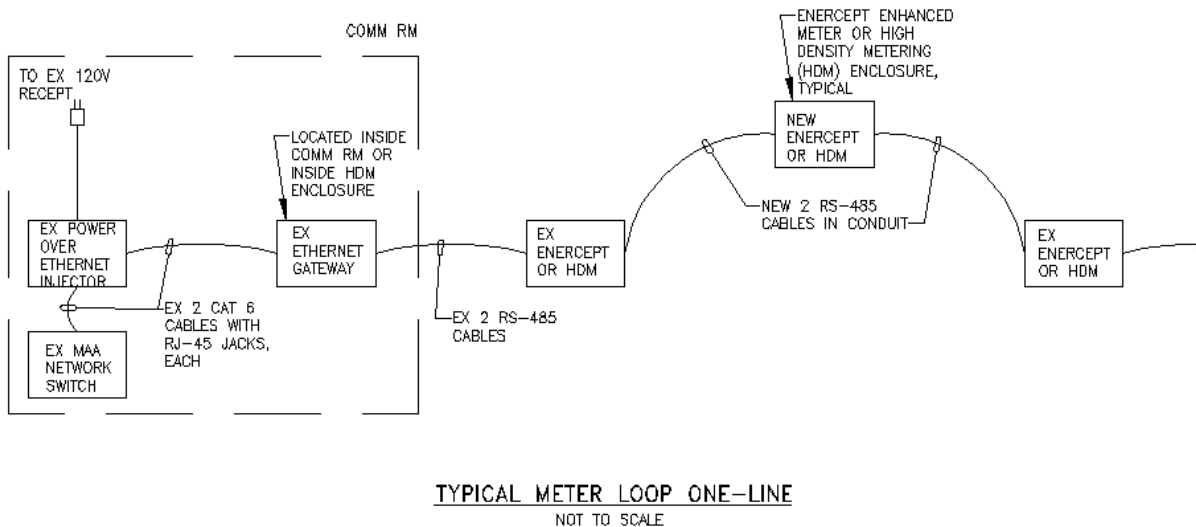
Daisy-chain connect each Enhanced Enercept meter to the existing metering network using two RS-485 cables (1 cable as spare) in 1" conduit. RS-485 cable shall be 600V rated Belden 1120A, or approved equal. Refer to the one-line diagram, "Typical Meter Loop One-Line."

Daisy-chain connect the HDM enclosure to the existing metering network using two plenum-rated RS-485 cables (1 cable as spare). RS-485 cable shall be 300V rated Belden 82841 cable, or approved equal.

Each RS-485 daisy-chain network shall provide maximum 32 devices at cable length of maximum 4000 feet.

Provide testing and verifications procedure to ensure functionality of meters.

The existing TMSCE and SMS software shall be updated to reflect the new work.



9.6 GROUNDING PROTECTION

A ground rod is required at each passenger boarding bridge pedestal base. The ground rod shall be connected to the pedestal in accordance with Chapter 18.2.1 Grounding.

9.7 FIRE SAFETY REQUIREMENTS FOR PASSENGER BOARDING BRIDGES (PBBS)

All PBBs shall comply with NFPA 415. Documents stating the PBB meets NFPA 415 shall be supplied as part of the PBB submittal (See PBB Specification in Appendix D).

Any modifications that are made to PBBs to accommodate regional jets shall meet the 5-minute fire resistance rating requirements of NFPA 415, and interior finishes shall be class “A” rated in accordance with NFPA 415.

Any modifications for PBBs to accommodate regional jets shall be subject to approval of the OFM and shall be provided for review and acceptance before use.

9.8 AIRPORTAL SUBMISSION DATA

9.8.1 PBB Information to Document

All PBB installation or modification work shall require the submission by the Contractor of relevant data to MAA for the updating of the AIRPortal Gate Management System. This includes:

1. Manufacturer
2. Model Number
3. Serial Number
4. Capacity Number
5. Rotunda Elevation, surveyed in feet
6. Year Purchased
7. Cab Floor Elevation, surveyed in feet
8. Ramp Elevation at Stop Bars
9. Operational Ranges including, but not limited to, height and swing
10. Aircraft Fleet Mix for which stop bar markings are provided in descending order of size with length taking priority over wingspan
11. Accessories including, but not limited to, PC Air, 400Hz, Regional Jet support, slides
12. Photos of interior and exterior
13. Photos of stop bar markings and lead-in lines
14. Gate restrictions and/or rules

This information shall be submitted to the MAA Project Manager following installation and initial testing, and prior to final commissioning of the PBB.

9.8.2 Photographic Documentation Procedure

When taking photographs to be stored and displayed in AIRPortal, the following instructions should be followed.

1. Set Camera Aspect Ratio to 4:3
2. Set Megapixel setting to no greater than 2 Megapixels (approximately 1632px W x 1224px H)
3. Photos should ALWAYS be taken holding the camera horizontally

4. The photo needs to be saved with a descriptive name. The following is a standard approach for a descriptive file name for each photo
 - a. Date of Photo - YYYY_MM_DD
 - i. for example 2014_01_06
 - b. Feature
 - i. Gate B1
 - ii. Stop Lines E5
 - c. Photo number – sequence starting with 1.
 - d. Example
2014_01_06 Gate B1 Photo 01
2014_01_06 Gate B1 Photo 02

CHAPTER 10 ENVIRONMENTAL PROCEDURES AND REQUIREMENTS

Also refer to section 4.8 for Environmental Coordination.

10.1 SEDIMENT CONTROLS AND STORMWATER MANAGEMENT

10.1.1 Sediment and Erosion Control

Refer to Chapter 4.11.2.3 for Standard MDE Sediment and Erosion Control Notes and Plans.

10.1.2 Stormwater Management Facilities (SWM)

The MAA Office of Planning and Environmental Services has developed a Design Criteria Manual for Stormwater Management Design and Stream Restoration, and Comprehensive Stormwater Management Plans for BWI Marshall and Martin State Airports. The requirements of these three documents must be followed in the design and construction of projects at BWI Marshall and Martin State Airports.

The following information outlines the general requirements for SWM at BWI Marshall and Martin State Airports, more specific information is provided in the Design Criteria Manual for SWM Design and Stream Restoration.

A. BWI Marshall Airport

Designers must comply with the Maryland Department of the Environment's (MDE's) stormwater management requirements as set forth in MDE's *2000 Stormwater Design Manual* and the Stormwater Management Act of 2007. The regulations outlined in this manual must be used during the design of all new stormwater management facilities on MAA-owned property on or near BWI Marshall Airport. MDE requires both quantity and quality control of stormwater and establishes goals for both in the *2000 Stormwater Design Manual* and the Stormwater Management Act of 2007.

Designers must also comply with enforceable guidance set forth by FAA. To ensure the safety of the traveling public, Designers must adhere to FAA's enforceable guidance set forth in Advisory Circular (AC) No. 150/5200-33 "*Hazardous Wildlife Attractants on and Near Airports*".

The FAA AC presents enforceable guidance for minimizing wildlife strike hazards through the reduction of wildlife attractants. FAA defines a wildlife attractant as:

Any human-made structure, land use practice, or human-made or natural geographic feature that can attract or sustain hazardous wildlife within the landing or departure airspace, aircraft movement area, loading ramps or aircraft parking areas of an airport. These attractants can include but are not limited to

architectural features, landscaping, waste disposal sites, wastewater treatment facilities, agricultural or aquacultural activities, surface mining, or wetlands.

The AC also provides guidance on placement and design of these facilities to achieve water quality goals while minimizing the potential for creation of a wildlife attraction. FAA's siting criteria for potential wildlife attractants state that wildlife attractants should not be within 10,000 feet of an airport's aircraft movement areas (including loading ramps and parking areas) or within 5 statute miles of approach or departure airspace, if the attractant may cause hazardous wildlife movement into or across the approach or departure airspace. When facilities that create open water exist within 5 statute miles of the airport, FAA's enforceable guidance requires that they drain within 24 hours following a one- or two-year storm event and within 48 hours following a ten-year storm event.

MDE recommendations strive to treat and store the water quality volume according to specific minimum detention times to improve water quality, but the holding times frequently exceed the holding times associated with FAA's wildlife guidance. Because MDE's stormwater management requirements and FAA's enforceable guidance conflict in some areas, MAA has developed specific criteria and innovative designs to fulfill MDE and FAA criteria (see Table 2-1).

10.1.2.1 Stormwater Management Requirements

Stormwater Management Ponds

MDE's *2000 Stormwater Design Manual* requires that stormwater management ponds constructed in Use III (Piny Run) and Use IV (Stony Run) watersheds are designed with a maximum detention time of 12 hours for the channel protection storage volume (i.e., the one-year storm event). MDE also requires the installation of a 3-inch low-flow orifice to prevent the pipe from clogging and to help ensure that the pond can drain in accordance with the designated time. These requirements are essential to preventing prolonged periods of standing water and support the FAA criteria.

FAA recommends the use of steep-sided, narrow, linear-shaped detention basins as opposed to retention basins, which retain the water quality volume for longer periods of time. MDE recommends the use of long flow paths (minimum ratio of 1.5:1 of length to width) and irregularly-shaped ponds, which coincides with the FAA criteria.

Stormwater Wetlands

Stormwater wetlands are typically used to treat and store the water quality volume through the use of small permanent pools and extended detention periods. As in the case of stormwater management ponds, MDE requires that flow paths be maximized and the surface area of a stormwater wetland be at least 1% of the

total drainage area of the facility. MDE also requires that at least 25% of the total water quality volume be in deepwater zones, with a minimum depth of 4 feet, and a minimal coverage of 50% in the planting zones after the second growing season. Both of these requirements can create large areas containing surface water and vegetation that are very attractive to wildlife. FAA prohibits the construction of stormwater wetlands and artificial marshes within 5 miles of an approach or departure surface.

Filtering Systems

MDE recommends that sand filters be designed to drain within 40 hours and that bioretention facilities be designed to drain within 48 hours and requires that the top few inches of colored material be removed and replaced with fresh material when the water remains on the surface of the filter bed for more than 72 hours. FAA requires that stormwater management facilities drain within 24 hours following a one- or two- year storm event and within 48 hours following a ten-year storm event.

MDE requires that underground sand filters be constructed with a gate valve located just above the filter bed for dewatering in the event of clogging. This drainage recommendation supports the FAA guidance, because it prevents conditions that would create standing water and attract hazardous wildlife.

Infiltration Systems

Infiltration is an important factor in predicting and reviewing drainage time, because many stormwater management detention ponds are used to store and treat the water quality volume in the bottom of the stormwater management ponds. Therefore, infiltration is paramount in preventing the formation of standing water for prolonged periods. MDE requires infiltration rate testing to ensure that the infiltration rate be no less than 0.52 inch per hour for infiltration trenches and basins. If the infiltration rate is less than 0.52 inch per hour for a surface sand filter or a bioretention facility, MDE requires the installation of an underdrain. In addition, MDE requires that infiltration tests be performed during the final plan phase and the grading permit phase. These requirements are essential for ensuring that infiltration facilities drain within reasonable periods.

Open Channel Systems

Open channel systems are usually designed with check dams to capture and treat the full water quality volume within dry or wet cells. MAA requires an underdrain for the dry swale to ensure this maximum ponding time is met and vegetation to mask the ponded water using appropriate species as presented in *Specifications for Performing Landscape Activities for the Maryland Aviation Administration* (see Appendix D).

Vertical Clearance Guidelines for Groundwater Table

In addition to the infiltration rate requirements, MDE provides vertical clearance guidelines for the groundwater table. If the groundwater table is intercepted, it can create volumes and periods of standing water that exceed those addressed by the original design. MDE's vertical clearance guidelines for the groundwater table reduce the potential for prolonged periods of standing water and support FAA and MAA goals for stormwater management facilities within the Airport Zone.

10.1.2.2 Facility Locations and Restrictions

To further reduce wildlife attractiveness associated with stormwater management facilities for BWI Marshall Airport, MAA has designated Wildlife Hazard Management (WHM) zones in which various types of stormwater management facilities are appropriate. WHM Zone A includes all property within Aviation Boulevard as well as all aircraft approach and departure airspaces to a distance of 5 statute miles. WHM Zone B includes all other property within 5 statute miles of BWI Marshall.

Within WHM Zone A, no new stormwater management facilities with open water components may be constructed. This includes, but is not limited to, detention and retention facilities, bioretention facilities, artificial marshes and wetland mitigation projects. *To achieve water quality and quantity associated with new MAA development within WHM Zone A, stormwater management facilities must be constructed underground.*

Within WHM Zone B, open water stormwater management facilities are permissible; however, as stated in the FAA AC, they must drain within 24 hours of 1- and 2- year storm events and within 48 hours of 10- year storm events. Appropriate masking techniques should be implemented if the facility retains water for more than 24 to 48 hours or if the facility attracts potentially hazardous wildlife (see Appendix D).

10.1.2.3 Landscaping Guidance

MAA provides guidance for landscaping (including appropriate seed mixtures) in its *Specifications for Performing Landscaping Activities for the Maryland Aviation Administration* (see Appendix D). In this document, MAA details appropriate species to utilize during design of new stormwater management facilities.

Table 2-1**Summary of MAA's Design Criteria for Stormwater Management Facilities**

Facility	MDE Regulation	FAA Guidance	MAA Design Criteria
Stormwater Management Ponds	<ul style="list-style-type: none"> Maximum detention time of 12 hours for channel protection volume (i.e., the one-year storm). Long flow paths (minimum ratio of 1.5:1). Permanent pool to meet water quality volume requirements. 	<ul style="list-style-type: none"> Maximum detention time of 12 hours. Long flow paths (minimum ratio of 1.5:1). No permanent pools (open water is considered to be a wildlife attractant). 	<ul style="list-style-type: none"> Maximum detention time of 12 hours. Long flow paths (minimum ratio of 1.5:1). No permanent pools (open water is considered to be a wildlife attractant).
Stormwater Wetlands	<ul style="list-style-type: none"> Typically used to treat and store the water quality volume through the use of small permanent pools and extended detention periods. 	<ul style="list-style-type: none"> Neither stormwater wetlands nor artificial marshes should be constructed within 5 miles of an approach or departure surface. 	<ul style="list-style-type: none"> Neither stormwater wetlands nor artificial marshes should be constructed on MAA property within 5 miles of an approach or departure surface.
Filtering Systems	<ul style="list-style-type: none"> Sand filters should drain within 40 hours. Bioretention facilities should drain within 48 hours and replaced when water remains for more than 72 hours. 	<ul style="list-style-type: none"> FAA requires standing water to drain within 24 hours following a 1- or 2- year event, and within 48 hours following a 10- year event 	<ul style="list-style-type: none"> Design all filtration systems to drain within 24 hours following a 1- or 2- year event, and within 48 hours following a 10- year event. Replace filter material when water remains on the surface of the filter bed for more than 24 hours following a 1- or 2- year event, or more than 48 hours following a 10- year event.

Table 2-1**Summary of MAA's Design Criteria for Stormwater Management Facilities**

Facility	MDE Regulation	FAA Guidance	MAA Design Criteria
Infiltration Systems	<ul style="list-style-type: none"> All infiltration systems must dewater the entire water quality volume with 48 hours of a storm event. An observation well must be installed in every trench to measure and ensure that the trench drains properly. 	<ul style="list-style-type: none"> FAA requires standing water to drain within 24 hours following a 1- or 2- year event, and within 48 hours following a 10- year event. 	<ul style="list-style-type: none"> All infiltration systems must dewater the entire water quality volume within 24 hours following a 1- or 2- year event, and within 48 hours following a 10-year event.
Open Channel Systems	<ul style="list-style-type: none"> The maximum allowable ponding time within an open channel be less than 48 hours. Provide an underdrain for the dry swale to ensure this maximum ponding time is met. 	<ul style="list-style-type: none"> FAA requires standing water to drain within 24 hours following a 1- or 2- year event, and within 48 hours following a 10- year event. 	<ul style="list-style-type: none"> FAA requires standing water to drain within 24 hours following a 1- or 2- year event, and within 48 hours following a 10- year event. Provide an underdrain for the dry swale to ensure this maximum ponding time is met. Provide vegetation to mask the ponded water using appropriate species as presented in <i>Specifications for Performing Landscape Activities for the Maryland Aviation Administration</i> (see Appendix D).
Vertical Clearance Requirements	<ul style="list-style-type: none"> MDE provides vertical clearance guidelines for the groundwater table to reduce the potential for prolonged periods of standing water. 	<ul style="list-style-type: none"> FAA guidance warns against the creation of standing water for prolonged periods 	<ul style="list-style-type: none"> Adhere to Section 4.4 of MDE's guidance for the minimum depth to the seasonally high water table.

10.1.2.4 Stormwater Management Facility Design Guidance

During Phase II of its Comprehensive Stormwater Management Plan Update, MAA analyzed stormwater runoff from existing and proposed future development for each of the 22 subwatersheds associated with BWI Marshall Airport. Based on this data, MAA identified the need for retrofit SWM facilities within each subwatershed to provide improved control for impervious areas developed since 1993, and identified water quality control needs for development within each subwatershed, as proposed in its Draft Airport Layout Plan.

Designers should coordinate with the MAA Project Manager and Office of Planning and Environmental Services to determine if the watershed improvements are required as part of their proposed projects.

Existing Conditions and Immediate Stormwater Management Needs

During the Phase II investigation, MAA identified six of the 22 subwatersheds associated with BWI Marshall Airport and MAA property require additional SWM facilities to achieve the goals of MDE's recent guidelines. Table 3-1 summarizes these results.

Table 3-1 Existing Conditions Channel Protection and Overbank Flood Protection Volume Requirements (acre feet)		
Drainage Basin	Additional Channel Protection Storage Volume	Additional Overbank Flood Protection Volume
Tributary of Sachs Branch	0	0
Sachs Branch	0	0
Kitten Branch	0	0
King Branch	0	0
Tributary North of King Branch	0	0
Bowden Branch	0	0
Signal Branch	0	0
Hawkins Branch	0	0
Clark Branch	0	0
Tributary of Stony Run	Data not available	Data not available
Tributary of Piny Run	Data not available	Data not available
Sawmill Creek	0.48	2.40
Sawmill 2 Tributary South of Runway 15R-33L)	0.25	1.16
Sawmill 3 (Tributary 22B)	0	0
Fork Branch	0.47	2.33
Phelps Branch	0	0
Tributary at Southeast Corner	0	0
Irving Branch	1.36	4.95
Tributary to Irving Branch	0	0
Southwest Branch	0	0
Muddy Bridge Branch	0	0
Cabin Branch	1.16	11.86

Future Stormwater Management Requirements:

Future stormwater management needs were projected for each subwatershed based on projects proposed in the BWI Marshall Airport Draft Airport Layout Plan. Table 3-2 details future requirements for water quality, recharge, channel protection storage, and overbank flood protection volumes.

Table 3-2				
Water Quality, Recharge Volume, Channel Protection and Overbank Flood Protection Volume Requirements- Future Conditions				
Drainage Basin	Future Requirements (acre- feet)			
	Water Quality Volume	Recharge Volume	Channel Protection Storage Volume	Overbank Flood Protection Volume
Tributary of Sachs Branch	0.80	0.17	0.71	2.66
Sachs Branch	7.3	0.38	11.10	18.40
Kitten Branch	6.52	0.65	11.83	26.59
King Branch	0.30	0.04	0.63	1.96
Tributary North of King Branch	0	0	0	0
Bowden Branch	0.81	0.11	0.99	2.48
Signal Branch	3.29	0.61	3.10	6.24
Hawkins Branch	11.65	2.89	14.49	28.39
Clark Branch	4.97	1.52	4.36	14.23
Tributary of Stony Run	3.07	0.74	6.17	10.38
Tributary of Piny Run	8.13	1.4	9.92	14.31
Sawmill Creek	1.77	0.45	2.16	3.99
Sawmill 2 (Trib. South of Runway 33L)	0.35	0.12	0.17	0.69
Sawmill 3 (Tributary 22B)	0.11	0.03	0.02	0.23
Fork Branch	0.92	0.19	0.73	2.86
Phelps Branch	0.52	0.18	0	0.25
Tributary at Southeast Corner	0.37	0.13	0	0.26
Irving Branch	0.81	0.17	0.53	2.21
Tributary to Irving Branch	0.13	0.03	0.12	0.40
Southwest Branch	0.34	0.07	0.35	1.24
Muddy Bridge Branch	4.15	0.66	8.06	17.27
Cabin Branch	2.53	0.58	3.70	10.63

Stormwater Hotspots

MDE requires developers to provide additional water quality treatment (WQv) for any new facility that has the potential to generate hydrocarbons, trace metals, or toxicants at concentrations that exceed those found in typical stormwater runoff. For BWI Marshall, additional water quality treatment is required for sites that are used for aircraft deicing vehicle washing, fueling, or maintenance; and fuel storage including outdoor loading and unloading locations. MDE regulations refer to these locations as hotspots and requires

either structural best management practices or pollution prevention practices to pretreat stormwater discharges prior to its release to the stormwater system and ultimately to the groundwater through infiltration or surface streams.

Proposed development for the planning period from 2000 to 2010 includes three potential “hot spots”: the Concourse F gates, the expansion area of Concourse E gates, and the hold block deicing pad proposed at the west end of Runway 10-28. These areas are all locations where deicing fluids would be applied during the deicing season. As with existing concourse gate areas at BWI Marshall and other deicing pad locations, the design of Concourse E expansion, Concourse F, and the 10-28 deicing pad would include a storm drain collection system to collect runoff containing deicing fluid. The collected fluid would be diverted to storage facilities located in the fuel farm and discharged to the sanitary sewer system for treatment at the Patapsco Wastewater Treatment Plant.

MAA Stormwater Management Design Guidance

Table 3-3 details the design guidance provided by MAA for appropriate stormwater management facilities within the BWI Marshall WHM Zones.

Table 3-3		
Maryland Aviation Administration Stormwater Management Siting Criteria and Design Guidance		
Facility	Zone A	Zone B
Stormwater Management Ponds	<ul style="list-style-type: none"> Cannot be sited within WHM Zone A 	<ul style="list-style-type: none"> Can be sited within WHM Zone B; however, standing water must drain within 24 hours following a 1- or 2-year event, and within 48 hours following a 10- year event. Long flow paths (minimum ratio of 1.5:1) No permanent pools (open water is considered to be a wildlife attractant).
Stormwater Wetlands	<ul style="list-style-type: none"> Cannot be sited within WHM Zone A- Neither stormwater wetlands nor artificial marshes should be constructed on MAA property within 5 miles of an approach or departure surface. 	<ul style="list-style-type: none"> Cannot be sited within WHM Zone B- Neither stormwater wetlands nor artificial marshes should be constructed on MAA property within 5 miles of an approach or departure surface.
Filtering Systems	<ul style="list-style-type: none"> Cannot be sited within WHM Zone A if an open water component exists. 	<ul style="list-style-type: none"> Can be sited within WHM Zone B; however, standing water must drain within 24 hours following a 1- or 2-year event, and within 48 hours following a 10- year event. Filter material must be replaced when water remains on the surface of the filter bed for more than 24 hours following a 1- or 2- year event, or more than 48 hours following a 10- year event.

Table 3-3 (cont.)		
Maryland Aviation Administration Stormwater Management Siting Criteria and Design Guidance		
Facility	Zone A	Zone B
Infiltration Systems	<ul style="list-style-type: none"> Cannot be sited within WHM Zone A if an open water component exists. 	<ul style="list-style-type: none"> Can be sited within WHM Zone B; however, all infiltration systems must dewater the entire water quality volume within 24 hours following a 1- or 2-year event, and within 48 hours following a 10- year event.
Open Channel Systems	<ul style="list-style-type: none"> Cannot be sited within WHM Zone A 	<ul style="list-style-type: none"> Can be sited within WHM Zone B; however, all infiltration systems must dewater the entire water quality volume within 24 hours following a 1- or 2-year event, and within 48 hours following a 10- year event. Underdrain must be provided for the dry swale to ensure this maximum ponding time is met. Vegetation must be provided to mask the ponded water using appropriate species as presented in Specifications for Performing Landscape Activities for the Maryland Aviation Administration (see Appendix D).
Vertical Clearance Requirements	<ul style="list-style-type: none"> Adhere to Section 4.4 of MDE's guidance for the minimum depth to the seasonally high water table. 	<ul style="list-style-type: none"> Adhere to Section 4.4 of MDE's guidance for the minimum depth to the seasonally high water table.

10.1.3 Stream Restoration

In its Phase II: Existing and Future Stormwater Management Needs Comprehensive Stormwater Management Plan Update, MAA identified streams that were unstable due to stormwater-related channel bed and bank erosion. MAA proposes stream restoration to restore stability and improve water quality conditions in these locations. MAA identified potential stream restoration projects for stream channels identified as unstable in Table 4-1.

Designers should coordinate with the MAA Project Manager and Office of Planning and Environmental Services to determine if the stream improvements are required as part of their proposed projects.

Table 4-1	
Geomorphic Stability: Existing Conditions at BWI Marshall	
Drainage Basin	Geomorphic Stability
Stony Run	NA
Sachs Branch	Unstable
Kitten Branch	Unstable
King Branch	NA
Tributary North of King Branch	NA
Bowden Branch	Stable
Signal Branch	Unstable
Hawkins Branch	Unstable
Clark Branch	Unstable
Tributary of Piny Run	NA
Tributary of Stony Run	NA
Sawmill Creek	Unstable
Sawmill 2 (Tributary South of Runway 15R-33L)	Unstable
Sawmill 3 (Tributary 22B)	Unstable
Fork Branch	Stable
Phelps Branch	Unstable
Tributary at Southeast Corner	NA
Irving Branch	Unstable
Tributary of Irving Branch	NA
Southwest Branch	NA
Muddy Bridge Branch	Stable
Cabin Branch	Stable

NA= Data are not available because the channel is ephemeral or extends beyond MAA property.

Designers should follow the general design methods and guidance presented in the following sections to ensure that the designs prepared for these restoration projects minimize the potential for attracting potentially hazardous wildlife to the restored streams.

Compliance with FAA Design Guidance

To comply with FAA's enforceable guidance MAA's stream restoration projects must be developed using MAA's *Specifications for Performing Landscaping Activities for the Maryland Aviation Administration*. (Appendix D)

MDE Design Guidance

MDE provides general design guidance for stream restoration projects in its publication: *Maryland's Guidelines to Waterway Construction*. In general, stream flow should be diverted by means of a pump around/diversion to temporarily dewater in-channel construction sites. Use of any live stakes, live fascines, brush layering or mattresses, live crib walls, or root wads must conform to MAA's Approved Species List, which is presented in Appendix D.

MAA recommends that stream restoration projects be designed following a natural channel design process that includes:

- A quantitative, field-based method of stream channel geomorphic assessment to understand existing aggradation/degradation processes;
- An identification of stream conditions that would be stable for the restored channel; and
- Restoration design based upon the stable form (i.e., the reference reach).¹

¹A discussion of the natural channel design process is presented in: *The Reference Reach, A Blueprint for Natural Channel Design*, 1998, by David Rosgen, Wildland Hydrology, Pagosa Springs, CO.

A quantitative understanding of existing conditions requires the following:

- A field survey of representative pool and riffle cross-sections and a long profile through each reach of the stream channel to be restored,
- Pebble counts,
- Pavement and subpavement sampling and analysis,
- Estimates of bank erosion, and
- Sediment transport rates.

Hydrologic and hydraulic modeling must be performed to understand the response of the existing channel to storm flow events. The results obtained from the model and the field measurement data can be combined to provide a complete quantitative understanding of existing conditions.

The natural channel design method requires field survey at nearby gage sites and a reference reach site. In the design process, the gage site data is used to validate field observations of bankfull discharge. The stable reference reach data is used to determine the dimensionless hydraulic geometry that forms the basis of the design (plan views and typical riffle and pool cross-sections) for the stream restoration project.

To minimize the attractiveness of the stream restoration project area, the plans set, specifications, and special provisions must be prepared using *Specifications for Performing Landscaping Activities for Maryland Aviation Administration* in Appendix

D, which provide temporary and permanent seed mixes appropriate for dry and wet conditions. Proposed plantings must be selected from the list of landscape plants provided in the specifications.

10.2 BIRD DETERRENT SYSTEMS

10.2.1 Waterfowl Deterrent System for Sediment Traps at BWI Marshall

There is a need to discourage ducks and other waterfowl from being attracted to stormwater in sediment traps. The system proposed for BWI Marshall will interfere with the ducks' landing pattern by installing a grid using lightweight wire above the surface of the trap. As they approach a water-filled trap, ducks, geese, and other waterfowl will see the grid wires and not attempt to land. A perimeter fence consisting of two wire strands strung around the posts will keep birds from walking onto the traps.

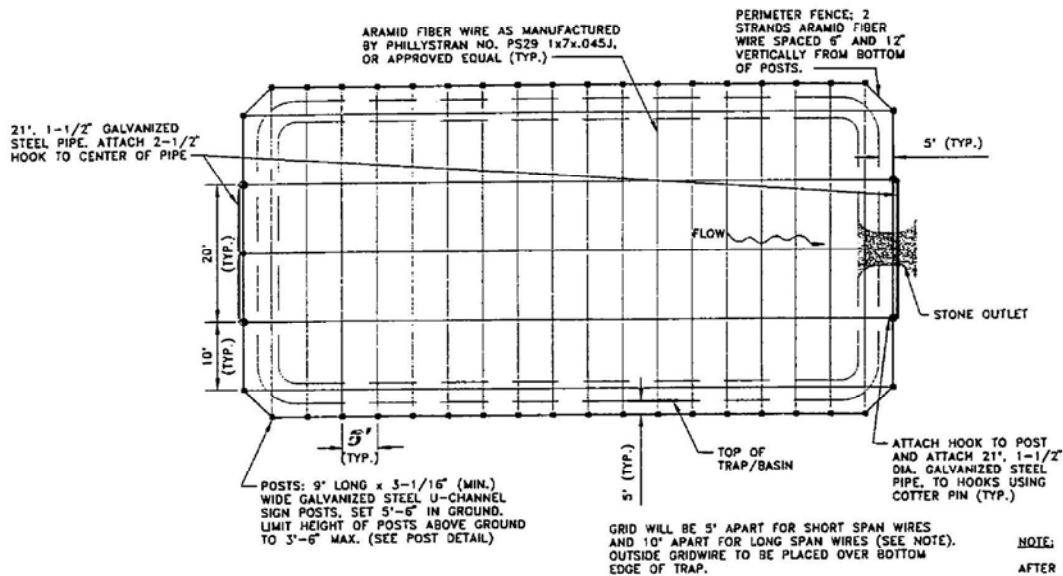
Initial grid spacing will be five feet for short spans and ten feet for long spans. See details for a typical layout. The ends of the grid wires will be strung from hooks placed on posts three feet above the ground. It is expected that the wires will sag as much as two feet and will exert a maximum line tension of thirty-five pounds.

Grid wire will be high-strength, lightweight synthetic material made from aramid fiber as manufactured by Phillystran, Inc., Part No. PS29 1x7x.045J, or approved equal.

Posts will be nine-foot long galvanized steel U-channel signposts, driven five and one half feet into the ground. The height above ground shall be no more than three and one half feet. Three holes will be drilled into each post to attach one 2 ½ inch hook and two 1 ½ inch eye bolts.

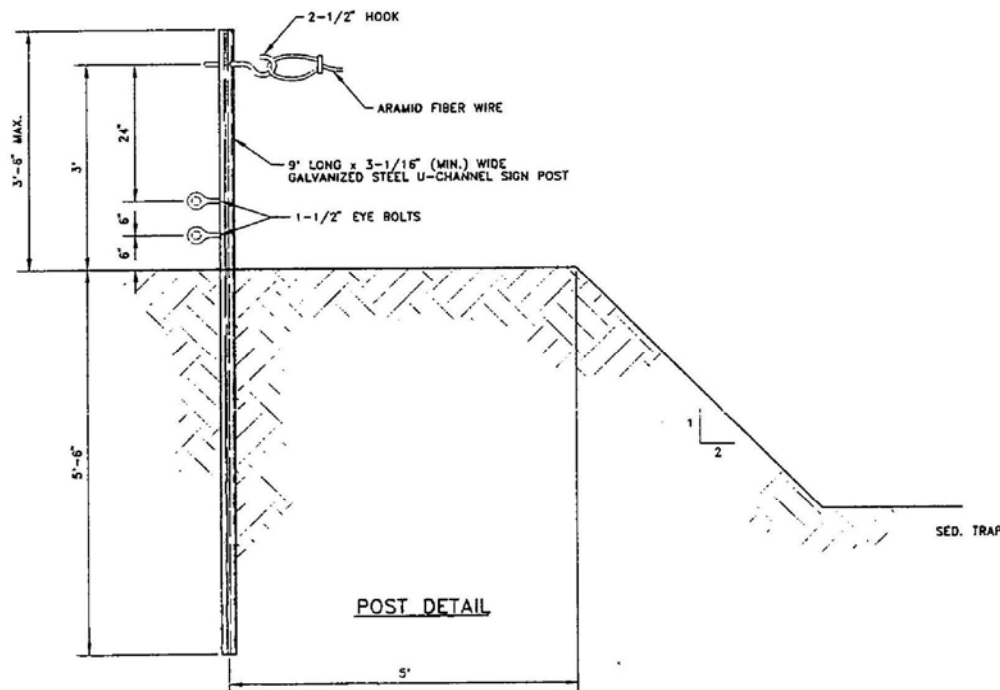
An access gate will be installed on the short end opposite the outlet to facilitate trap cleanout. Each gate consists of a twenty foot long, 1 ½" diameter horizontal pipe placed three feet above ground and spanning two posts spaced twenty feet apart. When sediment is to be cleaned out from the trap, the long pipe is removed. An identical horizontal pipe will also span the stone outlet weir at the opposite end of the trap. Each pipe will have a hook placed in the middle to attach the grid wire.

BIRD DETERRENT SYSTEM FOR SEDIMENT TRAPS AND SEDIMENT BASINS



BIRD DETERRENT SYSTEM FOR SEDIMENT TRAPS AND SEDIMENT BASINS

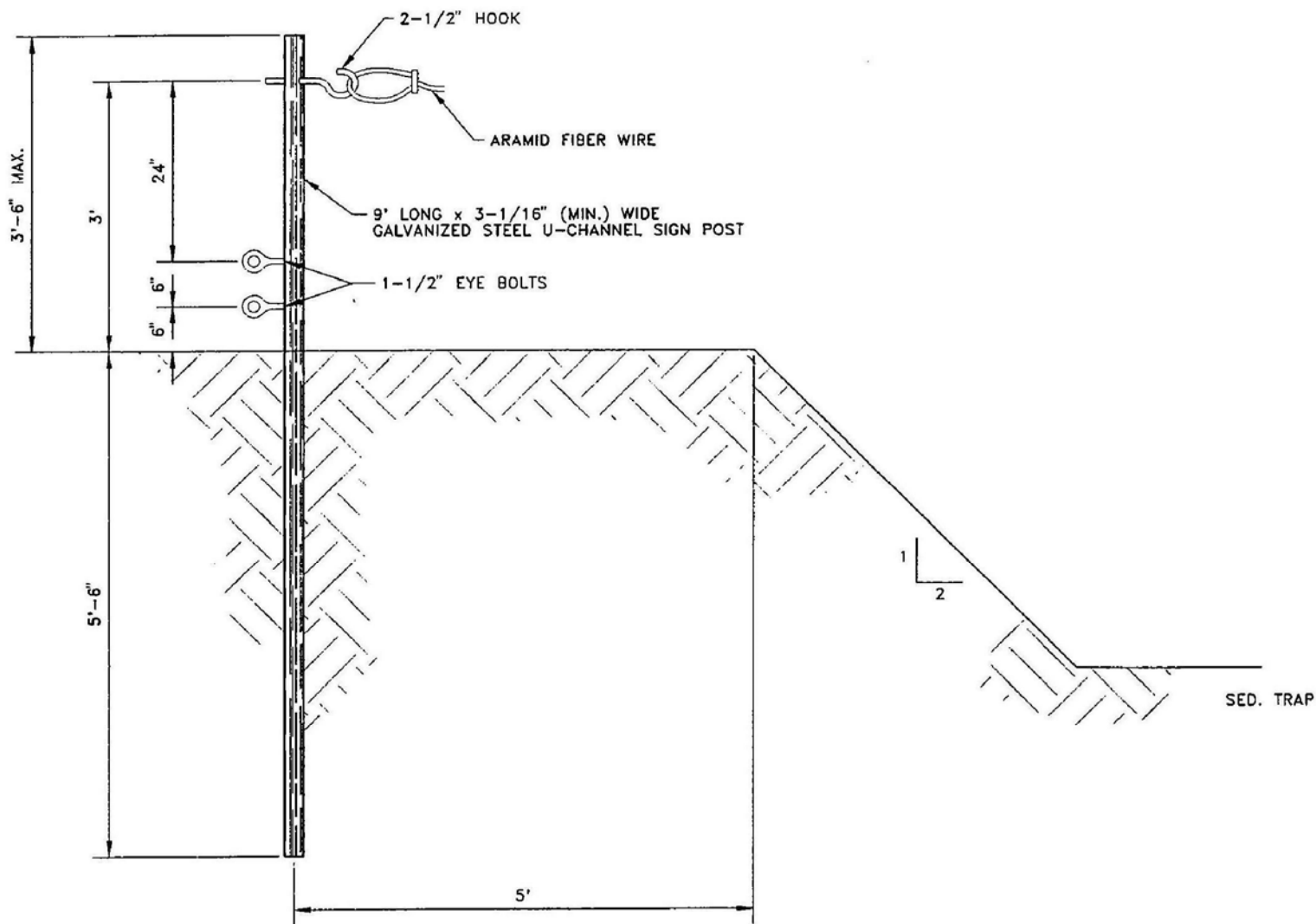
N.T.S.



CONSTRUCTION SPECIFICATIONS

AFTER EACH SEDIMENT TRAP/BASIN IS CONSTRUCTED, POSTS ARE PLACED FIVE FEET OUTSIDE OF THE TOP EDGE OF THE TRAP/BASIN, SPACED FIVE FEET ON CENTER ON THE LONG SIDES AND TEN FEET ON CENTER ON THE SHORT SIDES, LEAVING ONE 20-FOOT GAP FOR THE GATE AND ANOTHER 20-FOOT GAP TO STRADDLE THE OUTLET WEIR. AFTER MONITORING FOR EFFECTIVENESS, INSTALLATION OF ADDITIONAL LONG SPANS MAY BE ORDERED BY THE ENGINEER. ATTACH HOOKS TO POSTS, ATTACH BEAMS TO POSTS STRADDLING OUTLET WEIR AND ACCESS GATE. GRID WIRES WILL THEN BE SIZED AND LOOPS ASSEMBLED ACCORDING TO MANUFACTURER'S DIRECTIONS. GRID WIRES ARE THEN ATTACHED TO POSTS STARTING WITH THE LONG DIMENSION FIRST SO THAT THE LONGER WIRES WILL SAG BELOW THE SHORTER STRANDS. WIRE LENGTHS SHOULD BE SIZED TO ALLOW THEM TO BE PULLED TIGHT WITH TWO FEET SAG IN THE MIDDLE OF THE SPANS. AFTER THE GRID IS IN PLACE, THE TWO-STRAND PERIMETER FENCE CAN BE INSTALLED.

WHEN SEDIMENT NEEDS TO BE CLEANED OUT, DISCONNECT AND STORE THE GRID WIRES. THIS CAN BE DONE WITH A TWO-MAN CREW, ONE ON EITHER END OF THE WIRE. EACH PERSON SHALL DISCONNECT THE WIRE FROM THE HOOK AT THE SAME TIME, WALK BEYOND THE TRAP/BASIN, HOLDING THE WIRE TAUT, AND PLACE THE WIRE ON THE GROUND. THE CREW THEN MOVES TO THE NEXT WIRE AND REPEATS THE PROCEDURE UNTIL ALL THE WIRES HAVE BEEN REMOVED. NEXT, THE CREW SHALL REMOVE THE PERIMETER FENCE STRANDS AT THE ACCESS GATES AS WELL AS THE 21-FOOT LONG HORIZONTAL BEAM. CONTRACTOR'S EQUIPMENT CAN THEN ENTER THE TRAP/BASIN TO REMOVE SEDIMENT. AFTER SEDIMENT REMOVAL, THE CREW SHALL RE-INSTALL GRID ASSEMBLY AS DESCRIBED ABOVE.



POST DETAIL

Sediment Trap Bottom Dimensions, ft.	Approximate length per Gridwire, ft.	Number of Gridwires	Total length of Gridwire ft.	Total length of Perimeter Fence ft.	Number of Posts
40' x 85'	113'	5	565'	362'	44
	68'	18	1,224'		
	Trap TOTAL:		1,789'		
40' x 70'	98'	5	490'	332'	38
	68'	15	1,020'		
	Trap TOTAL:		1,510'		
30' x 105' (2 traps)	125'	4	500'	350'	50
	50'	22	1,100'		
	Trap TOTAL:		1,600'		
30' x 150'	175'	4	700'	450'	70
	50'	32	1,600'		
	Trap TOTAL:		2,300'		
30' x 155'	170'	4	680'	440'	68
	50'	31	1,550'		
	Trap TOTAL:		2,230'		
GRAND TOTAL:			11,029'	2,284'	320

TOTAL LENGTH OF GRIDWIRE: $11,029 + 2 \times 2,284 = 15,597$ feet

Procedure for Installing and Removing Grid Wire System

After each sediment trap is constructed, posts are placed five feet outside of the top edge of the traps, spaced five feet on center on the long side of the trap and ten feet on center on the short sides, leaving one twenty foot gap for the gate. Attach hooks to posts. Attach beams to posts straddling outlet weir and access gate. Grid wires will then be sized and loops assembled according to manufacturer's directions. Grid wires are then attached to posts starting with the long dimension first so that the longer wires will sag below the shorter strands. Wire lengths should be sized to allow them to be pulled tight with two feet sag in the middle of the spans. After the grid is in place, the two-strand perimeter fence can be installed.

When sediment needs to be cleaned out, disconnect, and store the grid wires. This can be done with a two-man crew, one on either end of the wire. Each person shall disconnect the wire from the hook at the same time, walk beyond the trap, holding the wire taut, and place the wire on the ground. The crew then moves to the next wire and repeats the procedure until all the wires have been removed. Next, the crew shall remove the perimeter fence strands at the access gates as well as the twenty-one foot long horizontal beam. Contractor's equipment can then enter the trap to remove sediment. After sediment removal, the crew shall re-install grid assembly as described above.

10.3 UNDERGROUND STORAGE TANKS (UST)

10.3.1 Conformance with Regulations, Codes, Standards, and Specifications

Underground Fuel Storage Tanks (UST) containing fuels or chemicals designated hazardous by the United States Environmental Protection Agency (U.S. EPA) or by the applicable codes and standards, shall be approved secondary containment systems and shall be in strict conformance with the most recent applicable regulations, manufacturer's recommendations, codes, and standards.

1. U.S. EPA Final Rule; Federal Relations: Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks. Title 40, Code of Federal Regulations, Part 280 (40 CFR Part 280).
2. State of Maryland, Department of Environment (MDE), Title; 26, Subtitle 10, Oil Pollution and Tank Management (COMAR 26.10).
3. State of Maryland, Department of Public Safety and Correctional Services, Title; 12, Subtitle 03, Fire Prevention Commission (COMAR 12.03).
4. National Fire Prevention Association (NFPA) Standards:
 - NFPA 30: Flammable and Combustible Liquids Code.
 - NFPA 30A: Motor Fuel Dispensing Facilities and Repair Garage.
 - NFPA 31: Standard for Installation of Oil-Burning Equipment.
 - NFPA 70: National Electric Code.
5. Petroleum Equipment Institute (PEI) Recommended Practice (RP) For the Installation of Underground Liquid Storage Systems (PEI/RP 100-05).
6. American Petroleum Institute (API) Recommended Practice (RP) For the Installation of Underground Petroleum Storage Systems (API/RP 1615).
7. American Petroleum Institute (API) Standard 2000, Venting Atmospheric and Low-Pressure Storage Tanks.
8. Listing and Labeling: Provide equipment and accessories that are listed and labeled as defined in the National Electric Code (NEC), Article 100.

10.3.2 Underground Fuel Storage Tank Requirements

Underground storage tanks shall be warranted for 30 years against failure due to internal/external corrosion and when properly installed, against structural failure. Underground storage tanks shall also be UL listed of one of the following type:

1. Fiberglass Reinforced Polyester UST

- A. The underground storage tank shall be constructed of double-walled, fiberglass reinforced polyester (FRP).
- B. Tank shall be manufactured with 100% resin and glass-fiber reinforcement. Tank shall include an integral fiberglass-reinforced polyester (FRP) secondary containment.
- C. The tank shall be double wall construction for containment of leaks with interstitial space between primary (internal) and secondary (external) tank walls to allow for free flow of all leaked product from the primary tank. The entire tank system shall be fabricated as a single unit and delivered to the job site as a complete assembly.
- D. Both the primary storage tanks and secondary containment shall be UL approved for their use and shall be compatible with gasoline, gasohol, ethanol, E85, methanol, oxygenated fuels, jet fuel, av-gas, kerosene, diesel fuel, bio-diesel, and motor oil (new or used) at ambient underground temperature or fuel oil stored at temperatures not to exceed 100°F. Tanks shall be chemically inert to petroleum products.
- E. Tank shall be designed with one 4-inch fitting that will access the tank bottom between the primary and secondary walls (annular space).
- F. Tanks with a 6-foot diameter or larger shall have a UL approved, integrally mounted reservoir installed on the tank for hydrostatic monitoring of the interstitial space. The reservoir shall be constructed of fiberglass reinforced plastic materials and warranted for 30 years against failure due to internal/external corrosion and when properly installed, against structural failure (same as tank warranty).
- G. The annular space of the tank shall be filled with a Brine Antifreeze solution provided by the tank manufacturer.
- H. The tank shall have one (1) 22-inch I.D. flanged manway complete with UL listed gaskets, bolts and cover and appropriate hold-down straps and lifting lugs.
- I. Each tank shall be provided with glass fiber reinforced plastic anchor straps for each tank. The number and location of straps shall be as specified by manufacturer. Each strap shall be capable of withstanding a maximum load for each tank diameter per the manufacturer's specifications. Straps shall be standard as supplied by the tank manufacturer.

- J. Precast concrete deadman anchors or poured-in-place concrete hold down slab shall be compatible with the manufacturers anchor straps. The concrete deadman or hold down slab and anchor straps shall prevent the fiberglass tank from floating out of the ground when the tank installation in an area of high groundwater or saturated soil conditions.
- K. The tank shall support accessory equipment such as ladders, submersible pumps, containment sumps, drop tubes, etc. when properly installed.
- L. Threaded fittings and optional equipment shall be consistent for use as directed by the Engineer.
- M. Striker plates shall be installed under each service fitting and manway opening.
- N. The Underwriters Laboratories (UL) label shall be permanently affixed to each tank.
- O. Provide lifting lug(s) on all tanks. Lifting lug system shall be capable of withstanding weight of tank with a sufficient safety factor.
- P. The tank shall withstand surface H-20 axle loads when properly installed according to manufacturer's installation instructions. The tank shall withstand aircraft loading if the proposed location requires such loading.

2. HMW Polymer Extruded Double-wall Steel UST

- A. The underground storage tank shall be double-walled steel with a primary steel storage tank contained in a 360°, air-pressure testable and unbreakable jacket, bonded together and sealed off at the fittings. The secondary containment tank wall shall be made of high molecular weight (HMW) polymer extruded and applied at the tank factory. The tank shall be designed with one (1) 22-inch I.D. flanged manway complete with UL listed gaskets, bolts and cover, and appropriate hold-down straps and lifting lugs.
- B. The tank shall be double wall construction for containment of leaks with interstitial space between primary (internal) and secondary (external) tank walls to allow for free flow of all leaked product from the primary tank.
- C. Tank shall be designed with one 2-inch fitting that will provide access to the tank bottom between the primary and secondary walls (annular space).
- D. The tank shall withstand surface H-20 axle loads when properly installed according to manufacturer's installation instructions. The tank shall withstand aircraft loading if the proposed location requires such loading.

- E. The tank shall be shipped, delivered, installed and 75% backfilled while maintaining a constant vacuum (minimum 12 inches of mercury vacuum) on the interstitial space to assure integrity of both the primary storage tank and secondary containment tank wall simultaneously.
- F. Each tank shall be provided with appropriate anchor straps, per the manufacturer's recommendations. The number and location of straps shall be as specified by manufacturer. Each strap shall be capable of withstanding a maximum load for each tank diameter per the manufacturer's specifications. Straps shall be standard as supplied by the tank manufacturer.
- G. Precast concrete deadman anchors or poured-in-place concrete hold down slab shall be compatible with the manufacturers anchor straps. The concrete deadmen or hold down slab and anchor straps shall prevent the tank from floating out of the ground when the tank installation in an area of high groundwater or saturated soil conditions.
- H. The tank shall support accessory equipment such as ladders, submersible pumps, containment sumps, drop tubes, etc. when properly installed.
- I. Threaded fittings and optional equipment shall be consistent for use as directed by the Engineer.
- J. Striker plates shall be installed under each service fitting and manway opening.
- K. The Underwriters Laboratories (UL) label shall be permanently affixed to each tank.
- L. Provide lifting lug(s) on all tanks. Lifting lug system shall be capable of withstanding weight of tank with a significant safety factor.

3. Double-wall Polyurethane-coated Steel UST

- A. The underground storage tank shall be double-walled steel, externally protected with 75mils thick of Polyurethane Coating System per corrosion control system specifications, and built in accordance with UL 58 Type I Construction criteria.
- B. The corrosion control system shall have a minimum of 30-year warranty against failure due to exterior corrosion and internal corrosion when used with compatible petroleum products. The tank will not require sacrificial anodes and therefore will not require cathodic monitoring.

- C. The tank shall be double wall construction for containment of leaks with interstitial space between primary (internal) and secondary (external) tank walls to allow for free flow of all leaked product from the primary tank.
- D. Tank shall be designed with one 2-inch fitting that will provide access to the tank bottom between the primary and secondary walls (annular space).
- E. The tank shall withstand surface H-20 axle loads when properly installed according to manufacturer's installation instructions. The tank shall withstand aircraft loading if the proposed location requires such loading.
- F. The tank shall be shipped, delivered, installed and 75% backfilled while maintaining a constant vacuum (minimum 12 inches of mercury vacuum) on the interstitial space to assure integrity of both the primary storage tank and secondary containment tank wall simultaneously.
- G. Each tank shall be provided with appropriate anchor straps, per the manufacturer's recommendations. The number and location of straps shall be as specified by manufacturer. Each strap shall be capable of withstanding a maximum load for each tank diameter per the manufacturer's specifications. Straps shall be standard as supplied by the tank manufacturer.
- H. Precast concrete deadman anchors or poured-in-place concrete hold down slab shall be compatible with the manufacturer's anchor straps. The concrete deadman or hold down slab and anchor straps shall prevent the tank from floating out of the ground when the tank installation is in an area of high groundwater or saturated soil conditions.
- I. The tank shall support accessory equipment such as ladders, submersible pumps, containment sumps, drop tubes, etc. when properly installed.
- J. Threaded fittings and optional equipment shall be consistent for use as directed by the Engineer.
- K. Striker plates shall be installed under each service fitting and manway opening.
- L. The Underwriters Laboratories (UL) label 58 Type I Construction label shall be permanently affixed to each tank.
- M. Provide lifting lug(s) on all tanks. Lifting lug system shall be capable of withstanding weight of tank with a significant safety factor.

10.3.3 Underground Storage Tank Piping

All product piping that is buried underground shall be made of non-ferrous materials and shall be designed as double containment components.

10.3.3.1 Double-Wall Flexible Plastic

- A. Underground piping shall be 1-inch – 1.5-inch diameter Flexible, Double-Containment Piping and MUST comply with UL 971 (2004).
- B. Ducting for flexible double wall pipe shall be 4” nominal diameter HDPE duct utilized as a carrier for double wall pipe to allow ease of replacement of double wall pipe if leakage is detected. Duct shall be a minimum SDR of 11 with a wall thickness of 0.409”. Bends within the duct shall be limited to a bend radius that is greater than or equal to the bend radius of the flexible double containment product piping.
- C. Flexible plastic piping systems shall not be utilized as direct fill lines, vent lines, stage II vapor recovery lines or aboveground.
- D. An automatic line leak detector must be installed on each fuel supply line that conveys product under pressure.

10.3.3.2 Coaxial Fiberglass Pipe

- A. An automatic line leak detector must be installed on each fuel supply line that conveys product under pressure.
- B. FRP piping shall not be utilized as direct fill lines or aboveground.

10.4 ABOVE GROUND STORAGE TANKS

10.4.1 Conformance with Regulations, Codes, Standards, and Specifications

Aboveground Storage Tanks (AST) containing fuels or chemicals designated hazardous by the EPA or by the applicable codes and standards, shall be approved secondary containment systems and shall be in strict conformance with the most recent applicable regulations, manufacturer’s recommendations, codes, and standards.

1. U.S. EPA Spill Prevention Control and Countermeasure Plans. Title 40, Code of Federal Regulations, Part 112 (40 CFR Part 112) as approved by MAA Manager of Environmental Compliance.
2. State of Maryland, Department of Public Safety and Correctional Services, Title; 12, Subtitle 03, Fire Prevention Commission (COMAR 26.03).

3. State of Maryland, Department of the Environment (MDE), Title; 26, Subtitle 10, Oil Pollution and Tank Management (COMAR 26.10).
4. National Fire Prevention Association (NFPA) Standards:
 - NFPA 1: Fire Code
 - NFPA 30: Flammable and Combustible Liquids Code.
 - NFPA 30A: Motor Fuel Dispensing Facilities and Repair Garage.
 - NFPA 31: Standard for Installation of Oil-Burning Equipment.
 - NFPA 58: Liquefied Petroleum Gas Code.
 - NFPA 59: Utility LP-Gas Code
 - NFPA 59A: Standard for the Production, Storage, and Handling of Liquefied Natural Gas (LNG).
 - NFPA 70: National Electrical Code.
 - NFPA 385: Standard for Tank Vehicles for Flammable and Combustible Liquids.
 - NFPA 395: Standard for the Storage of Flammable and Combustible Liquids at Farms and Isolated Sites.
 - NFPA 704: Standard System for Identification of Hazards of Materials for Emergency Response.
 - NFPA 780: Standard for the Installation of Lightning Protection Systems.
5. Petroleum Equipment Institute (PEI) Recommended Practice (RP) For the Installation of Aboveground Storage Systems for Motor-Vehicle Fueling (PEI/RP 200-03).
6. Underwriters Laboratories Inc. (UL) listing required – UL 142 – Standards for Steel Aboveground Tanks for Flammable and Combustible Liquids.
7. Underwriters Laboratories Inc. (UL) listing required – UL 2085 – Standards for Protected Aboveground Tanks for Flammable and Combustible Liquids.
8. American Petroleum Institute (API) Standard 2000, Venting Atmospheric and Low-Pressure Storage Tanks.
9. Steel Tanks Institute (STI), Shop Fabricated Atmospheric Tank Documents.

10.4.2 Aboveground Fuel Storage Tank Requirements

1. Storage tanks shall be warranted for 30 years against failure due to internal/external corrosion and when properly installed, against structural failure.
2. Aboveground storage tanks shall be UL-2085 or UL-142 listed and shall be equipped with the following design parameters:

A. “Protected” Aboveground Storage Tank System (UL-2085)

- a) The storage tank shall be a UL-2085 thermally insulated double-walled, steel aboveground storage tank designed for the storage of flammable and combustible liquids at atmospheric pressure. The tank shall include steel primary tank, integral steel secondary containment and thermal insulation that provides a minimum two-hour fire rating. The entire tank system shall be factory fabricated as a single unit and delivered to the job site as a complete assembly. Secondary containment shall be a minimum 110% of the primary containment volume.
- b) Inner and outer tank shall be manufactured in accordance with UL-142 Standard for Steel Aboveground Tanks for Flammable and Combustible Liquids. Entire tank shall be labeled for Underwriters Laboratories UL-2085 Standard for Insulated Secondary Containment Aboveground Tank for Flammable Liquids. The tank design shall comply with UL-2085 “Protected” Tank standard and shall be tested for Ballistics, Impact, Hose Stream, and Pool Fire UL-2085 performance standards. Each tank shall be delivered as a completed UL-listed assembly.
- c) Tank shall be manufactured and labeled per NFPA 704 for type of hazardous material stored and in strict accordance with Steel Tank Institute (STI) Fireguard® Thermally Insulated, Double Wall Steel Aboveground Storage Tank standards as applied by a license of the STI. Tanks shall be subject to STI’s Quality Assurance program and backed by the STI 30-year limited warranty.
- d) Tank shall be fabricated per UL-142 of mild carbon steel with shall seams of continuous lap weld construction. Tank shall be of double wall construction and provide complete secondary containment of the primary storage tank’s contents by an impervious steel outer wall. A minimum of 3-inches of porous, lightweight monolithic thermal insulation material shall be installed at the factory within the interstitial space between the inner and outer wall. The thermal insulating material shall be in accordance with American Society of Testing Materials (ASTM) Standards C-332 and C-495. The thermal insulating material shall allow liquid to migrate through it to the monitoring point. The thermal insulating material shall not be exposed to weathering and shall be protected by the steel secondary containment outer wall.

B. Aboveground Storage Tank System (UL-142)

- a) The storage tank shall be a UL-142 double-walled, steel aboveground storage tank designed for the storage of flammable and combustible liquids at atmospheric pressure. The tank shall include steel primary tank and integral steel secondary containment. The entire tank system

shall be factory fabricated as a single unit and delivered to the job site as a complete assembly. Secondary containment shall be a minimum of 110% of the primary containment volume. The tank shall be designed for possible relocation at a future date.

- b) Inner and outer tank shall be manufactured in accordance with UL-142 Standard for Steel Aboveground Tanks for Flammable and Combustible Liquids. Each tank shall be delivered as a completed UL-listed assembly.
 - c) Tank shall be fabricated per UL-142 of mild carbon steel with shall seams of continuous lap weld construction. Tank shall be of double wall construction and provide complete secondary containment of the primary storage tank's contents by an impervious steel outer wall.
- 3. Each tank shall be designed for possible relocation at a future date. Concrete encased tank designs are not recommended.
 - 4. Each tank shall be equipped with OSHA approved stairs and platforms with handrails, supplied by the manufacturer. For tanks without remote fill assemblies, stairs shall be located at same end of tank as fill pipe, fill pipe shall be fully accessible to fuel delivery operator.
 - 5. Lifting lugs shall be provided at balancing points to facilitate handling and installation of the tank.
 - 6. Exterior protective coatings shall be applied per manufacturer's recommendations.
 - 7. The interstitial space between tanks must be able to be monitored for leaks.
 - 8. Tank Appurtenances – At a minimum each tank shall be equipped with the following. Any deviations from this requirement must be approved by the Engineer in writing. All tank appurtenances must meet the requirements of NFPA 30 and NFPA 30A.
 - A. Normal vent;
 - B. Emergency vent(s);
 - C. Spill catchment basin;
 - D. Site gauge capable of providing the level of liquid within the tank to the nearest inch (minimum);
 - E. Overfill prevention valve;

- F. Vent whistle / high level alarm;
 - G. Fire valve;
 - H. Ball valve(s);
 - I. Antisiphon valve / solenoid valve that will prevent the release of liquid from the tank by siphon flow; and
 - J. Annular space leak detection gauge that will visually alert facility personnel to the presence of liquid within the annular space.
 - K. Minimum 30" diameter flanged manway access at top centerline of tank for tanks over 5,000gallon capacity.
9. The tank's primary and secondary containments must be tested for tightness in the factory and in the field (following installation of all components) before commissioning.

10.4.3 Aboveground Storage Tank Venting (Normal Vent)

1. Storage tank shall be adequately vented to prevent the development of pressure or vacuum that can damage the tank or exceed the tank's design pressure during filling or emptying of the tank. Each compartment of the primary tank shall be equipped with a normal venting device sized and installed in accordance with the requirements of NFPA 30, NFPA 30A, and API Standard 2000.
2. The normal vent shall be at least as large as the largest filling or withdrawal connection but shall not be less than 1.25-inches nominal inside diameter.
3. The normal vent for an AST system storing a flammable liquid shall extend a minimum of twelve (12) feet above the ground. The normal vent for an AST system storing a combustible liquid shall extend a minimum of three (3) feet above the top of the tank.
4. The venting device(s) shall be designed so vapors exhaust upward. Vent outlets shall be installed so that vapors will not be trapped by eaves or other obstructions, all vent outlets shall be a minimum of five (5) from building openings and air intakes.
5. Tank vents that are installed within or attached to a canopy shall extend a minimum of five (5) feet above the highest projection of the canopy.

6. Normal vents shall NOT be installed on any compartment of the tank that does not routinely contain petroleum products (i.e., interstitial spaces, closed portions of closed-top dike tanks).
7. Ball float vent checks shall NOT be used with an AST system.

10.4.4 Aboveground Storage Tank Venting (Emergency Vents)

1. Every aboveground storage tank shall have emergency relief venting (either through construction of device(s)) that will relieve excessive pressure caused by exposure to fire. This applies to every compartment of the primary tank, the interstitial space of the secondary tank, and the enclosed space of tanks of closed-top dike construction.
2. The necessary emergency relief venting capacity for a tank system shall be in accordance with NFPA 30, NFPA 30A, and the manufacturer's recommendations.

10.4.5 Aboveground Storage Tank Piping

1. Aboveground piping shall be minimum Schedule 40 galvanized steel for ground product fuels and internally lined epoxy-coated or stainless steel for jet fuel. Galvanized piping shall not be used for diesel or aviation fuels.
2. Underground product piping shall be one of the following: UL approved double-walled fiberglass, or UL approved double-walled corrosion resistant flexible petroleum fuel piping including polyethylene conduit, or equal, including the installation of product containment sumps for dispensing units and transition points from aboveground to underground piping.
3. Piping systems of aboveground storage tanks in connection with pumps shall contain a sufficient number of control valves and check valves to control the flow of liquids properly in normal operation and in the event of physical damage or fire exposure.
4. Piping systems affiliated with aboveground storage tanks shall be protected and supported in a way that it will be protected from physical damage and excessive stresses arising from settlement, vibration, expansion, contraction, or exposure to fire.
5. Aboveground product supply piping shall be equipped with the following components, which shall be installed in the following order moving downstream from the tank (unless otherwise specified by the Engineer in writing):
 - A. Block valve / Ball valve – capable of isolating the tank from the piping.

- B. Fire / Emergency valve – capable of automatically closing and isolating the tank and piping in the event of a fire. The fire / emergency valve shall be constructed of steel or nodular iron to prevent failure under fire conditions.
- C. Anti-siphon valve / solenoid valve – capable of preventing gravity-discharge / siphon flow of product from damaged piping. The anti-siphon valve may be electrically operated solenoid valves or mechanical check valves that open or close simultaneously with the operation of the pump motor. Anti-siphon valves are only required on tanks where the liquid level in the tank (at any point) is higher than the supply piping or dispensing unit. Where permitted, mechanical anti-siphon valves shall be installed in lieu of electric solenoid valves.

10.4.6 Fill Lines

1. Fill piping for aboveground storage tanks shall be provided with a means for making a direct connection to the delivery vehicle's dispensing hose, so that the delivery of fuel is not exposed to the direct air during filling operations.
2. Aboveground storage tank fill pipes shall be provided with check valves or block valves for automatic protection against backflow where the piping is arranged in such a way that backflow from the system is possible.
3. Locate fill pipe such that the delivery operator can perform tank fueling without climbing or walking on tank.
4. Means shall be provided to prevent overfilling by sounding an alarm when the liquid level in the tank reaches 90 percent of capacity and by automatically stopping the delivery to the tank when the liquid level in the tank reaches 95 percent of capacity. Overfill prevention equipment must not interfere with the proper operation of either normal or emergency tank vents.
5. Fill pipes that enter the top of the tank shall terminate within six (6) inches of the bottom of the tank.
6. All tanks storing flammable liquids shall have a drop tube installed on the fill line that terminates within six (6) inches of the bottom of the tank.
7. Fill lines shall not drop below the top of the tank, unless they are connected to a remote fill assembly.
8. All tank-top fill connections shall be made within a spill catchment basin.
9. All fill lines on aboveground storage tanks shall be fitted with a quick-connect adaptor that provides a positive locking connection between the delivery hose and fill connection.

10. All fill lines shall have a liquid-tight cap, which shall be properly identified, closed, and/or locked when not in use.
11. Means shall be provided to determine the level of liquid in the tank. This means shall be accessible to the delivery operator.

10.4.7 Remote Fill Assemblies

1. In the event a remote fill assembly is required, it shall be installed in a convenient grade-level access to the tank delivery point.
2. The remote fill assembly shall consist of a liquid-tight spill container capable of contacting any drips or spill that occur during the fuel delivery process. A manual pump or other means shall be provided to transfer any released product back into the tank. A manual drain must also be located in the bottom of the remote fill assembly to permit manual draining of liquids, if necessary.
- 3.
4. The delivery hose connection must be positioned so that that is maintained at a lower elevation than the discharge hose on the delivery truck.
5. The delivery hose connection point shall be equipped with a quick-connect adaptor, check valve (to prevent backflow), and a block valve / ball valve. If space is limited, the check valve and block valve may be located outside the spill container, but must be as close to the quick-connect adaptor as possible.

10.4.8 Collision Protection

1. Where a tank, piping, or dispensing unit might be exposed to vehicular impact, protection shall be provided to prevent damage to the equipment.
2. For all permanent aboveground storage tanks, pipe bollards shall be provided around all sides of tank from which traffic could possibly approach. Space bollards at intervals not greater than four (4) feet on center. Pipe bollards shall be installed in accordance with NFPA 30A, section 4.3.7.2.
3. Dispensing devices shall be mounted on a concrete island or shall be otherwise protected against collision damage.
4. For aboveground piping installed near roof lines, piping shall be protected from damage caused by falling ice.

10.5 STORAGE TANKS ASSOCIATED WITH GASOLINE DISPENSING/MOTOR VEHICLE REFUELING FACILITIES (GD/MVRFS)

Please see Chapter 4.8 titled “Environmental Coordination,” Section 4.8.5 regarding the Gasoline Dispensing/Motor Vehicle Refueling Facilities Permitting Process and Design Requirements.

For the purposes of this section and all subsequent subsections, “Owner” refers to the Maryland Aviation Administration (MAA), or either of BWI Marshall and/or Martin State Airports as determined by the context. “Designer” refers to any entity commissioned to design and/or specify equipment described herein for construction and/or installation at any MAA facility or location within the BWI Marshall and/or Martin State Airports.

Owner must ensure that proper procedures are followed during product transfer from cargo tanks to storage tanks to minimize vapor releases, such as minimizing gasoline spills, expeditiously cleaning up gasoline spills, using gasketed seals for gasoline containers and storage tank fill pipes, and minimizing product being sent to open waste collection systems that collect and transport gasoline to reclamation and recycling devices such as oil/water separators. Owner must not permit cargo (delivery) trucks/tanks to unload gasoline into a storage tank unless proper connections in the vapor balance system are established, vapor-tight equipment and connections are used, and the tank truck vapor return equipment/hatches/seals are vapor-tight and compatible with the storage tank vapor balance equipment. Additionally, the cargo tank must carry documentation that it has met specifications of EPA method 27.

Owner must comply with general requirements pertaining to permit duration, availability of permit at permitted location, modifications, inspections, right of entry, violations, and penalties as outlined in Part III of MDE/ARMA’s *Air Quality General Permit to Construct Application Package for Motor Vehicle Refueling Facilities*.

In addition, the following recordkeeping, testing, notification, and reporting procedures are required for GD/MVRF storage tanks:

1. Recordkeeping
 - a) For tanks with a monthly throughput of less than 100,000 gallons and Stage I vapor recovery equipment, owner must make gasoline throughput, gasoline spills and cleanups, and maintenance records available within 24 hours of a Maryland Department of the Environment’s Air and Radiation Management Administration (MDE/ARMA) request.
 - b) For tanks with monthly throughput of 100,000 gallons or more and Stage I vapor recovery equipment, owner must make those records outlined in item 1.a., above, as well as records of all tests performed and all notifications or reports submitted to the EPA or MDE/ARMA available within 24 hours of a MDE/ARMA request.
 - c) All records must be kept by owner for a period of five years.

- d) Additional recordkeeping requirements are outlined for tanks with Stage II vapor recovery equipment (required for all new sources at BWI Marshall and Martin State Airports) in Part II, Section E(2) of MDE/ARMA's *Air Quality General Permit to Construct Application Package for Motor Vehicle Refueling Facilities*.

2. Testing

- a) For tanks with a monthly throughput of 100,000 gallons or more and Stage I vapor recovery equipment, owner must demonstrate compliance at the time of installation and every three years thereafter with those tests outlined in Section 4.8.5.2, subsection 5(d-g) and in Part II, Section B(1)(c) of MDE/ARMA's *Air Quality General Permit to Construct Application Package for Motor Vehicle Refueling Facilities*.
- b) Testing frequency as well as additional testing requirements for tanks with Stage II vapor recovery equipment are outlined in Part II, Section B(2) of the *Application Package*.
- c) Owner must ensure that all Stage II equipment is inspected at least daily, and that at least one employee shall be trained to conduct inspections through an approved training course.

3. Notifications

- a) Regulatory notifications are required for tanks with monthly throughput of 10,000 gallons or more and Stage I vapor recovery equipment. Notification types include Initial, Compliance, Change in Information, and Performance Test, and requirements increase for tanks with a monthly throughput of 100,000 gallons or more. These notification requirements and procedures are outlined in Part II, Section C of the *Application Package*.
- b) Except for Performance Test notifications, there are no other notification requirements for tanks of any size with Stage II vapor recovery equipment (see Part II, Section C(2) and Section D(2) of the *Application Package*). Owner must notify MDE/ARMA of any Stage II vapor recovery equipment performance tests at least 5 days before conducting the test. Copies of all test results and reports of test failures must be forwarded to MDE/ARMA within 45 days per Part II, Section D(2) of the *Application Package*.

4. Reporting

- a) There are no reporting requirements for tanks with monthly throughput of less than 100,000 gallons and Stage I vapor recovery equipment. For tanks with monthly throughput of 100,000 gallons or more and Stage I vapor recovery equipment,

owner must report results of tests to EPA Region III and the MDE/ARMA within 180 days of test completion (see Part II, Section D(1) of the Application Package).

10.6 PAINT BOOTHS

For the purposes of this section and all subsequent subsections, “Owner” refers to the Maryland Aviation Administration (MAA), or either of BWI Marshall and/or Martin State Airports as determined by the context. “Designer” refers to any entity commissioned to design and/or specify equipment described herein for construction and/or installation at any MAA facility or location within the BWI Marshall and/or Martin State Airports.

The design and use of paint booths for paint stripping operations and surface coating operations must meet the requirements set forth in COMAR 26.11.01, 26.11.02, 26.11.03, 26.11.13, and 26.11.19, as well as the Federal regulatory requirements set forth in 40 CFR 63.11173 (if applicable). Applicable COMAR regulations can be found at the following website:

http://www.dsd.state.md.us/comar/subtitle_chapters/26_Chapters.aspx#Subtitle11

Applicable Federal Regulatory requirements can be found at:

<http://ecfr.gpoaccess.gov/cgi/t/text/textidx?c=ecfr&sid=c85e05c9612e654265ac8e4edd0d233e&rgn=div6&view=text&node=40:14.0.1.1.1.20&idno=40>

10.6.1 Paint Stripping Operations

If MAA or Tenant paint stripping operations includes paint stripping using methylene chloride (MeCl) for the removal of dried paint (including but not limited to paint, enamel, varnish, shellac, and lacquer) from wood, metal, plastic, and other substrates, then the following steps should be taken:

- a) Evaluate each application to ensure there is a need for paint stripping (e.g., evaluate whether it is possible to re-coat the piece without removing the existing coating);
- b) Evaluate each application where a paint stripper containing MeCl is used to ensure that there is no alternative paint stripping technology that can be used;
- c) Reduce exposure of all paint strippers containing MeCl to the air;
- d) Optimize application conditions when using paint strippers containing MeCl to reduce MeCl evaporation (e.g., if the stripper must be heated, make sure that the temperature is kept as low as possible to reduce evaporation); and
- e) Practice proper storage and disposal of paint strippers containing MeCl (e.g., store stripper in closed, air-tight containers).

Owners or operators of a paint stripping operation using paint strippers containing MeCl must submit an Initial Notification to EPA Region III and MDE/ARMA, as required by §63.9(b). For a new affected source, the initial Notification must be submitted no later than 180 days after initial startup. For an existing affected source, the Initial Notification must be submitted no later than January 11, 2010.

If the owner or operator of a paint stripping operation uses more than one ton of MeCl annually, a MeCl Minimization Plan must be developed to address the management practices outlined in §63.11173(a)(1) through (a)(5). Paint stripping operations that use less than one ton of MeCl annually must comply with the management practices outlined in §63.11173(a)(1) through (a)(5), but are not required to develop and implement a written MeCl Minimization Plan.

Each paint stripping operation must maintain copies of annual usage of paint strippers containing MeCl onsite at all times.

MAA or tenant operations which include a paint stripping operation using paint strippers containing MeCl must submit an Initial Notification to EPA Region III and MDE/ARMA, as required by §63.9(b). For a new affected source, the Initial Notification must be submitted no later than 180 days after initial startup. For an existing affected source, the Initial Notification must be submitted no later than January 11, 2010.

MAA/tenant owners or operators of a paint stripping operation must maintain the records specified below:

- a) Records of paint strippers containing MeCl used for paint stripping operations, including the MeCl content of the paint stripper used. Documentation needs to be sufficient to verify annual usage of paint strippers containing MeCl (e.g., material safety data sheets or other documentation provided by the manufacturer or supplier of the paint stripper, purchase receipts, records of paint stripper usage, engineering calculations);
- b) Paint stripping sources that annually uses more than one ton of MeCl are required to maintain a record of the current MeCl Minimization Plan onsite for the duration of the paint stripping operations. Records of the annual review of, and updates to, the MeCl Minimization Plan must also be maintained;
- c) Records of any deviation from the requirements in §§63.11173, 63.11174, 63.11175, or 63.11176. These records must include the date and time period of the deviation, and a description of the nature of the deviation and the actions taken to correct the deviation; and
- d) Per §63.111778, owners or operators of an affected source must maintain copies of the records listed above for a period of at least five years after the date of

each record. Copies of records must be kept onsite and in a printed or electronic form that is readily accessible for inspection for at least the first two years after their date, and may be kept offsite after that two year period.

10.6.2 Surface Coating Operations

Per §63.11173(e), motor vehicle and mobile equipment surface coating operations and miscellaneous surface coating operations must meet the following requirements:

- a) All painters, including contract personnel, must be certified that they have completed training in the proper spray application of surface coatings and the proper setup and maintenance of spray equipment.
- b) All paint spray gun cleaning must be done so that an atomized mist or spray of gun cleaning solvent and paint residue is not created outside of a container that collects used gun cleaning solvent. Spray gun cleaning may be done with, for example, hand cleaning of parts of the disassembled gun in a container of solvent, by flushing solvent through the gun without atomizing the solvent and paint residue, or by using a fully enclosed spray gun washer. A combination of non-atomizing methods may also be used.

Owners or operators of a surface coating operation subject to NESHAP Subpart HHHHHH must submit an Initial Notification to EPA Region III and MDE/ARMA, as required by §63.9(b). For a new affected source, the Initial Notification must be submitted no later than 180 days after initial startup. For an existing affected source, the Initial Notification must be submitted no later than January 11, 2010.

Per §63.11176(a), owners or operators of a motor vehicle or mobile equipment, or miscellaneous surface coating affected source, are required to submit an Annual Notification of Changes Report in each calendar year in which information previously submitted in either the Initial Notification, Notification of Compliance, or a previous Annual Notification of Changes Report has changed. Deviations from the relevant requirements in §63.11173(a) through (d) or §63.11173(e) through (g) on the date of the report will be deemed to be a change. The Annual Notification of Changes Report must be submitted prior to March 1 of each calendar year when reportable changes have occurred.

Owners or operators of a surface coating operation must maintain the records specified below:

- a) Certification that each painter has completed the training specified in §63.11173(f) with the date the initial training and the most recent refresher training was completed;
- b) Documentation of the filter efficiency of any spray booth exhaust filter material, according to the procedure in §63.11173(e)(3)(i);

- c) Documentation from the spray gun manufacturer that each spray gun with a cup capacity equal to or greater than 3.0 fluid ounces (89 cc) that does not meet the definition of an HVLP spray gun, electrostatic application, airless spray gun, or air assisted airless spray gun, has been determined by the Administrator to achieve a transfer efficiency equivalent to that of an HVLP spray gun, according to the procedure in §63.11173(e)(4);
- d) Copies of any notification submitted as required by §63.11175 and copies of any report submitted as required by §63.11176; and
- e) Per §63.111778, owners or operators of an affected source must maintain copies of the records listed above for a period of at least five years after the date of each record. Copies of records must be kept onsite and in a printed or electronic form that is readily accessible for inspection for at least the first two years after their date, and may be kept offsite after that two year period.

10.7 PARTS WASHERS AND DEGREASERS

For the purposes of this section and all subsequent subsections, “Owner” refers to the Maryland Aviation Administration (MAA), or either of BWI Marshall and/or Martin State Airports as determined by the context. “Designer” refers to any entity commissioned to design and/or specify equipment described herein for construction and/or installation at any MAA facility or location within the BWI Marshall and/or Martin State Airports.

Designers should consider the use of non-solvent based parts washers and degreasers whenever practicable. Alternative non-solvent based (citrus-based or microbial cleaning agents) parts washers and degreasers do not require permitting and will reduce air emissions and eliminate the generation of associated hazardous wastes at MAA and tenant owned facilities. If an alternative non-solvent based parts washer and/or degreaser cannot be installed, the Division of Environmental Compliance must be notified.

The design and use of parts washers and degreasers must meet the requirements set forth in COMAR 26.11.19.09, as well as the Federal regulatory requirements set forth in 40 CFR 63.462 (if applicable).

COMAR 26.11.19.09 requires that Good Operating Practices be employed when using VOC degreasing material. The following are considered Good Operating Practices:

- a) A person subject to this regulation shall implement good operating practices to minimize spills and evaporation of VOC degreasing material.
- b) Good operating practices shall include covers (including water covers), lids, or other methods of minimizing evaporative losses, and reducing the time and frequency during which parts are cleaned.

- c) Good operating practices shall be established in writing, and displayed so they are clearly visible to the operator.
- d) The written good operating practices shall be maintained at the facility and made available for review by the Department upon request.
- e) A person subject to this regulation may not use a halogenated substance that is a VOC in any cold degreasing.

10.7.1 Batch Cold Cleaning Machine Standards

1. Owners or operators of an immersion batch cold solvent cleaning machine shall comply with the requirements of §63.462(a)(1) through (a)(2).
2. Owners or operators of a remote-reservoir batch cold solvent cleaning machine shall comply with the requirements of §63.462(b).
3. Owners or operators of a batch cold solvent cleaning machine complying with §63.462(a)(2) or f §63.462(b) shall comply with the work and operational practice requirements in of §63.462(c)(1) through(c)(9), as applicable.
4. Owners or operators of a batch cold cleaning machine shall submit an Initial Notification Report as described in §63.468 (a) and (b) and a Compliance Report as described in 63.468(c).

10.7.2 Batch Vapor and In-Line Cleaning Machine Standards

1. Owners or operators of an existing or new batch vapor or in-line solvent cleaning machine shall meet all of the required work and operational practices of §63.463(d)(1) through (d)(12).
2. Owners or operators of a solvent cleaning machine which complies with §63.463(b), (c), (g), or (h) shall comply with the requirements of §63.463(e)(1) through (e)(4).
3. Owners or operators of a batch vapor or in-line solvent cleaning machine complying with the idling emission limit standards in §63.463(b)(1)(ii), (b)(2)(ii), (c)(1)(ii), or (c)(2)(ii) shall comply with the requirements of §63.463(f)(1) through (f)(5).

10.7.3 Test Methods

1. Owners or operators of a batch vapor or in-line solvent cleaning machine complying with an idling emission limit standard in §63.463(b)(1)(ii), (b)(2)(ii), (c)(1)(ii), or (c)(2)(ii) shall determine the idling emission rate of the solvent cleaning machine using Reference Method 307 in appendix A of 40 CFR Part 63.

2. Owners or operators of a batch vapor or in-line solvent cleaning machine complying with §63.464 shall, on the first operating day of every month ensure that the solvent cleaning machine system contains only clean liquid solvent. This includes, but is not limited to, fresh unused solvent, recycled solvent, and used solvent that has been cleaned of soils. A fill line must be indicated during the first month the measurements are made. The solvent level within the machine must be returned to the same fill-line each month, immediately prior to calculating monthly emissions as specified in §63.465(c). The solvent cleaning machine does not have to be emptied and filled with fresh unused solvent prior to the calculations.
3. Owners or operators of a batch vapor or in-line solvent cleaning machine complying with §63.464 shall, on the first operating day of the month, comply with the requirements of §63.465(c)(1) through (c)(3).
4. Owners or operators of a batch vapor or in-line solvent cleaning machine using a dwell to comply with §63.463 shall determine the appropriate dwell time for each part or parts basket using the procedures specified in §63.465(d)(1) and (d)(2).
5. Owners or operators of a source shall determine their potential to emit from all solvent cleaning operations using the procedures described in §63.465(e)(1) through (e)(3).

10.7.4 Monitoring Procedures

1. Owners or operators of a batch vapor or in-line solvent cleaning machine complying with the equipment standards in §63.463(b)(1)(i), (b)(2)(i), (c)(1)(i), (c)(2)(i), (g)(1), or (g)(2) shall conduct monitoring and record the results on a weekly basis for the control devices, as appropriate, specified in §63.466(a)(1) through (5).
2. Owners or operators of a batch vapor or in-line solvent cleaning machine complying with the equipment standards of §63.463 (b)(1)(i), (b)(2)(i), (c)(1)(i), or (c)(2)(i) shall conduct monitoring and record the results on a monthly basis for the control devices, as appropriate, specified in §63.466(b)(1) and (b)(2).
3. Owners or operators of a batch vapor or in-line solvent cleaning machine complying with the equipment or idling standards in §63.463 shall monitor the hoist speed as described in §63.466(c)(1) through (c)(4).
4. Owners or operators of a batch vapor or in-line solvent cleaning machine complying with the equipment standards in §63.463 (b)(1)(i), (b)(2)(i), (c)(1)(i), or (c)(2)(i) using a reduced room draft shall conduct monitoring and record the results as specified in §63.466(d)(1) or (d)(2).

5. Owners or operators using a carbon adsorber to comply with this subpart shall measure and record the concentration of halogenated HAP solvent in the exhaust of the carbon adsorber weekly with a colorimetric detector tube. This test shall be conducted while the solvent cleaning machine is in the working mode and is venting to the carbon adsorber. The exhaust concentration shall be determined using the procedure specified in §63.466(e)(1) through (e)(3).
6. Owners or operators of a batch vapor or in-line solvent cleaning machine complying with the idling emission limit standards of §63.463 (b)(1)(ii), (b)(2)(ii), (c)(1)(ii), or (c)(2)(ii) shall comply with the requirements specified in §63.466(f)(1) and (f)(2).
7. Owners or operators using a control device listed in §63.466(a) through (e) can use alternative monitoring procedures approved by the Administrator.

10.7.5 Recordkeeping Requirements

1. COMAR requires the MAA and tenants using VOC degreasing materials to maintain monthly records of the total VOC degreasing materials used and to make the records available to the Department upon request.
2. Owners or operators of a batch vapor or in-line solvent cleaning machine complying with the provisions of §63.463 shall maintain records in written or electronic form specified in §63.467(a)(1) through (7) for the lifetime of the machine.
3. Owners or operators of a batch vapor or in-line solvent cleaning machine complying with §63.463 shall maintain records specified in §63.467(b)(1) through (b)(4) either in electronic or written form for a period of 5 years.
4. Owners or operators of a batch vapor or in-line solvent cleaning machine complying with the provisions of §63.464 shall maintain records specified in §63.467(c)(1) through (3) either in electronic or written form for a period of 5 years.

10.7.6 Reporting Requirements

1. Owners or operators of an existing solvent cleaning machine subject to the provisions of §63.468 shall submit an Initial Notification Report to the Administrator no later than August 29, 1995. This report shall include the information specified in §63.468(a)(1) through (a)(6).
2. Owners or operators of a new solvent cleaning machine subject to the provisions of §63.468 shall submit an Initial Notification Report to the Administrator. New sources for which construction or reconstruction had commenced and initial startup had not occurred before December 2, 1994, shall submit this report as soon as

practicable before startup but no later than January 31, 1995. New sources for which the construction or reconstruction commenced after December 2, 1994, shall submit this report as soon as practicable before the construction or reconstruction is planned to commence. This report shall include all of the information required in §63.5(d)(1) of Subpart A (General Provisions), with the revisions and additions in §63.468(b)(1) through (b)(3).

3. Owners or operators of a batch cold solvent cleaning machine subject to the provisions of §63.468 shall submit a Compliance Report to the Administrator. For existing sources, this report shall be submitted to the Administrator no later than 150 days after the compliance date specified in §63.460(d). For new sources, this report shall be submitted to the Administrator no later than 150 days after startup or May 1, 1995, whichever is later. This report shall include the requirements specified in §63.468(c)(1) through (c)(4).
4. Owners or operators of a batch vapor or in-line solvent cleaning machine complying with the provisions of §63.463 shall submit to the Administrator an Initial Statement of Compliance for each solvent cleaning machine. For existing sources, this report shall be submitted to the Administrator no later than 150 days after the compliance date specified in §63.460(d). For new sources, this report shall be submitted to the Administrator no later than 150 days after startup or May 1, 1995, whichever is later. This statement shall include the requirements specified in §63.468(d)(1) through (d)(6).
5. Owners or operators of a batch vapor or in-line solvent cleaning machine complying with the provisions of §63.464 shall submit to the Administrator an Initial Statement of Compliance for each solvent cleaning machine. For existing sources, this report shall be submitted to the Administrator no later than 150 days after the compliance date specified in §63.460(d). For new sources, this report shall be submitted to the Administrator no later than 150 days after startup or May 1, 1995, whichever is later. The statement shall include the information specified §63.468(e)(1) through (e)(4).
6. Owners or operators of a batch vapor or in-line solvent cleaning machine complying with the provisions of §63.463 shall submit an Annual Report by February 1 of the year following the one for which the reporting is being made. This report shall include the requirements specified in §63.468(f)(1) through (f)(3).
7. Owners or operators of a batch vapor or in-line solvent cleaning machine complying with the provisions of §63.464 shall submit a Solvent Emission Report every year. This Solvent Emission Report shall contain the requirements specified in §63.468(g)(1) through (g)(4).
8. Owners or operators of a batch vapor or in-line solvent cleaning machine shall submit an Exceedance Report to the Administrator semiannually except when, the Administrator determines on a case-by-case basis that more frequent reporting is

necessary to accurately assess the compliance status of the source or, an exceedance occurs. Once an exceedance has occurred, the owner or operator shall follow a quarterly reporting format until a request to reduce reporting frequency is approved. Exceedance Reports shall be delivered or postmarked by the 30th day following the end of each calendar half or quarter, as appropriate. The Exceedance Report shall include the applicable information in §63.468(h)(1) through (h)(3).

9. Owners or operators who are required to submit an Exceedance Report on a quarterly (or more frequent) basis may reduce the frequency of reporting to semiannual if the conditions in §63.468(i)(1) through (i)(3).
10. Owners or operators of a solvent cleaning machine requesting an equivalency determination, as described in §63.469 shall submit an Equivalency Request Report to the Administrator. For existing sources, this report must be submitted to the Administrator no later than June 3, 1996. For new sources, this report must be submitted and approved by the Administrator prior to startup.

10.8 ASBESTOS AND OTHER HAZARDOUS MATERIALS

Current Federal and State environmental statutes require that certain potentially hazardous materials that may be affected by building improvements or modifications involving activities such as construction, repair, maintenance, alterations, and renovations be identified and removed prior to conducting these activities. The requirements mandate that hazardous materials be identified in order to comply with worker and occupant/tenant safety, environmental, and disposal requirements. The primary materials of concern include, but are not limited to, asbestos-containing materials (ACM), lead-based paint, PCB, and mercury-containing building elements.

Prior to developing a scope of work for the proposed improvements or modifications, the Designer, Contractor and/or Tenants are required to coordinate with the Division of Environmental Compliance to obtain recent hazardous materials surveys and to arrange for a Hazardous Materials Site Assessment. An MAA contractor will inspect the area and provide a report describing the hazardous materials that will be affected by the proposed activities and recommendations for their removal or management. Hazardous materials removal services will be arranged and managed by the MAA or by the tenant. In either case, "third party" abatement oversight will be provided by the Division of Environmental Compliance. The 100% plans shall be submitted to the Division of Environmental Compliance for review and coordination.

The following shall be incorporated into the construction documents for hazardous materials abatement work:

1. The Contractor shall coordinate through CMI the scheduling of the Division of Environmental Compliance inspectors' and industrial hygienist during the construction demolition phase. The Environmental Compliance Inspectors and Industrial Hygienist would identify any suspect hazardous material that may have been inaccessible during

design, for example behind a wall or under a floor. If hazardous material is found during demolition, a Field Revision will be issued by the Engineer.

2. Include Miscellaneous Work Allowance for unforeseen asbestos removal.

The following addresses the post abatement deliverables from abatement contractors and provides a consistent method of reporting required information. This is designed to be included in contracts or agreements between MAA and abatement contractors.

Contract Language for Office of Design to Provide to Abatement Contractors:

The Abatement Contractor shall perform work in accordance with the contract terms, applicable Federal and State regulations, and approved Abatement Design. Within thirty (30) days of project completion the Contractor shall provide an Abatement Closure Report. The submittal shall consist of two hard copies of the Closure Report and one electronic version in PDF format. The Closure Report must include a Title Page containing the site or renovation area, project name (what was removed from where), Contractor name and information, Contract number, and dates of abatement. An Abatement Summary must be provided that describes the materials removed, controls used, work procedures, total amount removed and location(s) of removal. Indicate if "all" materials were removed or if remnant materials remain and where.

The following appendices must be provided:

- * Copies of Abatement Design/Work Plan
- * Copies of EPA Notifications or permits (as applicable)
- * Copies of Contractor Supervisor and Worker certificates/licenses
- * Copies of Daily Sign in Logs and Inspection Logs
- * Copies of Air Sample Results
- * Copies of Waste Manifests

The hard copy and electronic reports shall be submitted to MAA's Environmental Program Manager, Division of Environmental Compliance for review and acceptance.

10.8.1 Asbestos

1. For renovation work, a checklist should be formulated to insure all possible sources of asbestos have been removed (i.e., ceiling tile, floor tile, insulation, etc.). If asbestos is suspected, the MAA Environmental Compliance Officer shall be contacted to initiate the proper documentation and testing of the site and determination of the proper abatement procedures.
2. Column Covers: Many of the column covers in the terminal building consist of preformed asbestos cement. Because this material is non-friable, there is no health hazard associated with its undisturbed presence. Any cutting, sawing, drilling, or

work which disturbs the column will require a licensed asbestos abatement firm to properly isolate, contain, and dispose of debris produced.

10.8.2 Lead Paint

The Designer shall determine if the project has potential lead exposure. Where the potential for lead exposure exists, request the MAA Environmental Compliance Officer to test the project site for potential areas which may result in lead exposure above the action level. Test locations and results shall be shown on the contract plans. Incorporate the following into the Special Provisions:

“The Contractor shall fully comply with the requirements of COMAR 09.12.32 – ‘Occupational Safety and Health Standard – Occupational Exposure to Lead in Construction Work,’ dated November 28, 1988, and as may be amended.”

“The Maryland Aviation Administration (MAA) had conducted preliminary tests of the project site to determine the potential lead exposure to workers above the action level. The location and results of those tests are shown in the contract documents.”

“The MAA has conducted the tests and made the results available as a matter of courtesy to prospective contractors. This information in no way relieves the Contractor from performing his own tests or complying with the requirements set forth in COMAR 09.12.32.”

Project inspectors shall follow-up and insure the requirements of COMAR 09.12.32 – “Occupational Safety and Health Standard – Occupational Exposure to Lead in Construction Work” are being complied with.

10.8.3 Management of Radioactive Wastes

The identification, handling, storage, transferring, and disposal of common radioactive wastes, specifically, self-luminous exit signs that may contain radioactive gas, such as tritium or radium, generated from construction projects is subject to Federal regulations that govern tritium or radium-containing signs which are found in the Nuclear Regulatory Commission regulations, 10 CFR 31. Accordingly, any construction project at BWI Marshall and Martin State Airports involving removal and disposal of common radioactive waste shall include the Section 010009X specification for Management of Radioactive Wastes. The 010009X specification can be found in Appendix D, Standard Specifications.

10.8.4 Management of Universal Wastes

The characterization, handling, storage, transport, and disposal of Universal Wastes (UW), such as mercury-containing equipment, batteries, mercury-containing lamps or

bulbs, and fluorescent light ballasts that contain polychlorinated biphenyls (PCBs), generated from construction projects is subject to Code of Maryland Regulations 26.13.10. Accordingly, any construction project at BWI Marshall and Martin State Airports involving removal and disposal of UW material/equipment shall include the Section 010008X specification for Management of Universal Wastes. The 010008X specification can be found in Appendix D, Standard Specifications.

10.9 GLYCOL COLLECTION

Underground Diversion Vaults, Lift Stations, and other similar structures related to glycol collection system shall be designed with Schedule 80 CPVC pipe and fittings. Ductile iron pipe will be accepted as an alternate piping material only if there is a potential for hydrocarbons, e.g. or fuel or oil to enter the piping system. Support brackets, clamps, and braces shall be non-metallic, and use non-corrosive materials. Hardware shall be corrosion resistant.

The deicing collection system shall communicate with the existing BWI Marshall Metasys Facility Management System (FMS).

10.10 FUEL TRUCK PARKING

The design of all facilities at BWI Marshall and MTN, involving fuel loading and/or parking areas for mobile or portable fuel/oil storage containers must comply with NFPA 407, and must meet 40 Code of Federal Regulations, Part 112 requirements of the Environmental Protection Agency's Spill Prevention and Control Countermeasures (SPCC).

The MAA requires all owners of existing fuel operations at BWI Marshall and MTN to construct the secondary containment. New facilities must construct the required secondary containment prior to beginning operation. The requirement for secondary containment applies but is not limited to, the following conditions:

1. Fuel truck parking areas where filled and parked fuel trucks are left unattended. The fuel truck parking areas must be provided with secondary containment capable of holding the volume of the largest tank.
2. Truck loading/unloading areas. Areas where fuel is loaded or unloaded from a tank truck to a storage tank, or vice-versa, must be provided with secondary containment capable of holding at least the maximum capacity of any single compartment of a truck using the facility.

10.11 OIL WATER SEPARATOR (OWS)

Oil/Water Separators offer environmental protection from surface water pollution meeting the needs of a wide variety of run-off applications. The MAA Office of Planning and Environmental Services performs maintenance to oil/water separators following construction and has developed the following basic design criteria to ensure a quality product.

Construction and performance of the oil/water separators must be in accordance with UL 2215. Oil/Water separators shall be listed to Underwriter's Laboratories UL 2215. Manufacturer must provide certification documentation detailing criteria under which the system was tested. UL 2215 label shall be prominently displayed on manway covers. Each separator shall be provided with a limited 30 year warranty against failure due to internal/external corrosion and when installed properly, against structural failure.

Capacities, dimensions, construction, and thickness of separators shall be in strict accordance with UL 58, double-walled construction with 360-degree steel secondary containment. The inner steel tank shall be completely contained within the outer tank, enclosing 100% of the tank volume. The tank must have a double steel shell with a space between the layers. The space between the inner and outer steel walls shall be monitored with an approved leak detection device.

Separators shall have the structural strength to withstand static and dynamic hydraulic loading while empty and during operation conditions. The oil/water separators dimensions and thickness shall be in strict compliance with Roark's Formulas for Stress and Strain as presented in UL 58. Calculations shall be submitted to document structural strength under specified overbearing or external pressure. The separator shall be installed in accordance with manufacturer's recommendations. OWS installed belowground shall be installed to withstand H-20 or aircraft rated loading depending on application.

Oil/water separator must comply with API-421 performance verification calculations for effective coalescer surface area.

Separators must be designed to remove all free oil droplets equal or greater than 20 microns. In addition the effluent quality must meet a discharge limit of 15mg/L Oil and grease.

To ensure performance, the manufacturer must submit analysis which indicates that at the calculated overflow rate of the separator will be provided with the required square feet of projected plate separation area to achieve the specified performance under laminar flow conditions. Submitted calculations shall take into account the rate of flow, potential surge flow, influent concentration, particle characteristics (20-micron), fluid temperature, fluid specific gravity and pH.

Corrosion control systems for separators shall be in accordance with UL 1746 standard for external corrosion protection systems for steel underground tanks.

Specific criteria and controls for the design, as required in the Standards, policies and standard specifications noted below. If there is a conflict between criteria in materials referenced in the section below, the latest listed standard, policy or standard specification will govern. The MAA Office of Planning and Environmental Services shall provide additional guidance as necessary.

Oil/water separators may provide treatment with flow-through or actuated inlet tanks. OWS systems shall be fabricated, inspected and tested for leakage before shipment from the

manufacturer as completely assembled units. Before being placed into service, the OWS shall be tested in accordance with NFPA 30 Chapter 21.5.2.

Oil/water separators serving as secondary containment as defined by 40CFR 112.8 must be constructed to contain 110% of the volume of the largest oil storage container. This often includes mobile fuelers and bulk fuel storage containers.

Separators shall never be intended for use with hazardous chemicals. Oil/water separators should not be used with additional tanks for collection of oil effluent downstream of the unit discharge.

The source of the influent to the separator shall be gravity flow from storm water runoff, hydrocarbon spills, and/or cleaning/maintenance operations.

Selected separator manufacturer shall have at least 15 years experience in manufacturing similar units for identical applications.

OWS must include petro screen with removable sections of polypropylene impingement coalesers designed to intercept oil globules of less than 20 microns in diameter to allow for easy lifting during maintenance.

Oil/water separator local alarm control panel shall consist of audible and visual alarms generated. Alarms shall consist of “high” oil level, “high, high” oil level, and “leak” detection. Control panel shall consist of NEMA 4 enclosure and level sensors shall be intrinsically safe. Separators shall allow for a hydraulic retention time of no less than 10 minutes. This will ensure acceptable laminar flow conditions.

Oil/water separator must contain a minimum of two manways. One manway shall provide easy access to the parallel coaleser plates. The second manway shall be directly above the petro screen. Each manway dimensions shall facilitate easy removal of either device during maintenance. No manway shall be less than 32 inches in size.

Separators shall be furnished with flanged inlet and outlet pipe connections including D.I.P. spool pieces located on each end of the tank.

Separators shall utilize necessary appurtenances, including, but not limited to, liquid level devices, overpressure devices, venting, heaters, pumps, monitors, shutoff valves, control panels, or other individual mechanical or electrical components.

- Must comply with Standard for External Corrosion Protection Systems for Steel Underground Storage Tanks—UL 1746, Section #4
- Normal Venting for Underground Storage Tanks—National Fire Protection Association (NFPA) 30A, 2012. Flammable and Combustible Liquids Code.
- Erosion and Sediment Control—COMAR 26.17

Design must maintain positive drainage through unit. Piping utilized for drainage from the unit shall be sized based on maximum discharge flowrates from the unit, pipe capacity, and necessary pipe strength based on depth of below ground pipe placement. Piping shall be installed with all necessary appurtenances, including seals at piping connections to prevent contamination by unit, cleanouts to allow access to entire length of installed piping, and necessary valves. OWS inlet and outlet piping shall be installed with a minimum slope of 1 percent, and to discharge non-erosively.

- Gaskets and Seals—UL 157

Oil water separator must be properly vented to prevent flow siphoning through the tank. Comply with OWS manufacturer recommendations for vent pipe size and locations.

CHAPTER 11 ARCHITECTURAL / BUILDINGS

11.1 DESIGN CONTINUITY

The Designer shall coordinate their design approach with MAA's Resident Architect prior to and during the concept and schematic design phases for all projects. In addition, the Resident Architect shall review and approve all architectural materials. Prior to the proposal preparation, the Designer, MAA's Project Manager, and Resident Architect shall identify any specialty architectural sub-consultants required for interior design, graphics, furnishings, etc.

The Office of the Fire Marshal (OFM) is responsible for the numbered identification of all doors, elevators, stairwells, and buildings. Designs/construction requiring new or re-numbering of any of the mentioned shall be obtained from the OFM.

11.1.1 Domestic Terminal Baggage Claim Areas

The Designer shall match the standard wall covering, solid surface wainscot and terrazzo floor finish. The red wall covering used on the back wall is "Tretford 570" manufactured by Eurotex. Signage shall match the Airport's standard.

11.1.2 Domestic Terminal Ticketing Concourse

The present design of the ticket counter facing the public shall be maintained. All plastic laminate visible to the public shall match the existing black plastic laminate. The ticket counter module and baggage well size shall match the existing unless approved in advance by the MAA. The provider of the inserts shall be identified during the concept design phase. The design of the back wall, including airline signage and graphics, must be approved by the MAA. Signage required by the Federal Aviation Administration (FAA) must be maintained. The MAA must approve any objects placed by tenants in the public space. Ticket counters shall be designed to have an accessible counter level for the disabled per ADA's current regulations.

Queuing areas may be a maximum of twenty feet (20') from the face of the ticket counters on the upper level of the terminal. Temporary exceptions to these limits may be allowed when needed to accommodate a large number of patrons; however, a minimum of twelve feet (12') of clear corridor must be maintained at all times. Stanchions shall be manufactured by Lavi Industries, Model #60-50-3000CL with plastisol coating on the base and a nylon webbed belt that will extend 6 feet. The logo and color of the tenant/designer's choice shall be silk-screened on the belt.

11.1.3 LED and Blade signs shall match existing.

Domestic Terminal Security Checkpoints

Terminal Security Checkpoints shall comply with all regulations issued by the Transportation Security Administration (TSA) for security checkpoint equipment,

signage, screens, search rooms, etc. Wall covering and solid surfacing wainscot shall match the Airport's standard. Column covers shall be stainless steel. The checkpoint area shall be separated from the egress corridor with full height clear butt-glazed partition. Designers must provide a private search room for dignitaries and an office for the security personnel. In addition, convenient storage for personal items belonging to security personnel shall be provided. This may be a closet or a cupboard in the casework. Lockers, which are visible to the public, are not acceptable.

11.1.4 Domestic Terminal and International Terminal Concourse Holdrooms

The furnishings and finishes in the preferential use Domestic Terminal Holdrooms are the responsibility of the airlines, if required by the lease agreements. Changes in the finishes must be submitted to the MAA for approval. The furnishings and finishes in the International Terminal and common use Domestic Terminal Holdrooms are the responsibility of the MAA. Ticket and lift and gate podium design shall match existing unless approved by MAA.

11.1.5 Commercial Storefronts and Signage

Some latitude is allowed in the design of storefronts and signage in the Domestic Terminal. The preliminary design must be approved by the MAA Resident Architect prior to commencement of Construction Documents (CDs). The roll down grilles shall be aluminum and approved by the MAA Resident Architect. Storefronts and signage in the International Terminal shall conform to the current design. Roll-down grilles shall be clear aluminum and approved by the MAA Resident Architect.

For all Terminal buildings, except A, B, A/B and E Concourses, storefront security grills must be "smoke barrier" grills. Lexan, or Class A rated thermal polycarbonate filler strips, are permitted by the OFM to be used for smoke barrier grill designs.

11.1.6 Service Areas

Back-of-house corridor walls should be constructed of painted gypsum board, painted concrete block, or glazed concrete block. When using gypsum board, vinyl bumpers and corner guards shall be provided to protect walls from impact damage. Consider using a wainscoting material such as Kydex or approved equal at the elevator entrances and/or other areas especially subject to damage.

11.1.7 Offices

The design of office space shall be coordinated with the MAA Resident Architect.

11.1.8 FIDS/BIDS Enclosures

The design of FIDS/BIDS enclosures and displays shall be coordinated with the MAA Resident Architect.

11.1.9 Bomb Mitigation Design

Criteria exist for the design of terminal and building facilities to mitigate a potential vehicle bomb attack at the terminal curbside. These criteria can be obtained by contacting the MAA Manager of Office of Design & Construction.

11.2 AESTHETICS

11.2.1 Sustainable Design Innovation

All projects designed and constructed for the Maryland Aviation Administration shall comply with the 2001 Maryland Green Building Council “High Efficiency Green Building Program.”

The standard is mandatory for all state owned/leased buildings and is established in accordance with Executive Order 01.01.2001.02 “Sustaining Maryland’s Future with Clean Power, Green Buildings, and Energy Efficiency.”

In accordance with this standard, all new building construction larger than 7,500 gross square feet must achieve a Leadership in Energy and Environmental Design (LEED) Silver Certification or higher as established by the LEED Rating System of the United States Green Building Council (USGBC). Exempt buildings are listed in the 2001 Maryland High Efficiency Green Building Program.

11.3 TENANT IMPROVEMENTS

11.3.1 International Terminal and Concourse Millwork

MAA would like to maintain the architectural standard and structural integrity of the International Terminal and Concourse millwork. Accordingly, modifications to the ticket counter and holdroom millwork should be designed, reviewed, and constructed using the following general guidelines. Deviations from the following will require approval on a case by case basis by the MAA Resident Architect.

1. Cabinet Work or Shell

- Top, front, and sides of counters that are visible to the public should not be altered. The continuity of design that is presented to the public should be maintained.
- Modifications for inserts should be done in a manner which insures that support is provided for all parts of the shell independent of the inserts.
- The rear counter work surface can be modified, provided that supports are added so that the work surface can support itself without the use of inserts.
- When modifications such as cut outs are made, all visible edges should be finished by qualified case work specialist with plastic laminate, or solid surfacing material to match original design.

2. Baggage Scales

- Stainless steel surrounding the scales and the scales should not be modified in any manner. The continuity of design that is presented to the public should be maintained.
- Readouts should not be modified or relocated. The continuity of design that is presented to the public should be maintained.

3. Hardware

- Hinges for the flip-up counter top work surface in front of the monitors should be concealed or located in such a manner so that clothing cannot be damaged.
- Visible hardware, such as locks and hinges, should be the same as or compatible with the original design.
- All hardware should be commercial grade.

4. Inserts and Equipment

- New inserts should match original design with respect to colors, finish, plastic laminate, solid surface material, etc.
- Monitors should have a metal angle or wood stops to prevent them from resting on the back of the front counter wall.
- Scale readouts should remain on the side panels as originally designed. They should not be placed in the counter top work surface.
- Telephones, outlets, etc. shall not be placed in areas that are visible to the public.

5. Plastic Laminate

- Plastic laminate shall be Nevamar; MR-6-7-CR, PHANTOM GRAY MATRIX.

6. Solid Surface

- Solid surface material shall be Wilsonart; Surfacing veneer Steel Grey Tempest – 9194TM at 13 mm thickness.

11.4 PUBLIC AREA MATERIALS, FINISHES AND COLORS

11.4.1 Restrooms

Refer to Restroom Design Standards in Section 11.8 and Appendix F for materials, finishes, and colors of restrooms.

11.5 ROOF SYSTEMS

All projects at BWI Marshall and Martin State Airports shall comply with the Department of General Services (DGS) Statewide Roofing Policy and specifications, as well as the following criteria:

1. Design shall include a 60-year life cycle cost analysis for all new construction projects. Reroofing rehabilitation projects are exempt from this requirement. Any method of analysis is acceptable as long as assumptions include: 1) 20-year life for built-up and modified bitumen roofs, 2) biannual maintenance performed.
2. If the proposed roofing system has not been previously approved by DGS, designers shall submit the system to Chief, Project Management Design, DGS Engineering, for review and approval. DGS review time is approximately 14 days.
3. Based on project specifics, DGS may waive the requirement to install vapor retarders for roof installation and/or replacement projects. DGS shall evaluate the need for vapor retarders on a case-by-case basis. Requests for waivers shall be submitted to Chief, Project Management Design.
4. All projects shall be specified to insure qualified contractors perform the work. Qualified contractors shall be approved by the manufacturer, have a minimum of 5 years of experience in the installation of roof systems, and meet the following guarantee and warranty requirements:

- a. Provide Manufacturer's roof warranty, including the following minimum criteria:

- Complete coverage of the cost of the labor and materials for repair of leaks due to poor workmanship or materials failure.
- Complete systems warranty must include each and every component of the roofing system.
- Non-prorated, non-penal sum (no dollar limit), twenty (20) year warranty period.

Note: The use of polyisocyanurate (Iso) insulation, to make up the two layers of insulation (base and tapered layer) needed to achieve a 20-year no dollar limit roof, is no longer allowed unless a ½" cover board is applied. Roof systems in which felts are attached directly to the Iso boards shall be rejected and must be remedied.

- Coverage of the cost of removal and replacement of damaged or wet insulation, which is a result of leaks from poor workmanship or failed materials.
 - No exclusion from coverage for damage to the roof system as a result of wind gusts less than 55 mph.
- b. Submit and provide components required by the roofing system manufacturer for the specific warranty.
 - c. At the completion of the work, the contractor shall guarantee in writing to the Maryland Aviation Administration (MAA) representative that the roofing system, flashing, sheet metal work and all associate components as installed are of the highest quality, weathertight, waterproof and free from defects due to improper or defective materials, and/or workmanship developing under normal wear and tear for a period of five (5) years from the date of final acceptance of all work under this

contract. The contractor shall be notified by the MAA representative of any defective work, and shall correct water leaks into the building within forty-eight (48) hours after notification and within ten (10) days for all other defects. Failure of the contractor to correct any defects in the time allowed shall allow the MAA to contract for repairs and charge the contractor for all costs incurred. All repairs/replacement shall be at no cost to the MAA.

- d. Evidence shall be submitted to MAA which verifies that all new or replacement roofing materials conform with applicable Underwriter's Laboratories listed fire rated roof-ceiling assemblies, where listed assemblies are specified as components of A/E designs for the subject building, or are otherwise required by the adopted building or fire codes. Additionally, MAA will not accept any roofing material that is not a Class "A" roof, listed by Underwriter's Laboratories or Factory Mutual.

- 5. All roofs at BWI Marshall and Martin State Airports shall be color white. Designer shall coordinate with Resident Architect for exact color requirements.

11.5.1 Rooftop Equipment Installation

Equipment installation such as satellite dishes is prohibited. Only HVAC equipment shall be permitted on rooftops. All rooftop equipment installation shall undergo a Line of Sight study and shall be reviewed and coordinated with MAA Operations and FAA-ATCT at BWI Marshall.

11.6 FLOOR AND WALL COVERINGS

11.6.1 Restrooms

Refer to Restroom Standards in Section 11.8 Restroom floor and wall coverings.

11.6.2 Tile

- 1. Red Ceramic Tile Column Finish: Summitville Tile, Inc., Summitville, Ohio 43962, manufacturers the red tile which clads the columns in front of the Passenger Terminal. The custom color number is 4865-1.
- 2. No asbestos containing materials are to be used, including mastic.

11.6.3 Carpet Tile

- 1. Terminal E Carpet Tile: Carpet tile used in Concourse E Holdrooms is manufactured by Shaw Industries, Inc. The product is Networx Hemisphere No. SC-32, color 4295B-11. The field is 3 ply Dupont Antron Lumina, 2 end No. C145A and 1 end No. C151A. The border is 2 ply Dupont Antron Lumina, 1 end No. C127A and 1 end No. C247A.

2. Domestic Terminal Carpet Tile: The Designer shall coordinate selection of carpet with the MAA Resident Architect.

11.6.4 Painting

Architects shall specify “white” paint colors that are standard with the MAA Division of Maintenance in order to minimize the paint colors they have to keep on hand.

11.6.5 Wall Covering

The wall covering used in the public areas of the Domestic Terminal shall be the MAA standard.

11.6.6 Solid Surfacing Material

1. Domestic Terminal’s Public Area: The solid surfacing material for the Domestic Terminal’s public area wainscot shall be coordinated with the MAA Resident Engineer.
2. Terminal E Casework: The solid surfacing material for Terminal E casework is Wilsonart Steel Grey Tempest – 9194TM at 13 mm thickness.

11.6.7 Plastic Laminate

1. Terminal E Casework: The Plastic Laminate used for Terminal E casework shall be Nevamar “Phantom Grey Matrix Crystal” MR-6-7CR, and “Storm Grey Matrix Crystal” MR-6-4CR.

11.6.8 Waterproofing

1. Waterproofing of suspended composite and reinforced concrete floors in janitors’ closets, toilet rooms, kitchens, food preparation areas and any other spaces where the use of the space, potentially or consequently, results in the wetting of the floor. These spaces are referred to as “wet areas” in this Design Standard.
2. Prevention of water damage from hot water heaters and sprinkler drains.

SPECIAL NOTE:

Designers shall not place wet pipes over electrical rooms (such as electrical substations, communications rooms and other spaces where water damage would have significant impact on life safety or the airport’s operations or that of its tenants’). For special conditions that prohibit this, it should be brought to the attention of the Building Permit Committee or the MAA Project Manager. This may result in additional provisions being required beyond those contained in this Design Standard.

11.6.8.1 Waterproofing of Floors

1. Waterproofing of floors in wet areas is intended to prevent water damage to spaces below or adjacent to the wet area.
2. Waterproofing of floors in wet areas shall be continuous. The waterproofing may be a membrane material or a liquid-applied material, and must have acceptable waterproofing and crack-suppression qualities. The material must be laid in full compliance with the manufacturer's instructions.
3. Acceptable membrane materials are "Schluter-Ditra" membrane and underlayment as manufactured by Schluter Systems, or equal materials approved by MAA.
4. Acceptable liquid-applied materials are "Redgard" waterproofing and crack prevention membrane, as manufactured by Custom Building Products, or equal materials as approved by MAA.
5. At perimeter walls of wet areas and at pipe and other projections above the floor slab, turn up floor waterproofing minimum 2" onto the vertical surface, so that the wet area is surrounded by a continuous waterproof barrier to prevent water penetration into surrounding spaces. Refer to Standard detail for Floor Penetration on the following pages.

11.6.8.2 Floor Drains, Floor Sinks and Floor Cleanouts

1. Refer to the standard details for floor drains and floor sinks on the following pages.
2. Floor drains, floor sinks, and floor cleanouts in food preparation spaces must comply with the requirements of Anne Arundel County Health Department.
3. Floor sinks, floor drains, and floor cleanouts in wet areas generally must comply with the following requirements:
 - Floor sinks, drains, and cleanouts must be provided with flanges to allow the floor waterproofing to be flashed around the flange and secured with continuous flashing clamps. Where necessary to allow for smooth transition of floor waterproofing onto flange, cut back the topping of the slab as illustrated.
 - Floor sinks and drain must have seepage openings to allow moisture penetrating the floor covering to discharge into the body of the sink/drain. Provide loose gravel at seepage openings.

4. Size of floor drains and sinks.

- Grids of drains and sinks shall be not less than 8 inches in diameter, or 8" X 8" square. Rectangular grids shall not be less than 50 square inches in area.
- Floor drains and sinks must have outlets not less than 4 inches diameter to discharge into drain piping not less than 4 inches in diameter.

5. Cleanouts

- Cleanouts below the slab shall only be located above service areas or other unoccupied spaces, where access to them will not inconvenience other Tenants or the Public.
- Where cleanouts below slab level are not permissible, provide side-accessible cleanouts in walls above the slab, such as walls of mechanical chases or other walls in Tenant's premises.
- Cleanouts shall not be permitted in electrical substations, communications rooms and other similar spaces.

11.6.8.3 Penetrations Through Floors of Wet Areas

1. Refer to the standard details on the following pages.
2. Penetrations through slabs for new sinks, drains and pipes must not impair the structural stability of the slabs. Existing suspended slabs at the Airport are generally of the following types (Designer must verify this information in the field):
 - Composite concrete, generally 4-1/2 inches thick, with 2-1/2 inch concrete topping on 2 inch metal deck.
 - Reinforced concrete. Thickness varies, from approximately 6 inches to 8 inches.
3. General Requirements for Floor Penetrations
 - Submit drawings and documents signed and sealed by a structural engineer registered in the State of Maryland.
 - Locate penetrations through slabs so that they are clear of below-slab beams.

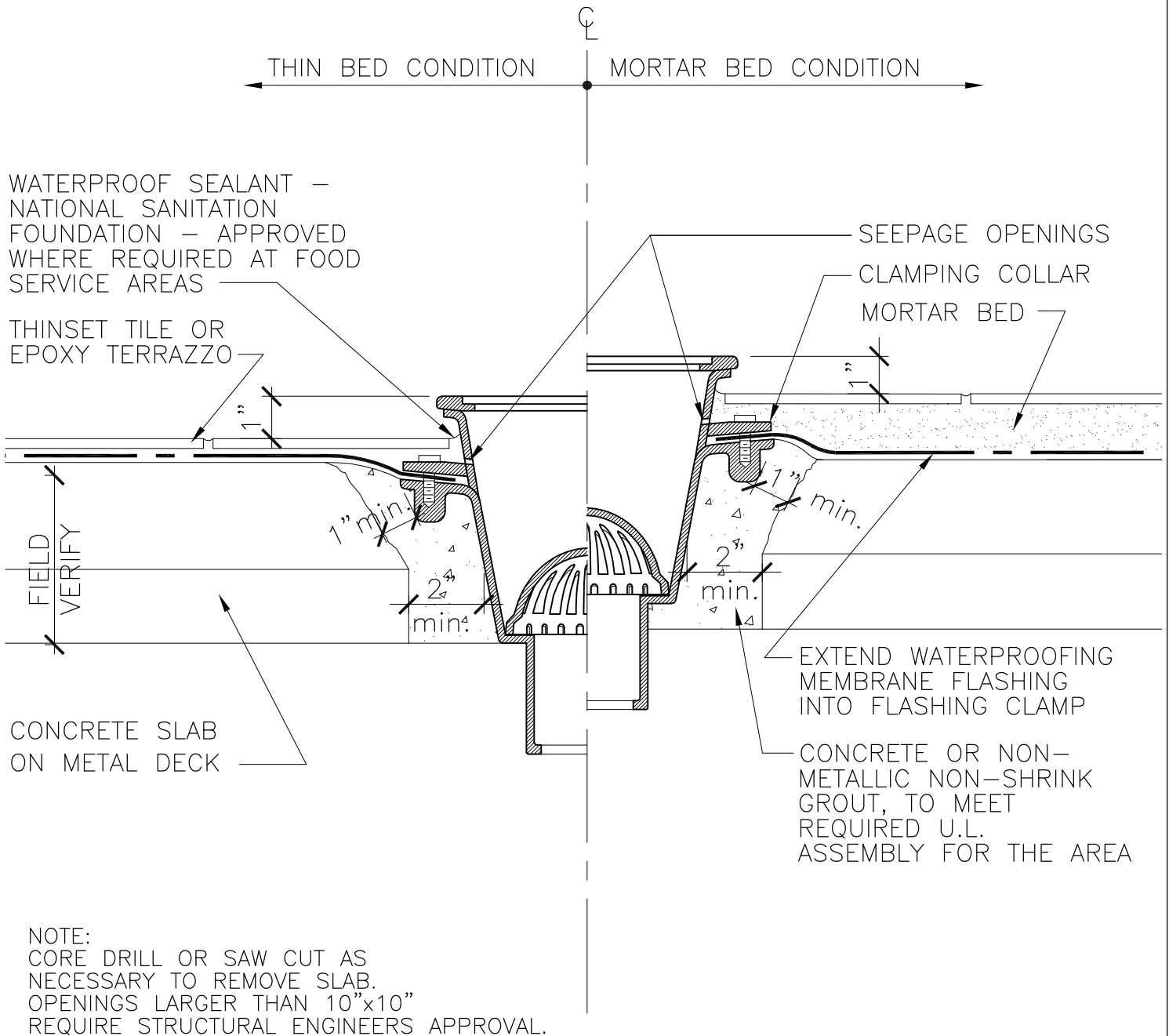
- For reinforced concrete slabs, locate penetrations so as to avoid the slab reinforcement. Slab reinforcement is likely to be heavy in the areas surrounding columns. Where penetrations through reinforced concrete slabs are so located or of such a size that cutting of slab reinforcement bars is unavoidable, provide specific details signed and sealed by a structural engineer.
- For composite slabs, for any penetrations larger than 10" X 10" through the slab, provide specific details signed and sealed by a structural engineer.

11.6.8.4 Floor Coverings.

1. Impervious tile or epoxy terrazzo is required in wet areas. Portland-cement based terrazzo is not permitted. An epoxy-type grout is recommended for tiled floors. At junction of floor finish and floor sinks/drains/cleanouts, provide flexible sealant. (National Sanitation Foundation approved where required at food service areas.)
2. At perimeter walls, etc., turn floor covering up as a wall base and to protect turned-up vertical waterproofing.

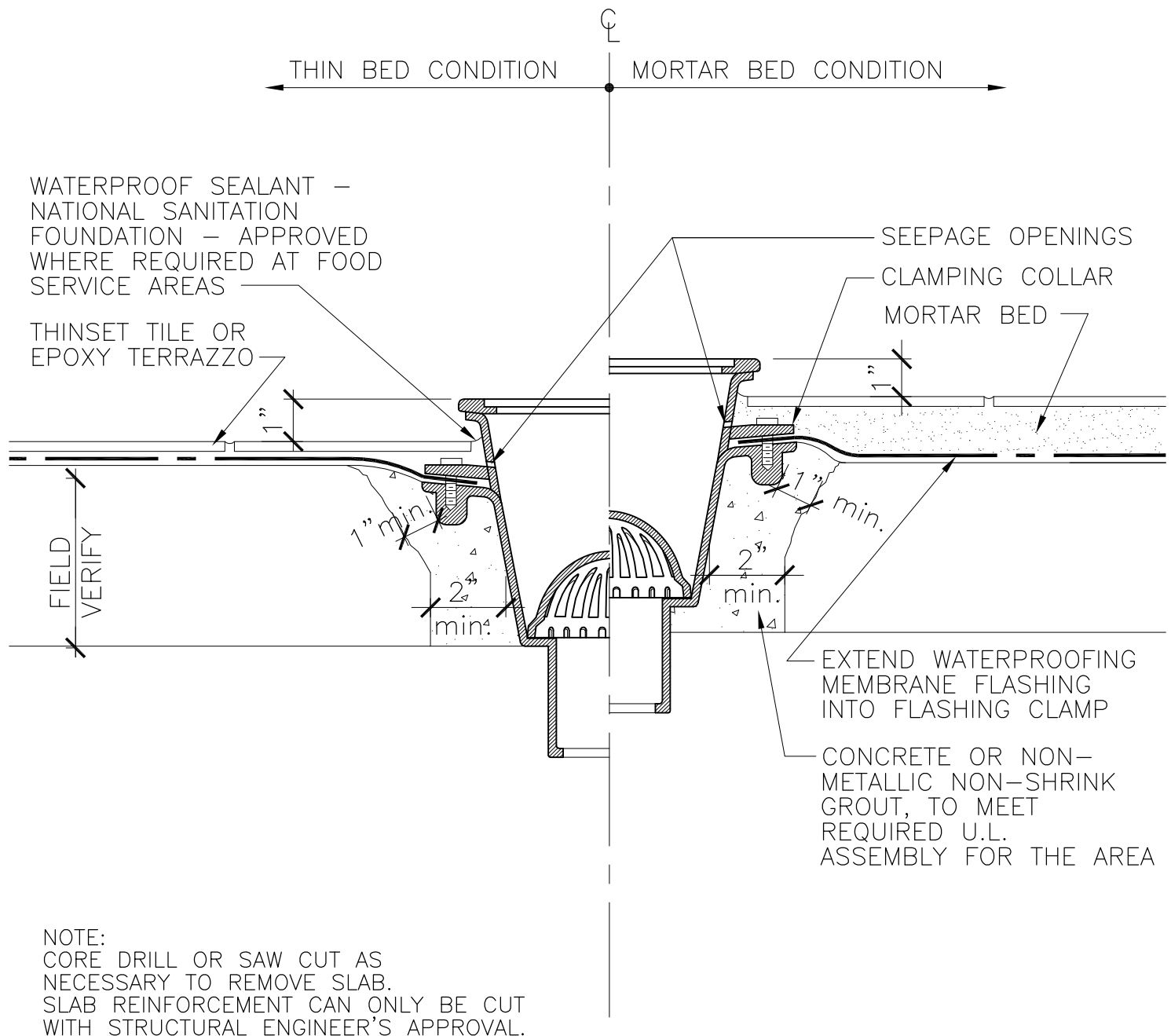
11.6.8.5 Preventative measures to avoid water damage to floors from water heaters, sprinkler drains, etc.

1. Install hot water heaters (high level) over a curbed galvanized metal or other catchment tray, with a discharge pipe to discharge at a floor sink, mop sink or floor drain with a funnel.
2. Install hot water heaters (floor mounted) on a curbed waterproof tray raised sufficiently above the floor so that the tray discharge pipe can fall to discharge at a floor sink or floor drain.
3. Sprinkler drains must discharge over an adequately sized floor drain or floor sink.



LOCATE FLOOR SINK UNDER EQUIPMENT/ ETC.
TO AVOID TRIPPING HAZARD.

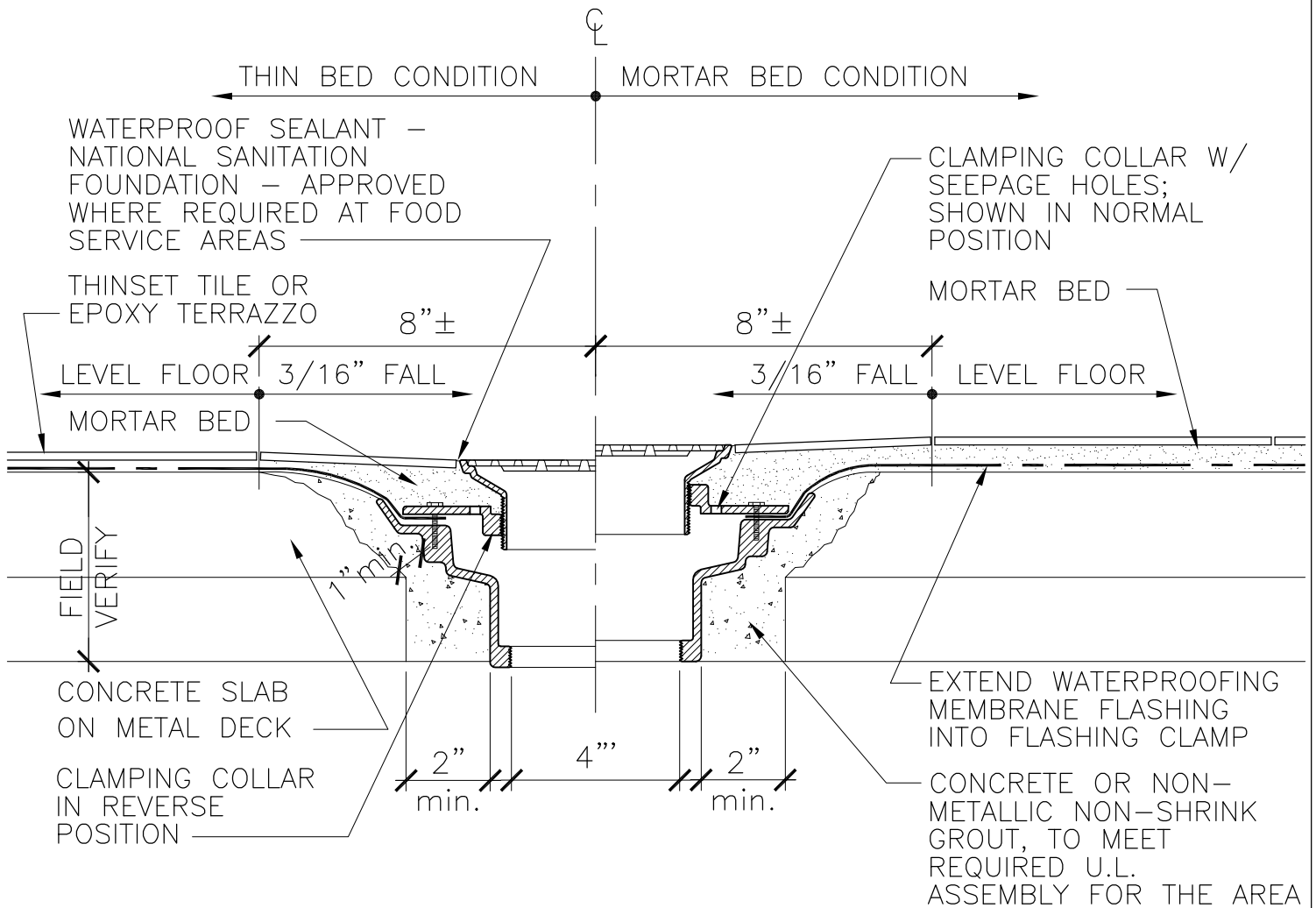
1 FLOOR SINK — COMPOSITE SLAB CONDITION
SK-3 SCALE: 3" = 1'-0" SINK AS SHOWN — J.R. SMITH SANI-CEPTOR # 3100
EQUIVALENT SINKS ACCEPTABLE FROM JOSAM OR ZURN



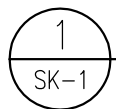
NOTE:
CORE DRILL OR SAW CUT AS
NECESSARY TO REMOVE SLAB.
SLAB REINFORCEMENT CAN ONLY BE CUT
WITH STRUCTURAL ENGINEER'S APPROVAL.

LOCATE FLOOR SINK UNDER EQUIPMENT/ ETC.
TO AVOID TRIPPING HAZARD.

1 FLOOR SINK — SUSPENDED REINFORCED CONCRETE SLAB CONDITION
SK-4 SCALE: 3" = 1'-0"
SINK AS SHOWN — J.R. SMITH SANI-CEPTOR # 3100
EQUIVALENT SINKS ACCEPTABLE FROM JOSAM OR ZURN



NOTE:
CORE DRILL OR SAW CUT AS
NECESSARY TO REMOVE SLAB.
OPENINGS LARGER THAN 10"x10"
REQUIRE STRUCTURAL ENGINEERS APPROVAL.

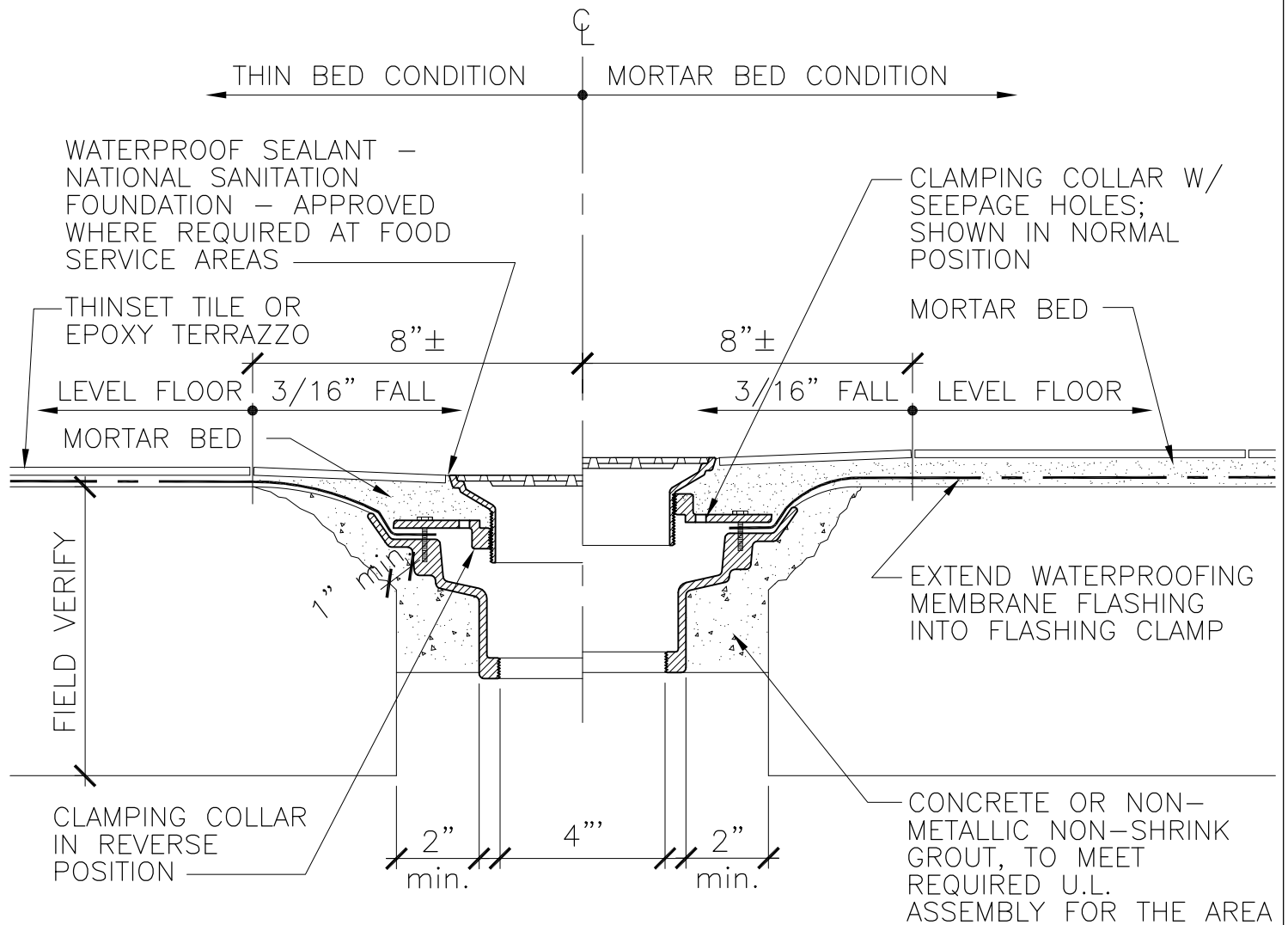


FLOOR DRAIN — COMPOSITE SLAB CONDITION

SK-1

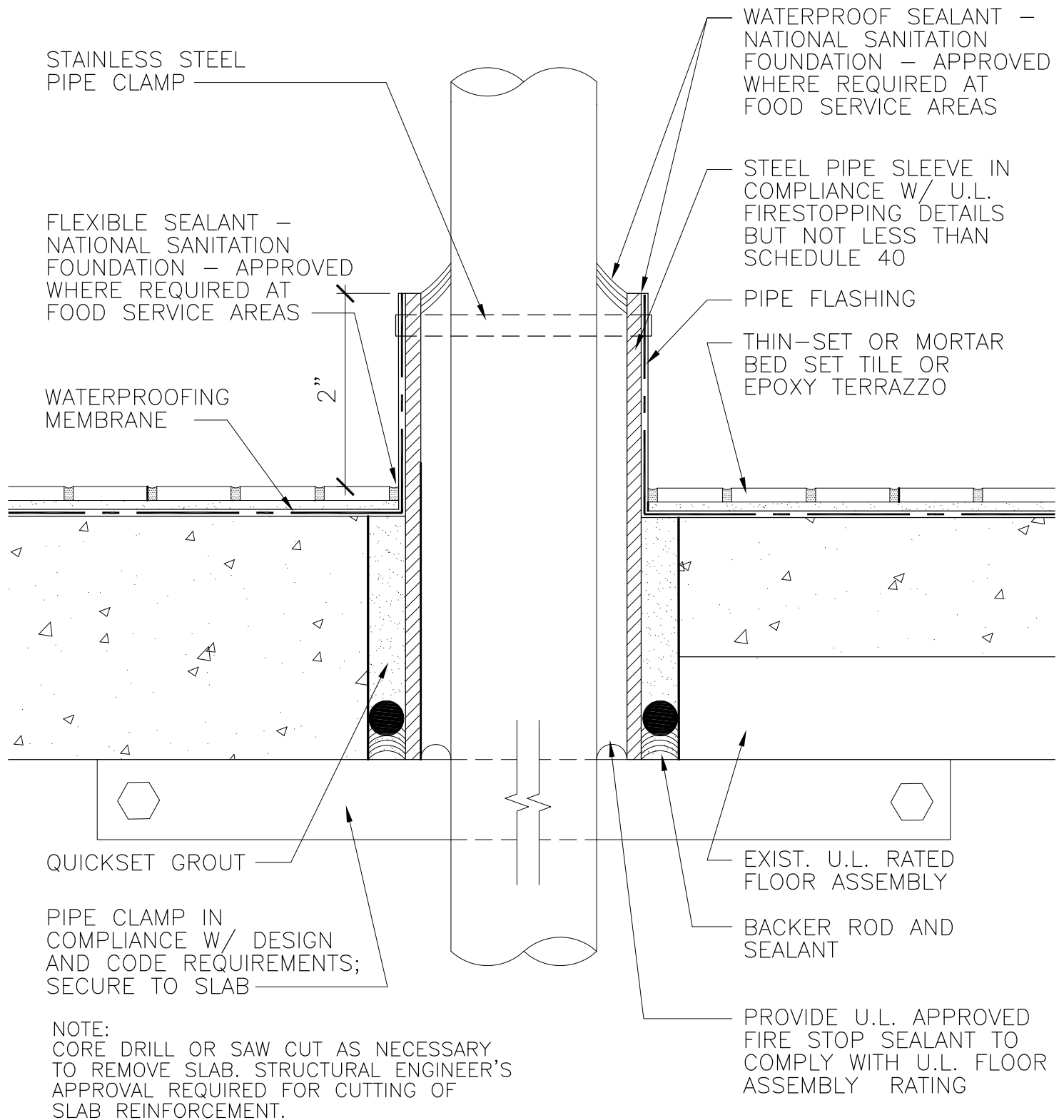
SCALE: 3" = 1'-0"

DRAIN AS SHOWN — J.R. SMITH FLOOR DRAIN # 2005-A
EQUIVALENT DRAINS ACCEPTABLE FROM JOSAM OR ZURN



NOTE:
CORE DRILL OR SAW CUT AS NECESSARY TO REMOVE SLAB.
SLAB REINFORCEMENT CAN ONLY BE CUT WITH STRUCTURAL ENGINEER'S APPROVAL.

1 FLOOR DRAIN — SUSPENDED REINFORCED CONCRETE SLAB CONDITION
SK-2 SCALE: 3" = 1'-0" DRAIN AS SHOWN — J.R. SMITH FLOOR DRAIN # 2005-A
EQUIVALENT DRAINS ACCEPTABLE FROM JOSAM OR ZURN



1 FLOOR PENETRATION SK-5 SCALE: N.T.S.

11.6.8.6 Test for Waterproofing of Floors

1. Test of all wet areas as defined and required to be waterproofed should be tested to ensure that the requirements and recommendations in the standards have been successfully applied and that all spaces below and adjacent to the wet areas are protected from water penetration and moisture damage.
2. Items to be Tested:
 - a. Waterproofing of Floors:
 - i. Continuity of membrane and/or liquid-applied material.
 - ii. Perimeter walls to a min. 1-1/2 inches height above the contributory area.
 - iii. Projections of pipe and other material above the floor.
 - b. Floor Drains, Floor Sinks and Floor Cleanouts:
 - i. Prevention of migration of water to occupied spaces below any wet area to be waterproofed in conformance with Chapter 11.6.8 “Waterproofing” water proofing standards.
3. Cost of the flood test shall be borne by the tenant, not the Airport.
4. The flood test shall include testing of:
 - a. Each wet area to be waterproofed in conformance with Chapter 11.6.8 “Waterproofing” standards.
 - b. All floor drains, floor sink drains, and clean outs in and serving each wet area.
 - c. Ensure that all corners and door threshold are thoroughly tested.
5. Test Procedure: The flood test shall be performed in conformance with the following:
 - a. Ensure that all new sanitary pipe drains are pre-tested for leaks and proper drainage prior to the wet area flood test.
 - b. Allow for manufacturer’s recommended dry and cure time for the installed water proof membrane before conducting testing.
 - c. Notify the MAA Office of Commercial Management ten calendar days prior to testing to obtain access and an access schedule for the spaces being tested and the spaces located below and adjacent to the areas to be tested.
 - d. Prior to testing, remove acoustic ceiling panels in spaces located beneath test area.
 - e. Prior to testing, provide access into the ceiling/under slab space, in any areas with drywall ceiling that are located beneath the test area.

- f. Prior to testing, provide protective plastic sheet covering to all equipment, and furniture in any occupied areas located immediately below or adjacent to the wet floor being tested.
 - g. Prior to testing, provide protection of doors into and out of the space being tested.
 - h. Provide a seal at the sill (threshold) of each door into and out of the space being tested.
 - i. Provide observers in the areas located immediately below the wet area being tested.
 - j. Equip the testing team with devices that will permit communication between the wet floor area being tested and the areas immediately below and adjacent to the wet area being tested.
 - k. Provide each of the observers with a reporting form that when filled out will locate any leaks for use during subsequent resealing operations.
 - l. Install plugs in the floor drains in the wet floor being tested.
 - m. Flood each area to a depth of 1-1/2 inches above the highest finish level of the contributory area. (That is to 1/2 inch below the two inch height of the turned up membrane located at the edges of the contributory area).
 - n. Maintain 1-1/2 inches of water in the wet area for a minimum of 2 hours.
 - o. Observe and report any leaks using the forms and communication devices called for above.
 - p. Identify source of leak on top side of slab.
 - q. After two hours of testing, unplug floor drains and allow water to drain out of the wet area.
 - r. After one hour, observe again, the conditions in areas below and adjacent to the test area.
 - s. Upon completion of the test replace all removed acoustic ceiling panels and repair any drywall ceiling modified to provide testing access. Remove all protective plastic sheathing and return the space to its original condition.
6. Report: Compile a report summarizing the test and specifically locating and describing any leaks that occur. Include the observers filled out forms as well as a diagram showing where the sources of the leaks are located. Provide two copies of the report to:
- MAA Inspector and/or the Resident Engineer,
991 Corporate Boulevard
Linthicum, Maryland 21090
7. Re-test: After sealing leaks, re-test the wet area as specified above. Continue sealing leaks and testing until all leaking has been eliminated.
8. Repair: The contractor will be responsible for all damage, caused by the test, in areas which are located adjacent to and below the test area.

11.6.9 Floor Structure Recessed Expansion Joint Covers

The designer of new or renovated facilities shall specify floor structure expansion joints with recessed/flush metal covers when and wherever possible. The intent of the required covers is to reduce potential tripping hazards and, secondarily, to protect the expansion joints. This standard addresses both floor to floor and floor to wall expansion joints.

The need for, location of, performance requirements and type of expansion joints will be determined by the designer as required by the type of floor construction, floor finishes and current design code requirements.

a. General Requirements

All expansion joint covers shall be:

1. Recessed and flush with adjacent finishes or slab surface.
2. ADA-compliant.
3. Heavy duty, as appropriate, for the anticipated traffic over the joint.
4. UL fire-rating, as appropriate, where installed in a fire-rated assembly.
5. Weatherproof when exposed to the weather with occupied spaces below (including parking garages). Covers subject to snowplowing should be designed to withstand this activity.
6. Stainless steel or aluminum, as appropriate, with finishes to be determined by Designer. Ensure proper isolation barriers are specified for aluminum on concrete installations.
7. The Designer shall consider the coefficient of friction of adjacent floor/slab surfaces when selecting the cover plate and its finish. Plate texturing or applied non-skid treatment may be applicable with certain adjacent finishes.
8. Joint covers over bellow type expansion joints should be removable to allow cleaning.
9. The cover should span all components of the expansion joint.

b. New Construction Guidelines

For new construction in the Terminal, and other buildings with applied floor finishes, the expansion joint covers shall accommodate and be appropriate for the floor finishes on each side of the joint. These finishes typically include: carpet, vinyl composition tile, ceramic tile and terrazzo. Where the recessed expansion joint cover also acts as a transition between two types of floor finishes, the designer shall specify a cover that is designed for such transitions.

c. Existing Construction Guidelines

Designers of building renovations that include existing floor structure expansion joints within the limits of work must provide the MAA with an evaluation of the structural feasibility and probable costs to modify or replace existing expansion joints to allow for a recessed flush cover plate installation. Based on the evaluation, the MAA will decide on whether to modify the existing joints to comply with the requirements of this standard.

NOTE: Floor structures in the Hourly, Daily and Consolidated Rental Car Facility Garages are post-tensioned concrete slabs. The Designer should take particular care in attempting to modify existing expansion joint configurations in this type of structure.

11.7 LOCK SYSTEM

11.7.1 Finish Hardware

All projects shall specify MAA standard hardware and locksets. A list of the MAA Division of Maintenance (DOM) approved hardware and lockset is available from the Office of Design & Construction. The DOM must approve all hardware that deviates from the list.

11.7.2 Cipher Locks

Installation of all cipher locks shall comply with the requirements of the Life Safety Code, National Fire Protection Association (NFPA) 101, 2006 Edition or later adopted edition, as new editions are published and accepted and COMAR Title 5 – Department of Housing and Community Development, Subtitle 02 – Building and Material Codes. Per paragraph 7.2.1.5.1 of NFPA 101, no cipher locks shall be installed along required paths of egress travel. This requirement includes, but is not limited to, exterior doors, doors of egress from aircraft boarding bridges, and doors leading to stairways, corridors, etc. The Maryland Aviation Administration Fire Marshall is the governing authority in determining whether a door is part of a required path of egress.

The Fire Marshall shall be notified of the installation of any cipher lock. To allow emergency access, all cipher locks must have a key override. Three sets of keys shall be submitted to the Fire Marshall for each cipher lock installed.

The key override system shall have a Best core. Cipher locks to be installed on the exterior side of doors must be rated for exterior usage.

Magnetic card locks must meet requirements of NFPA 101 for delayed egress locks and are subject to review by the OFM.

11.8 RESTROOM STANDARDS

Any toilet room renovated or newly constructed in public space on the departures or arrivals level of the terminal or concourses shall comply with this section. Toilet rooms constructed in Airline operation areas and tenant space shall comply with the hardware, fixtures, urinals, etc. and other requirements as outlined in this section to the full extent possible.

11.8.1 Design and Layout

- A. **Code Requirements:** The design of the toilet room shall be in accordance with the most current edition of the applicable codes. The International Building and Plumbing Codes, the Americans with Disabilities Act (ADA), "Accessibility Guidelines for Buildings and Facilities (ADAAG)," and COMAR are applicable, and shall be used for the toilet room designs at BWI Marshall.
- B. **Fixture Quantity Calculations:** The designer should consider the proposed services being offered in the immediate vicinity of the toilet room for the basis of fixture quantity calculations. Fixture quantities in renovated toilet rooms shall be in accordance with the current local, state and federal plumbing codes.

When Male and Female toilet rooms are designed immediately adjacent to each other, parity between fixtures shall be in accordance with current building codes and MAA requirements. Currently no requirement exists for parity. Women's toilet rooms shall be provided with as many fixtures as possible.

- C. **Toilet Room Configuration:** The configuration and geometry of toilet rooms will vary depending on the physical constraints in the existing facility for renovated or new toilet room construction. All Toilet rooms shall be designed in accordance with the following guidelines:
 - 1. The entry into high volume toilet rooms should be through a "maze" configuration. The maze should be configured to prevent direct line of sight into the toilet room from the entry corridor. The minimum functional clearance should permit two-way traffic through the maze, and be considerate of travelers with baggage. The minimum allowable clear width is five (5) feet. The maze geometry should consider the traffic volumes expected for the toilet room.
 - 2. Family Assist, single-use, and tenant toilet rooms shall be equipped with a lockable door.
 - 3. The toilet room geometry should consider the daily maintenance required.
 - a. Designs should permit half of the toilet room to be closed and cleaned while the other half remains open.

- b. A 3-foot chase is required behind all toilet walls for ease of maintenance. Accessible chases are not required behind lavatories and urinals, although a non-accessible “wet wall” may be required for plumbing line clearance and installation.
- c. Waste receptacles should be shown on the plans to verify adequate space is available.

D. Janitorial Closets:

- 1. A janitorial closet shall be located immediately adjacent to the toilet room(s). Only one closet is needed per pair of male/female restrooms. One closet is required adjacent to a single stall restroom.
- 2. The janitorial closet shall be a minimum of 20 square feet with a minimum width of 3 feet in any direction.
- 3. Closets shall be equipped with:
 - a. Floor mounted mop basin constructed of terrazzo or molded stone.
 - b. One fluorescent lighting fixture operated by a wall switch.
 - c. Single gang electrical outlet installed in accordance with code (i.e. GFCI).
 - d. A mop strip over the basin with multiple clips for hanging equipment.
 - e. Threaded hose connection with an anti-siphon backflow preventer.
- 4. Hot water heaters are NOT to be installed in the Janitorial Closets.
- 5. Minimal storage is required in the janitorial closet. The designer should verify the location of the nearest bulk storage location to verify if additional storage should be provided at the designed location.
- 6. Access to the closet shall be from the common public corridor. Locks for the door should be in accordance with the requirements of this document.
- 7. Waterproofing of floor shall be designed per section 11.8.2 B. Floors.

11.8.2 Facility Construction Requirements

- A. The facility construction requirements provided below should be followed for all public toilet rooms. Private toilet rooms that are maintained and used by tenant personnel only should follow the requirements for the hardware, fixtures, urinals, etc. and other requirements as outlined in this standard to the full extent possible.
- B. **Floors:** The floors can be either ceramic tile or terrazzo. The material shall match the existing corridor material. If the existing corridor does not consist of ceramic tile or terrazzo, then ceramic tile is preferred. The tile should be 12” x 12” with a non-slip finish. The grout should be non-absorbent and dark. The floors should be sloped to the extent possible to promote drainage. Floor drains are required for

each bank of fixtures. The floor drains should be located in non-walking areas. The castings and grates for the drains should be stainless steel. Drains are to be installed per the current Plumbing Code. No check valve type drains are to be provided.

- C. **Walls:** The walls should be constructed of concrete masonry units (CMU) when costs and structural integrity allow. CMU walls offer greater durability and impact resistance, and better anchorage for fixtures, stalls and accessories. Other approved wall construction would consist of 20-gauge metal studs with 5/8" marine grade plywood and cement board. Use of the stud wall construction should be reviewed and approved by the MAA. The wall finish should be ceramic tile from floor to ceiling. The cove base should be extended as high as possible off the floor. The tile size should match the floor. The grout for the walls should be light colored. The grout lines of the wall shall match the grout lines of the floor.
- D. **Crash Protection:** Crash rails should be provided along the entrance hall walls. The material should be a high impact resistant extruded rigid plastic. The corners should have full-height corner guards from the floor to the ceiling. All guards should be mechanically fastened for ease of replacement when needed.
- E. **Ceiling:** The height of the ceiling should be nine feet (9'-0") above finish floor, unless constrained by existing conditions. The ceiling material is preferred to be gypsum wallboard with access panels. The access panels should be 16" x 16", minimum and key-lockable. The keys shall have best key core to match airport standards. The finish on the gypsum ceiling is to be painted semi-gloss enamel. If an excessive number of access panels are required, an acoustic tile ceiling is permitted. Tile ceilings should consist of 2' x 2' moisture resistant panels, aluminum pre-painted suspension grid and tiles with anti-micro bacterial coatings. A restroom with both gypsum and acoustic panel ceiling is acceptable.
- F. **Doors:** Doors are required for the Family Assist, single use, and tenant restrooms. The janitorial closets and the chase entry locations should also have doors. The doors should be hollow metal seamless with welded frames. The hardware should be in accordance with the details found in Section 11.8.3 and restroom design cut sheets in Appendix F.
1. Hinges should be stainless steel ball bearing type.
 2. Door Lever should be type required by ADA. The lever should be of a type that returns to door face, to avoid possibility of catching fire hoses in an emergency situation.
 3. Locks should be keyed to MAA master key system. The locks should be equipped with Best Lock Company interchangeable cores.
 4. Closers should be delayed action closing type.

- G. **Casework:** At multi-user locations, the countertops should be solid surface material with drop-in self-rimming lavatories, integral back and end splashes. The countertops should be linear and set at a constant height. The height should be in accordance with current ADA requirements. Under lavatory guards should be provided at each lavatory to prevent the potential scalding to users due to hot piping. Refer to Finishes cut sheets in Appendix F.
- H. **Partitions:** Stalls are required at multi-user toilet rooms with water closets. Do not install urinals screens. The stall partition should be stainless steel with honeycomb cores. Additional reinforcement should be provided for grab bars, toilet paper holders and other accessories. The partitions should be floor supported unless otherwise approved.

Stall doors shall be attached to partitions with continuous stainless steel piano hinges - top and bottom pivot hinges are not acceptable.

The locking mechanism should be the latch type. No piston in hole type latch. Doors are required to have automatic returns. Typical stall doors should swing in towards the toilet. For the ADA toilets, the doors need to swing out. (Refer to Partitions cut sheets in Appendix F.

The wall-mounted side of the partition should be a continuous connection rather than a point-mounting bracket.

No coat hooks are to be placed on the partitions or the door. Locate hooks on rear wall. The coat hook attachment should be reinforced to the extent possible. Hooks should be located so the automatic flusher sensor is not blocked.

- I. **Accessories:** The toilet accessories apply to public toilet rooms only.
1. **Mirrors** should be located above the vanity running the full length in multi-user toilet rooms. In single use or Family Assist restrooms, only a wall mounted individual mirror is required. Mirrors can be tilted if required by the ADA. A minimum of one independent full height mirror is required in each multi-use toilet room. All mirrors should be placed away from the main entrance and in a location that would permit reflective view into the room. Mirrors should be constructed of tempered glass.
 2. **Soap dispensers** should be liquid soap dispensing type. They are required to be wall mounted with adhesive material. One dispenser is required between each sink. Coordinate with MAA Building maintenance for acceptable manufacturer per vendor contract.

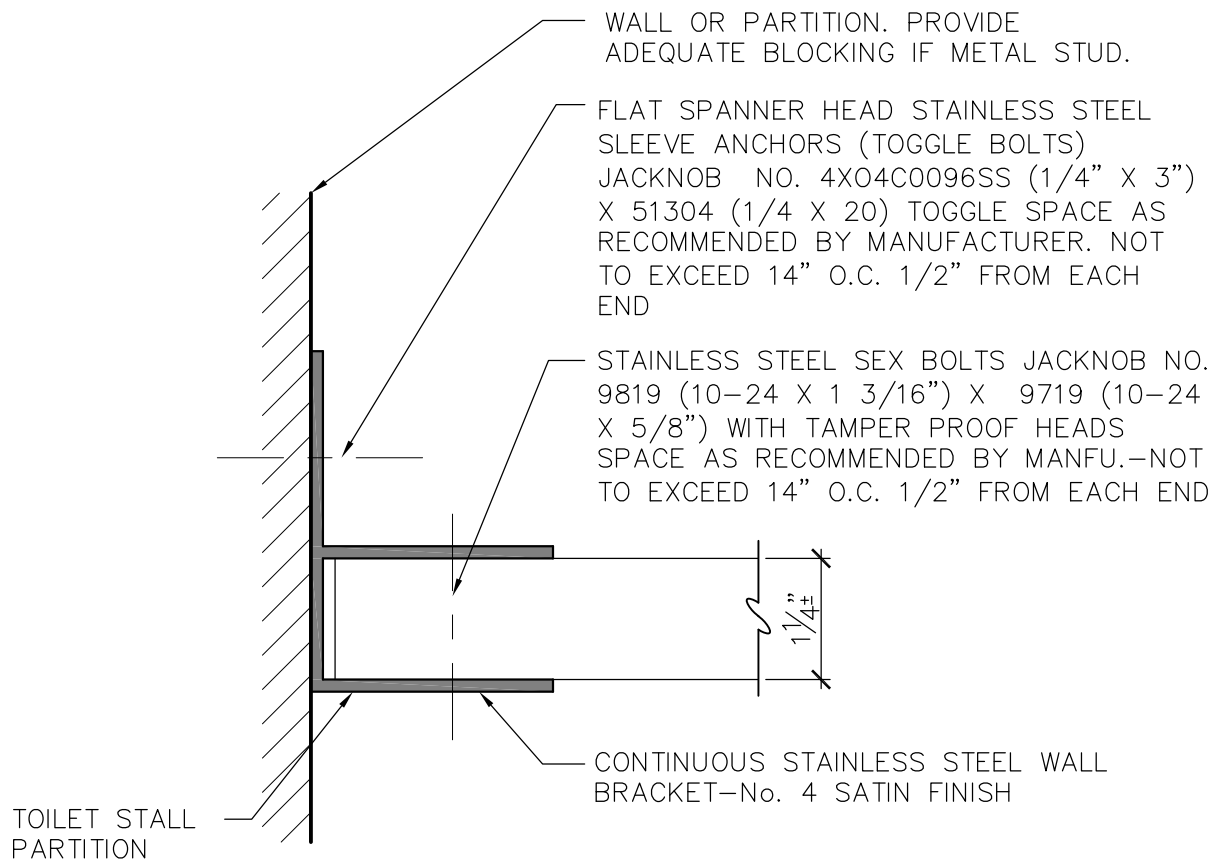
3. **Paper towel dispensers** shall be coordinated with MAA Building maintenance for acceptable manufacturer per vendor contract. Do not specify electric hand dryers.
4. **Toilet paper holders** shall be coordinated with MAA Building maintenance for acceptable manufacturer per vendor contract. Provide one at each water closet.
5. **Waste receptacles** are to be 32 gallon, round freestanding unit with large top opening and grey in color. Waste receptacles should be located immediately adjacent to the towel dispensers and of sufficient quantities. Where possible, provide a recessed nook to permit the receptacles space without taking away any traffic floor area. Waste receptacles are to be located on the plan view of the restroom in the construction documents.
6. **Sanitary napkin disposal** receptacles should be provided in each stall of the women's toilet room. Receptacles should be free standing and not attached to the partitions. Coordinate with MAA Building maintenance for acceptable manufacturer per vendor contract.
7. **Sanitary napkin dispensers** should be located in the women's and Family Assist restrooms. Coordinate with MAA Building maintenance for acceptable manufacturer per vendor contract.
8. **Toilet seat cover dispensers** are required in the toilet rooms. They are not required in each stall and should be wall-mounted type. The automatic toilet seat cover dispenser is not to be specified. Coordinate with MAA Building maintenance for acceptable manufacturer per vendor contract.
9. **Air Fresheners** shall be located in all restrooms. A minimum of one should be provided for the Family Assist restroom. The location and number of fresheners in the multiple-user restrooms is at the discretion of the designer. Coordinate with MAA Building maintenance for acceptable manufacturer per vendor contract.
10. **Grab bars** are required in the ADA toilet stall. Grab bars should have slip resistant gripping surface.
11. **Handbag shelves** are not to be provided in multiple-user toilet rooms.
12. **Baby changing stations** and related countertops and sinks are to be provided in each male and female multi-use toilet room and Family Assist restroom. The changing table should be within 4 feet of the countertop and sink. Baby changing equipment shall be Koala Bear Care or approved equal. A sign is required within each multiple-user restroom indicating the location of the baby changing station.

- J. **Signage:** The toilet room signage should be in accordance with the terminal standards. Icons are to be used to designate male and female toilet rooms. Directional signs are required in public toilet room areas. Signs shall be installed at the toilet room entrance including blade-type signage. ADA compliant wall mounted signage is to be provided at each toilet room.
- K. **Lighting:** Lighting design and illumination levels should be in accordance with current lighting standards and codes. Lighting fixtures consistent with Chapter 19 Lighting, and should be 2 x 2 with parabolic lens and respective luminaire type. Alcove lighting above sinks and urinals shall have an egg-crate type parabolic diffuser. Flat translucent sheet diffusers are not acceptable.
- L. **Ventilation:** The ventilation should exceed published mechanical standards by ten percent. The toilet room should be designed to have lower pressure than the public corridor to prevent fumes from escaping.
- M. **Acoustics:** All toilet rooms should be sound proof. This is to be performed by constructing walls from the floor to roof deck/floor above.
- N. **Fire Alarm and Emergency Lighting:** All public rooms need to comply with current building codes for fire alarm notification and emergency lighting requirements.
- O. **Plumbing Fixtures:** The plumbing fixtures shall have the following requirements for all toilet rooms constructed. Refer to Fixtures cut sheets in Appendix F.
1. Lavatories for Family Assist and single use restrooms are to be wall mounted with trim and controls. Lavatories for multi-use toilet rooms are to be countertop mounted drop-in self-rimming with trim and controls. All sinks are to be cast iron. The mixing valves should be located in the walls (not the ceiling). The maximum temperature setting should be in accordance with applicable code. Automatic presence sensors are required at each lavatory.
 2. Urinals are to be wall mounted with trim and controls on the flushometer. Wing-walls are required on the urinals. Automatic presence sensors are required at each urinal. The sensor shall be equipped with the ability to manual flush in the event the sensor is malfunctioning.
 3. Water closets are to be wall mounted with trim and controls. Automatic presence sensors are required at each water closet. Comply with current ADA requirements for accessible toilet stalls. The sensor shall be equipped with the ability to manual flush in the event the sensor is malfunctioning.

4. Mop basins are to be floor mounted with trim, controls and plumbing accessories.
 5. Floor drains should be self-priming and properly flashed for leak prevention (pertains to Janitorial closet as well).
 6. General control requirements for all toilet rooms:
 - a. All controls are to be automatic and hard wired.
 - b. Limit the number of fixtures on a single transformer to reduce multiple fixture outages.
 - c. Provide scald protection at all lavatories.
- P. **Shower Compartments:** Shower compartments are not to be placed in multi-use, Family Assist, or single-use public toilet rooms. When shower compartments are required, they shall meet the following standards (Refer to Fixtures cut sheets in Appendix F):
1. Designed in accordance with current ADA requirements.
 2. The compartment should be a prefabricated solid surface material.
 3. Each compartment should have grab bars, soap dish or dispenser, a shower seat, and a heavy-duty curtain rod.
 4. The mixing valve should be in the wall.
 5. The showerhead should be slide type (up and down). Head is not to be placed on the back wall.
 6. A floor drain is to be installed in front of the shower when installing an ADA accessible shower stall.
- Q. **Lockers:** Lockers are not to be placed in multi-use, Family Assist, or single use public toilet rooms. The type, size, and material are at the discretion of the designer. All lockers shall have removable legs with base filler (no concrete bases for ease of renovation). Attaching lockers to the wall or to the floor is to be approved by MAA. The lockers and locks will not be provided by MAA. ADA requirements must be maintained in locker areas.
- R. **Sanitary Lines:** All restroom fixtures should drain by gravity to the sanitary piping system. If existing conditions prohibit gravity flow then lift station/ejector pits are to be included in the design. Lift stations and ejector pits should be located outside the footprint of the building structure the restroom is within. In addition, secondary containment of the lift station and ejector pit should be considered to limit overflow into adjacent areas during system failure.

11.8.3 Restroom Exhibits and Standard Details

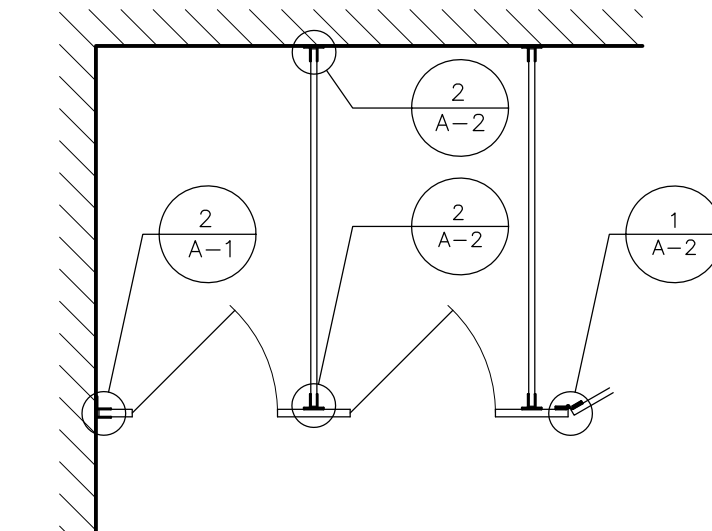
The following pages include standard exhibits and details to be utilized for restroom designs.



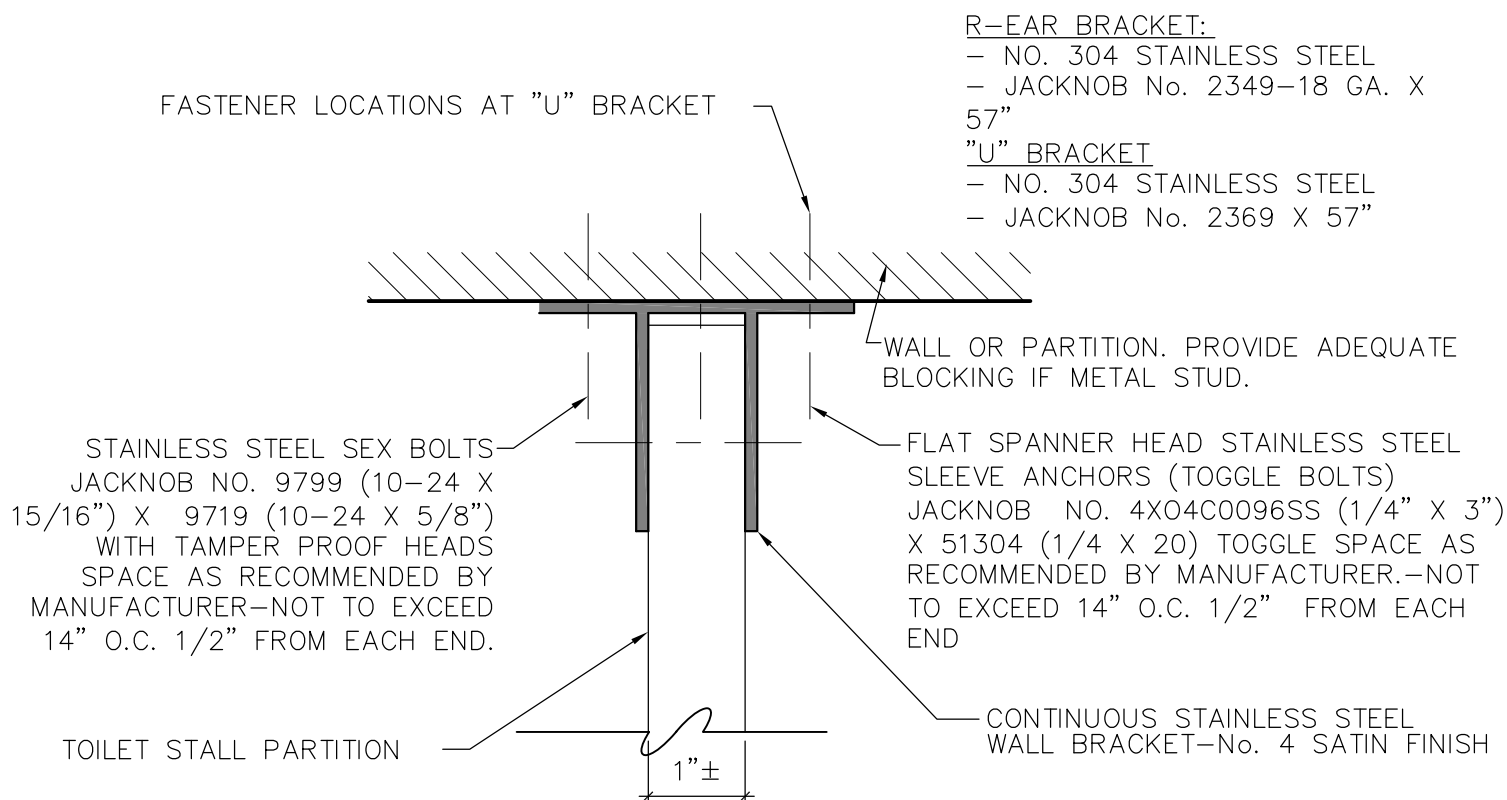
ONE-EAR BRACKET:

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- JACKNOB No. 2349—18 GA. X 57"

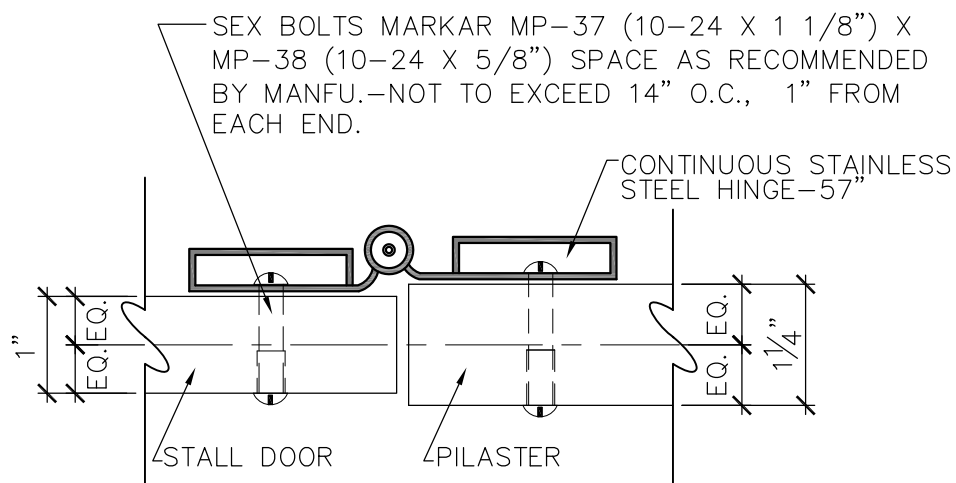
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A-1 TYPICAL PILASTER—WALL ANCHOR
NOT TO SCALE



1
A-1 REFERENCE PLAN—TOILET STALLS
NOT TO SCALE

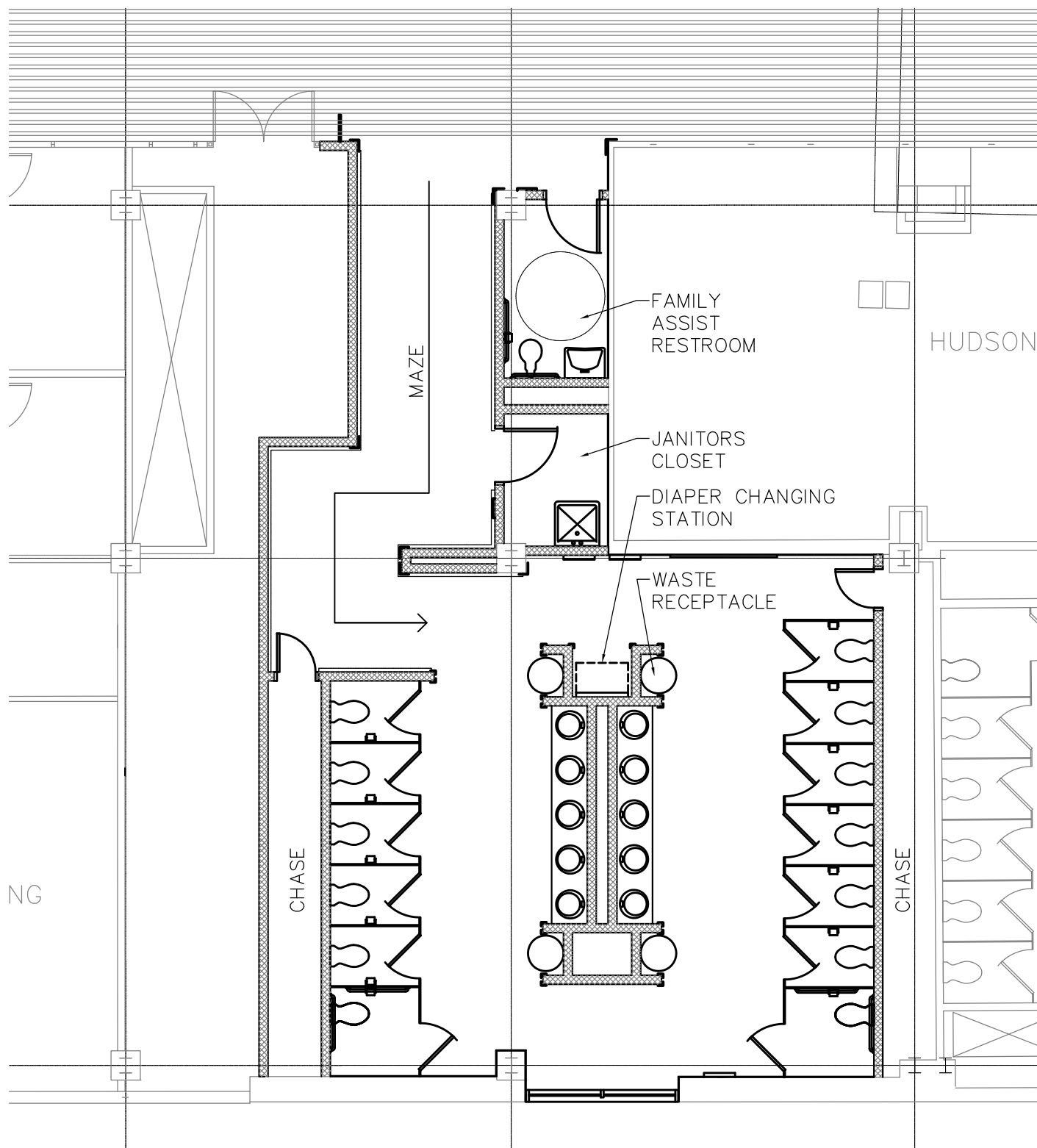


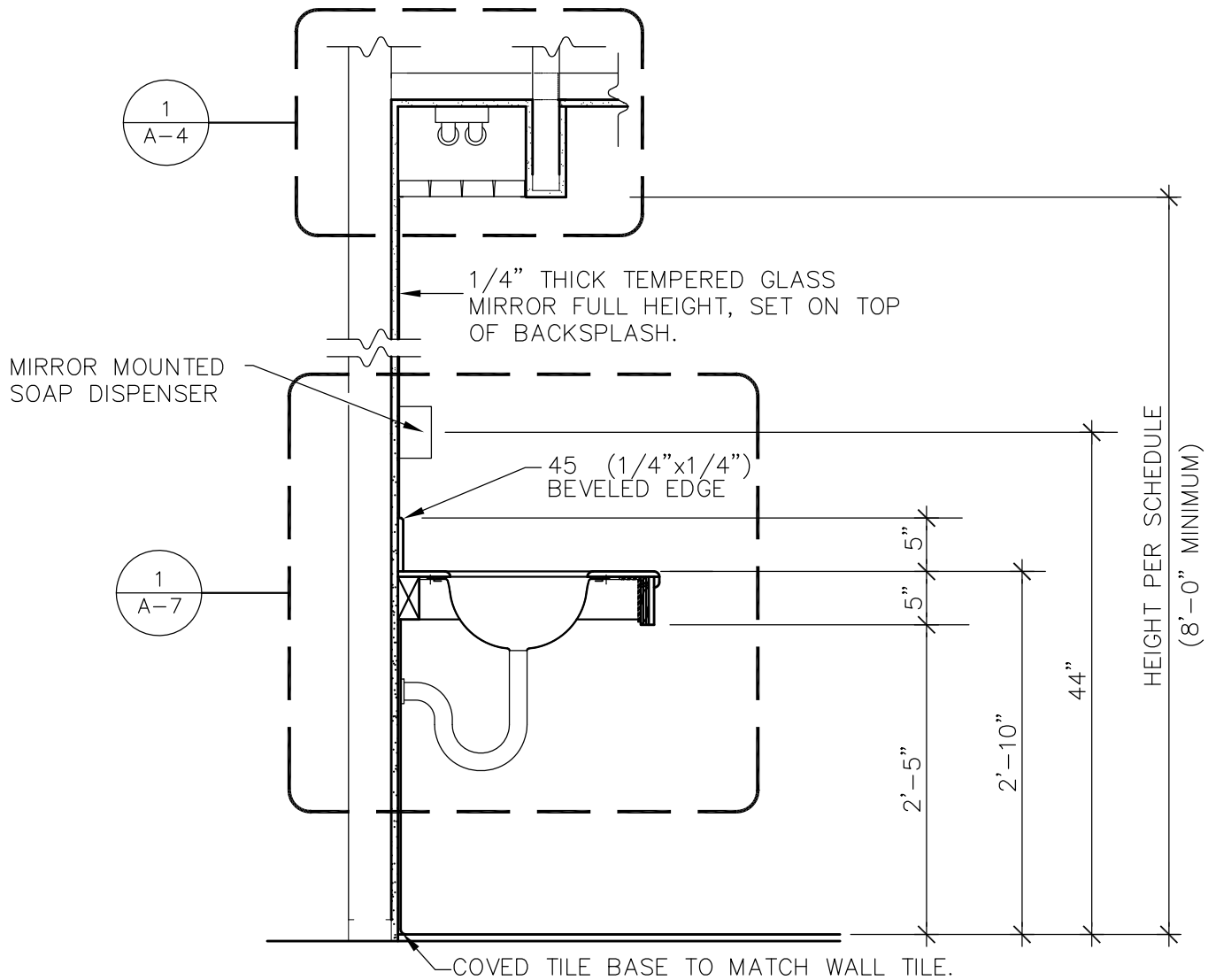
2
A-2 TYPICAL STALL PARTITION ANCHOR
NOT TO SCALE



HINGE:
— MARKAR PRODUCTS INC.
— No. FS-901-TP BHMA 630-14
GA.
— NO. 304 STAINLESS STEEL

1
A-2 TYPICAL STALL DOOR
NOT TO SCALE

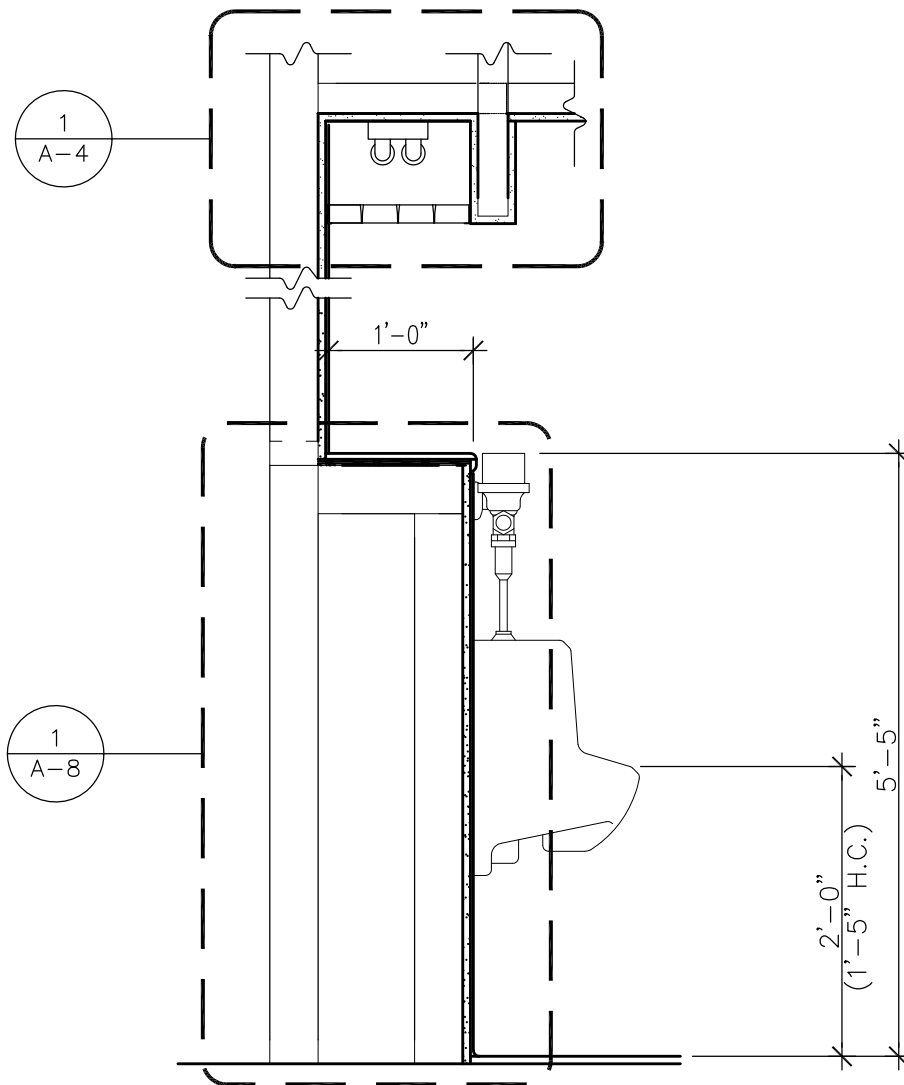




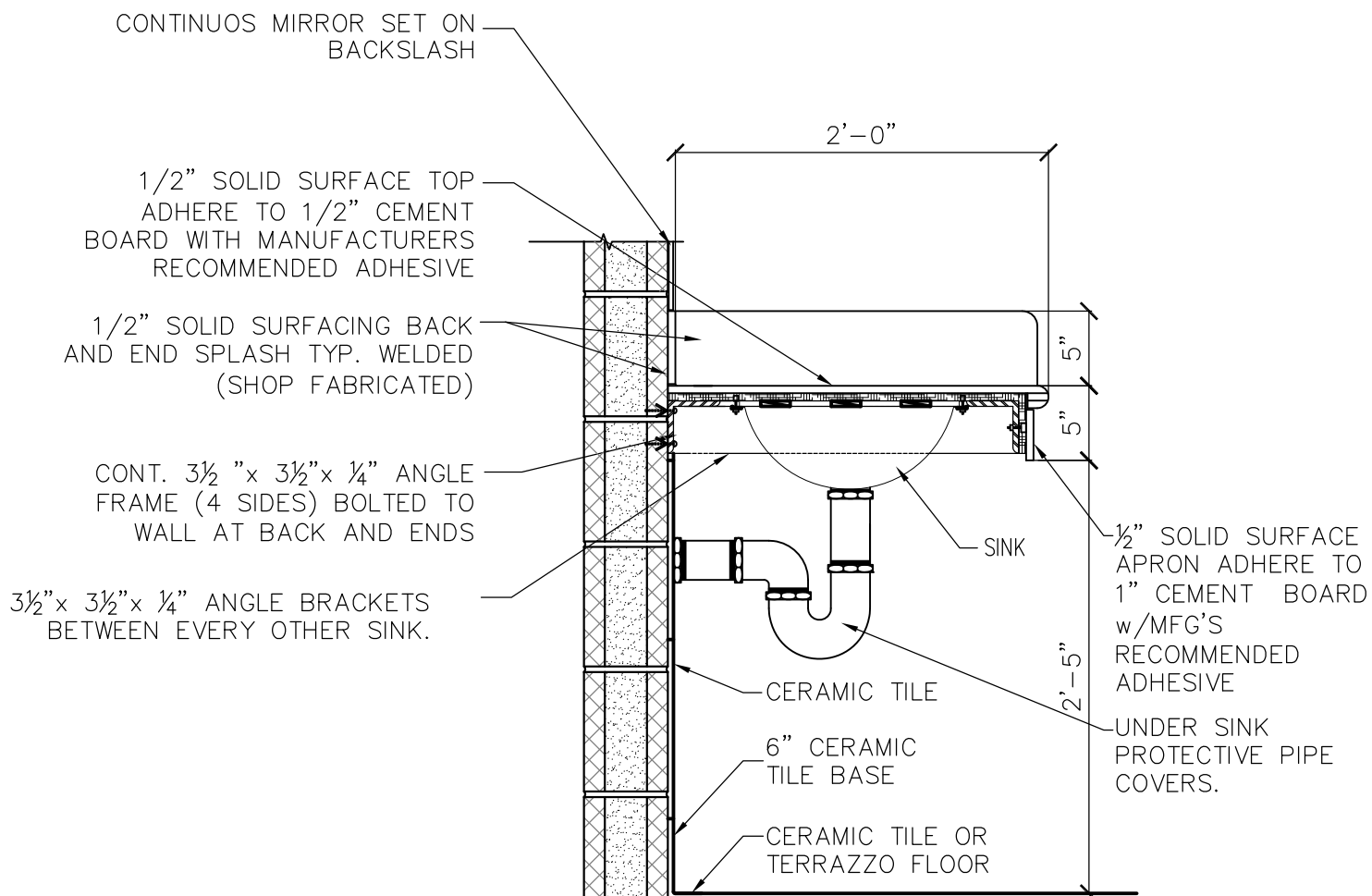
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A-5

SECTION THROUGH LAVATORIES

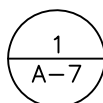
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1 SECTION THROUGH URINAL SHELF
A-6 NOT TO SCALE

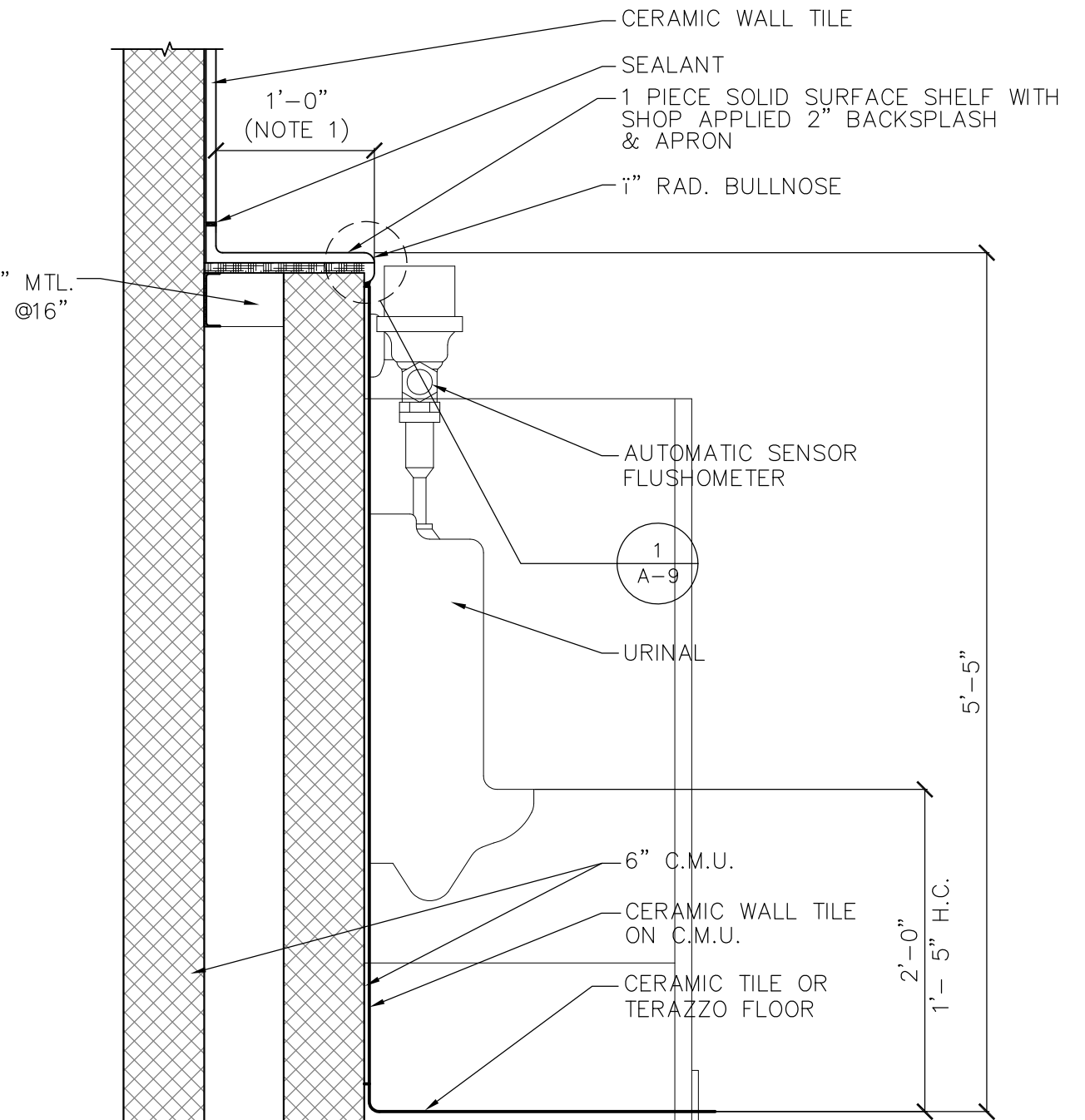


NOTE: FINAL COUNTER STRUCTURE REQUIREMENTS TO BE
VERIFIED BASED ON WALL CONSTRUCTION, ANCHORING &
LENGTH OF VANITY COUNTER.

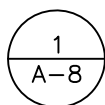


LAVATORY COUNTERTOP

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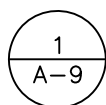
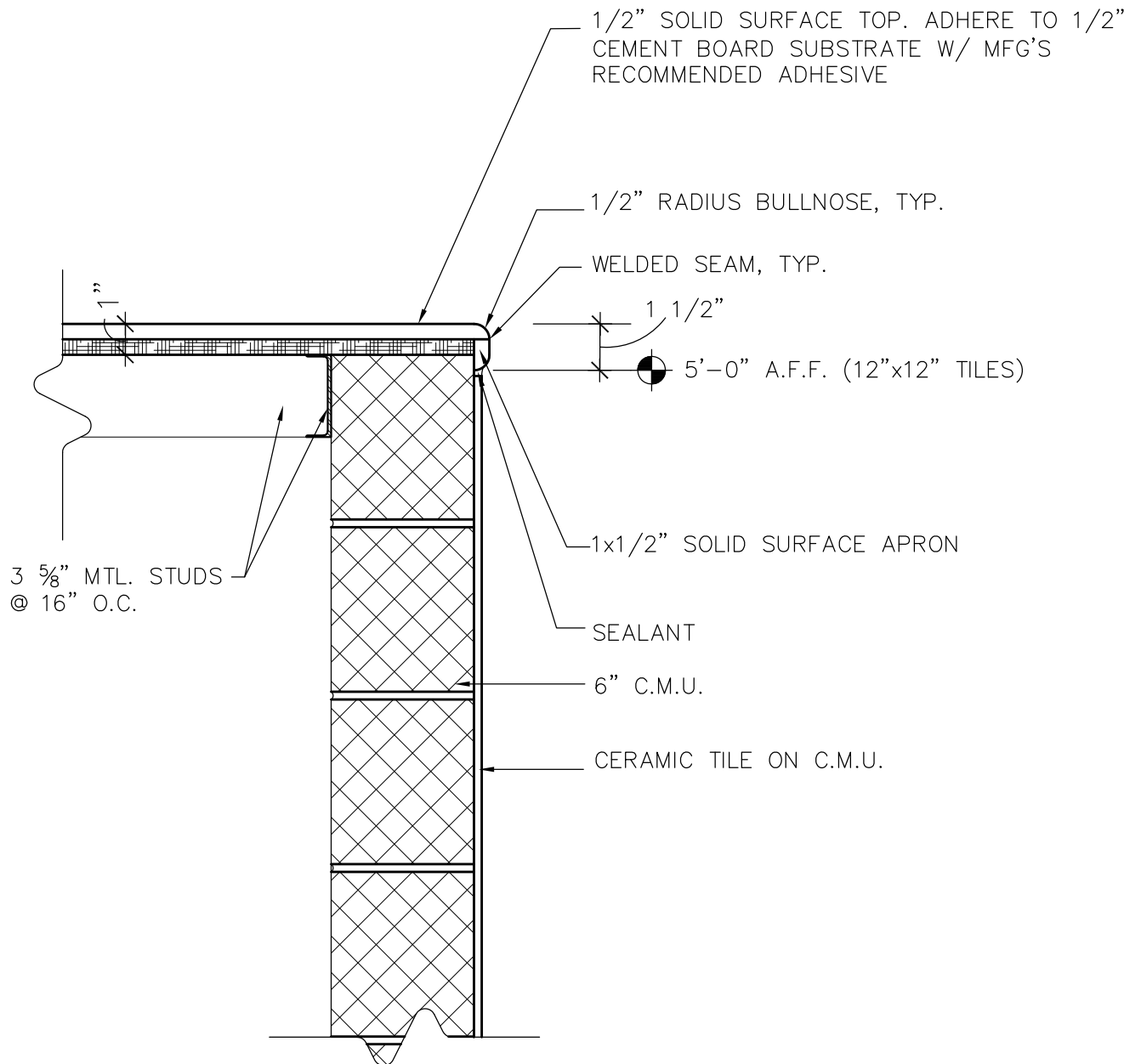


NOTE 1: COORDINATE FINAL DIMENSION REQUIREMENTS WITH URINAL CARRIAGE.



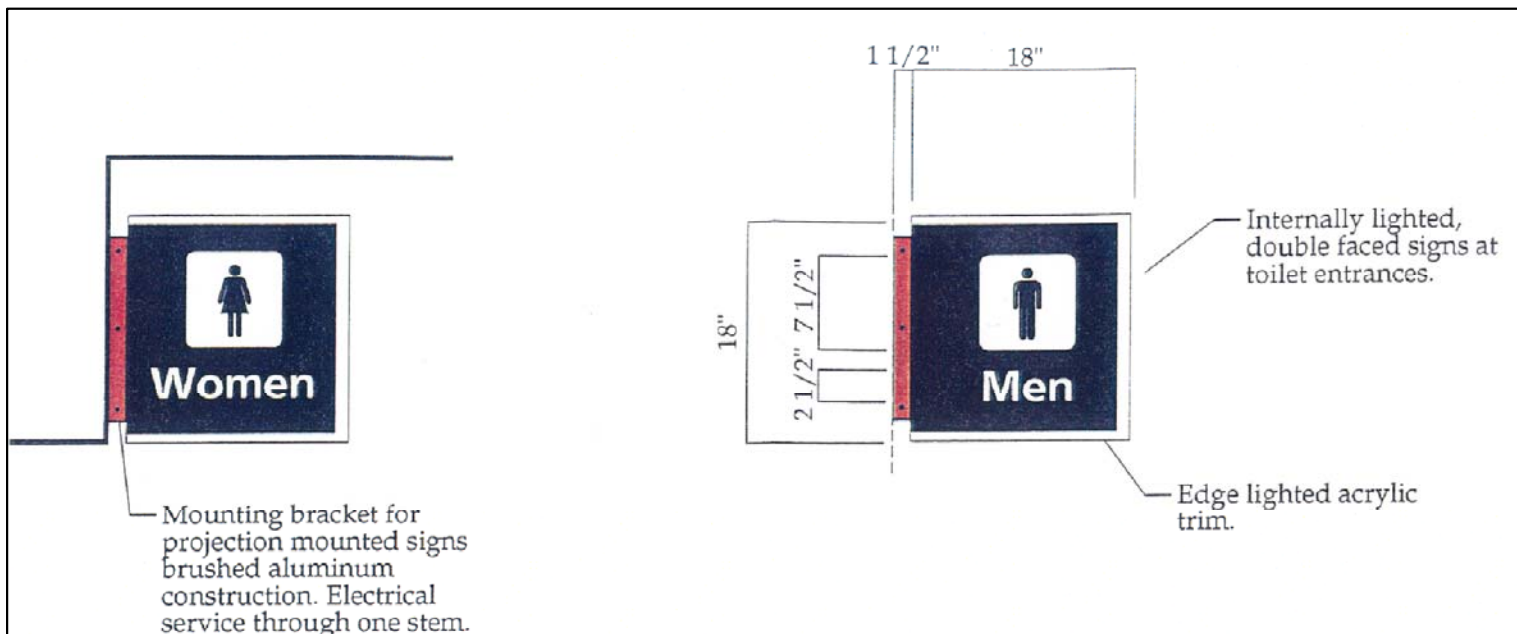
URINAL WALL & SHELF

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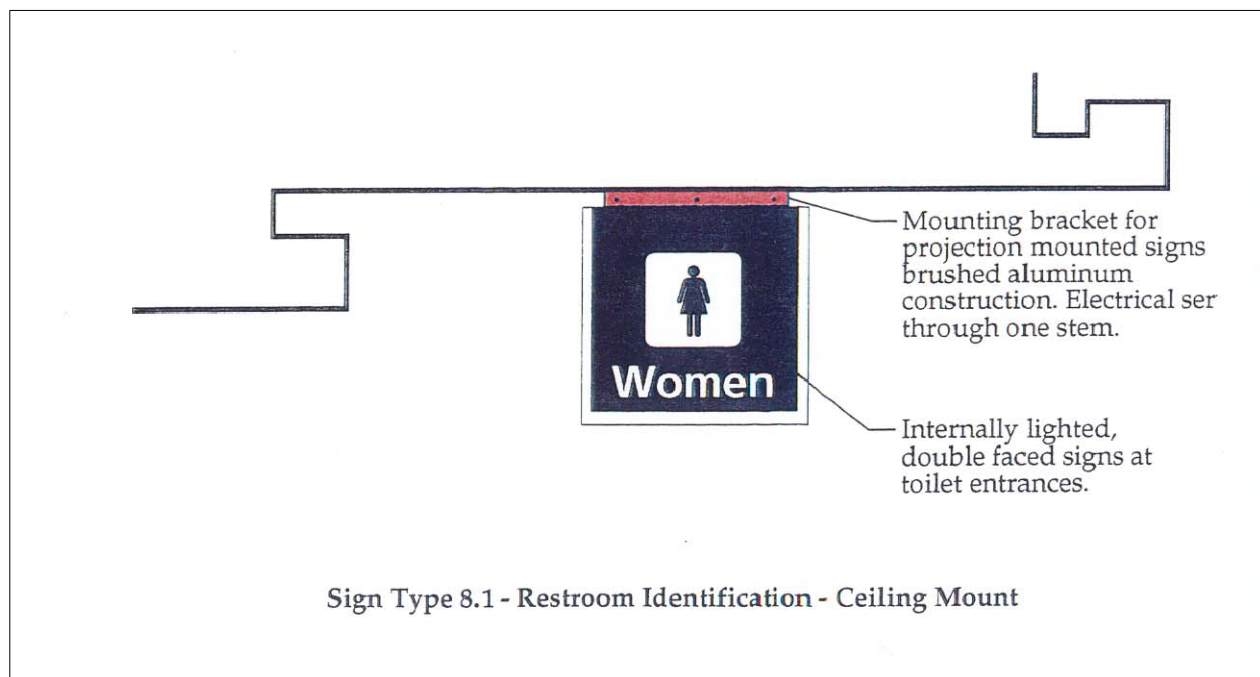


URINAL SHELF BULLNOSE DETAIL

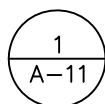
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Sign Type 8 - Restroom Identification - Flag Mount



Sign Type 8.1 - Restroom Identification - Ceiling Mount

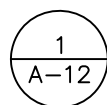
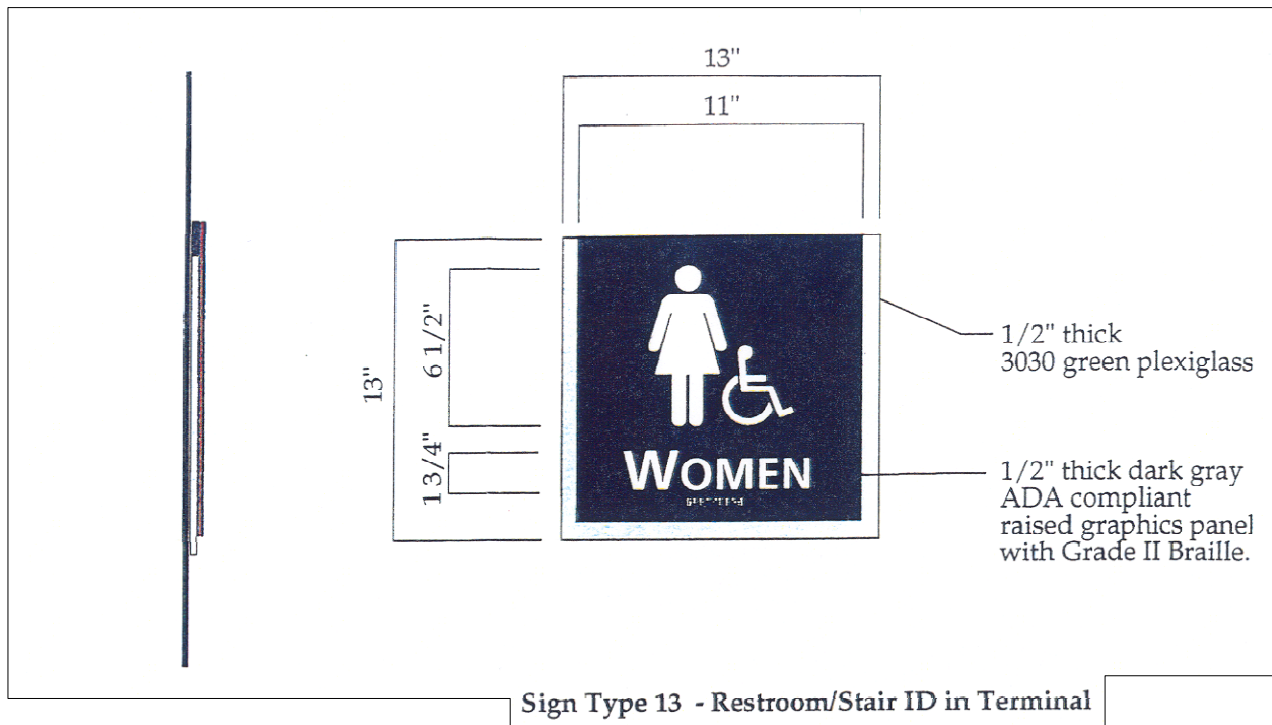


SIGNAGE

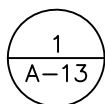
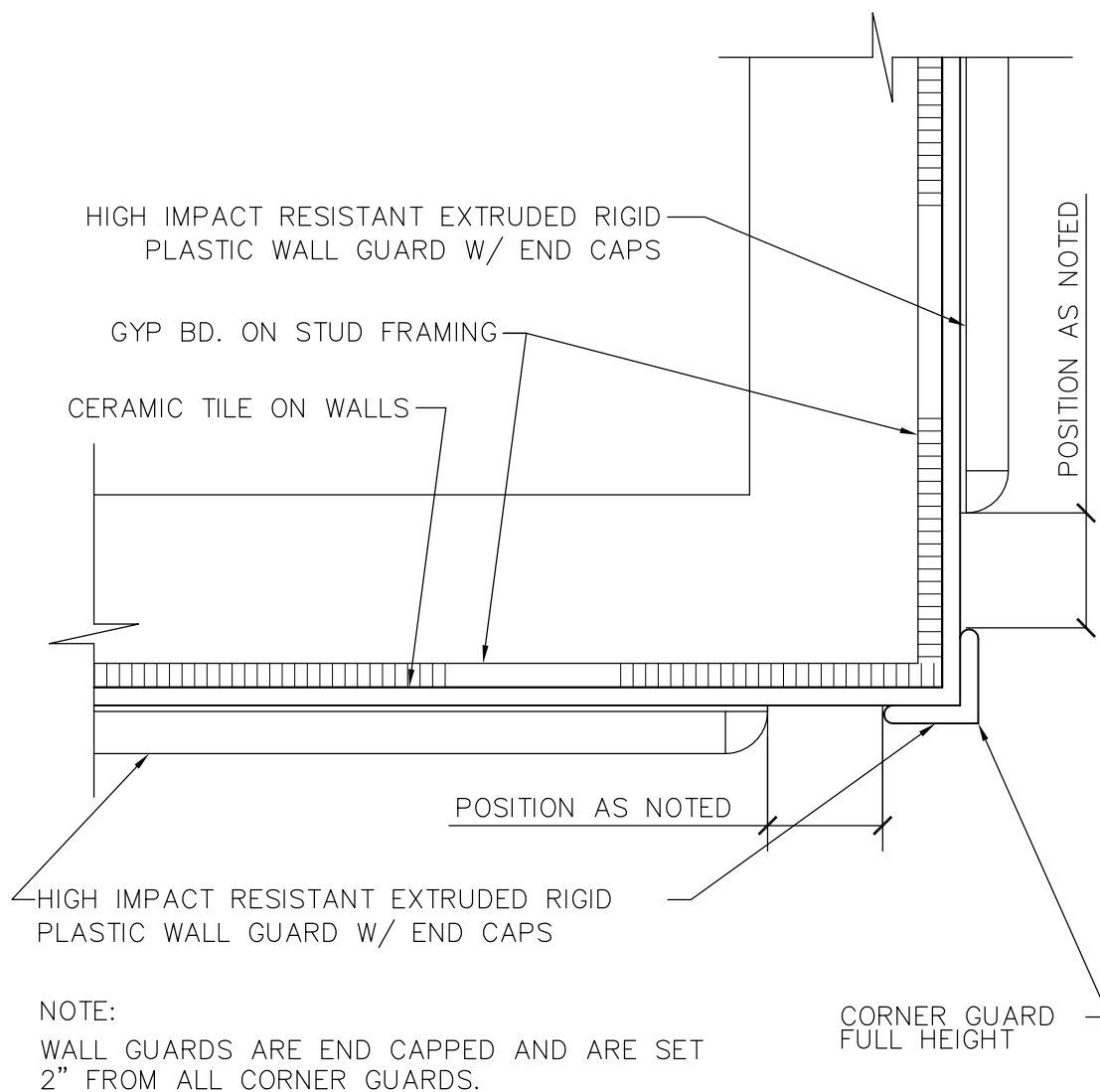
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Typical Layouts

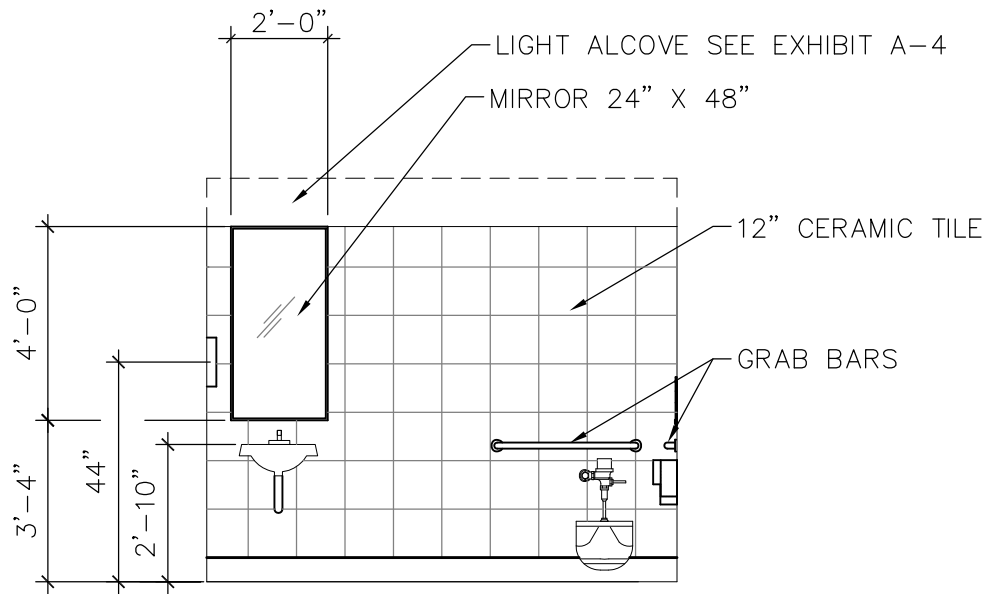


SIGNAGE
NOT TO SCALE



CORNER GUARD / WALL GUARD DETAIL

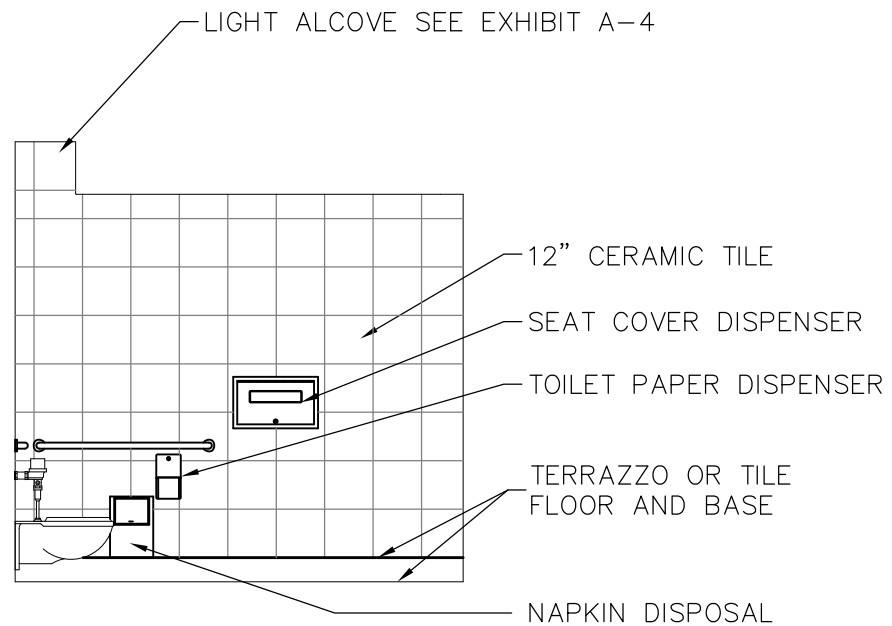
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A-14

FAMILY ASSIST RESTROOM

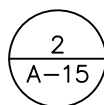
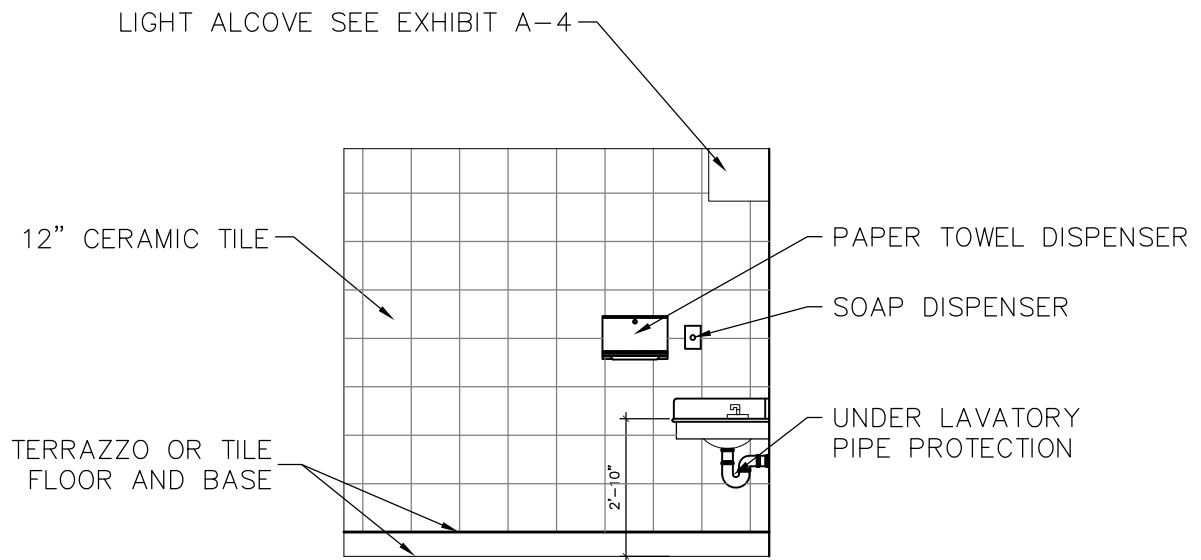
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A-14

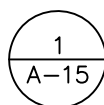
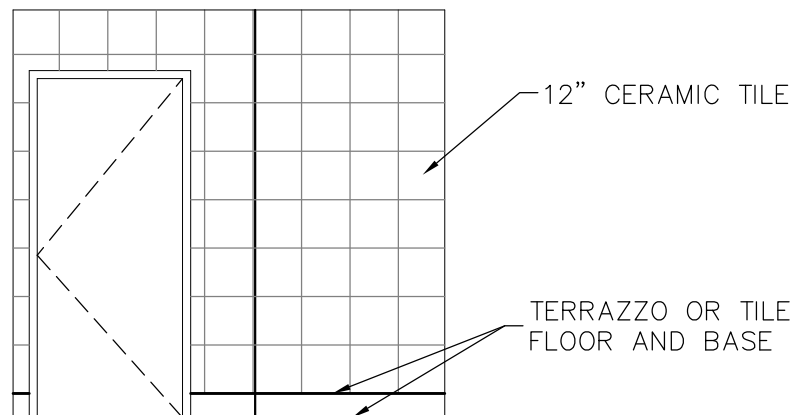
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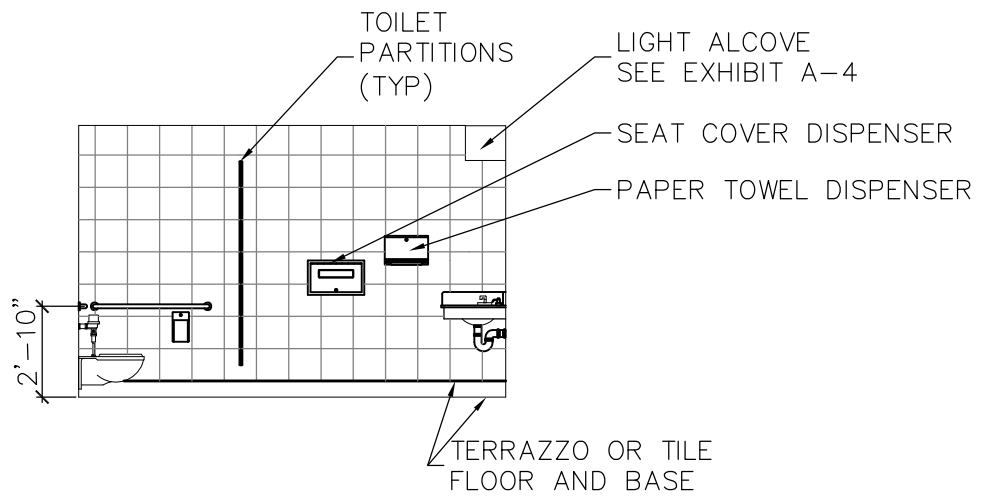
FAMILY ASSIST RESTROOM

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FAMILY ASSIST RESTROOM

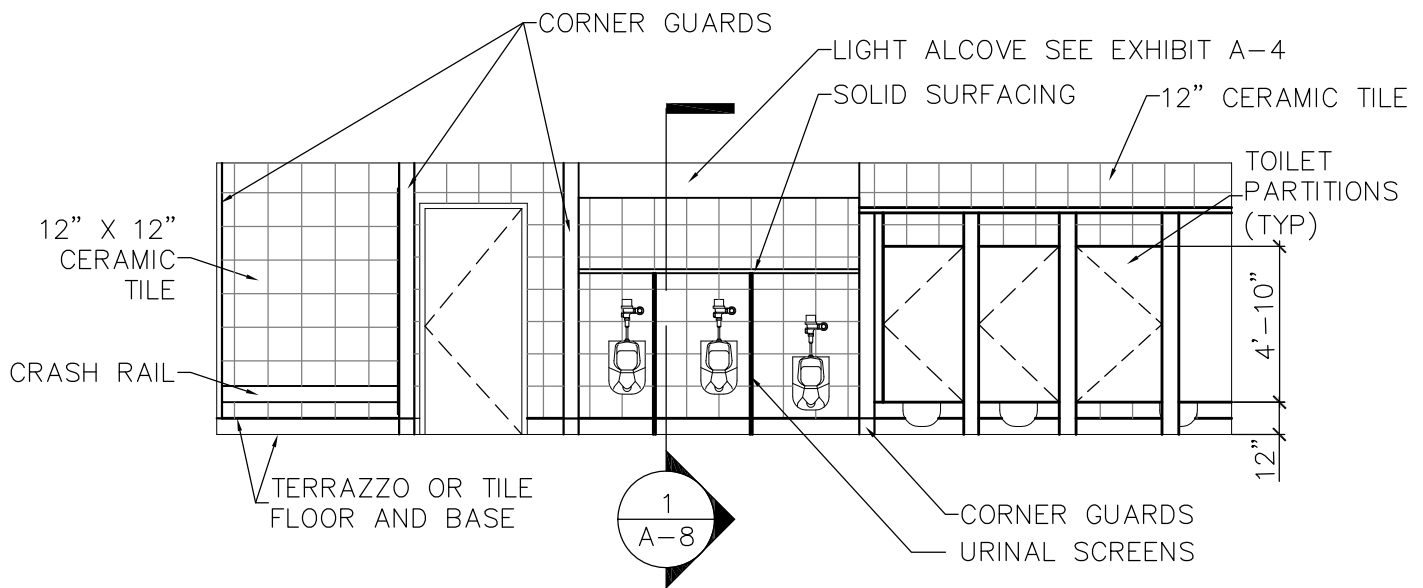
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2
A-16

MEN'S RESTROOM

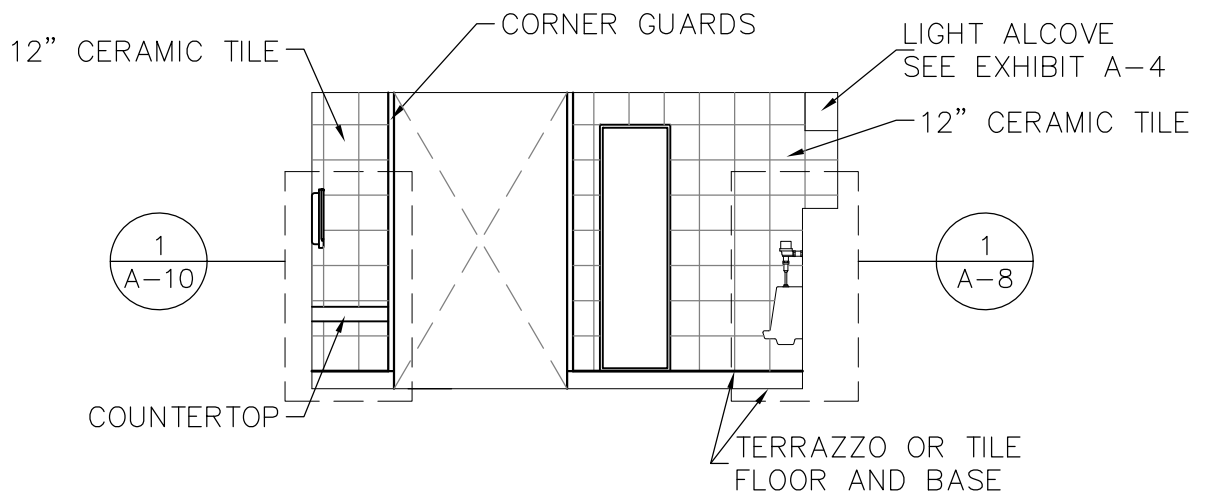
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A-16

MEN'S REST ROOM

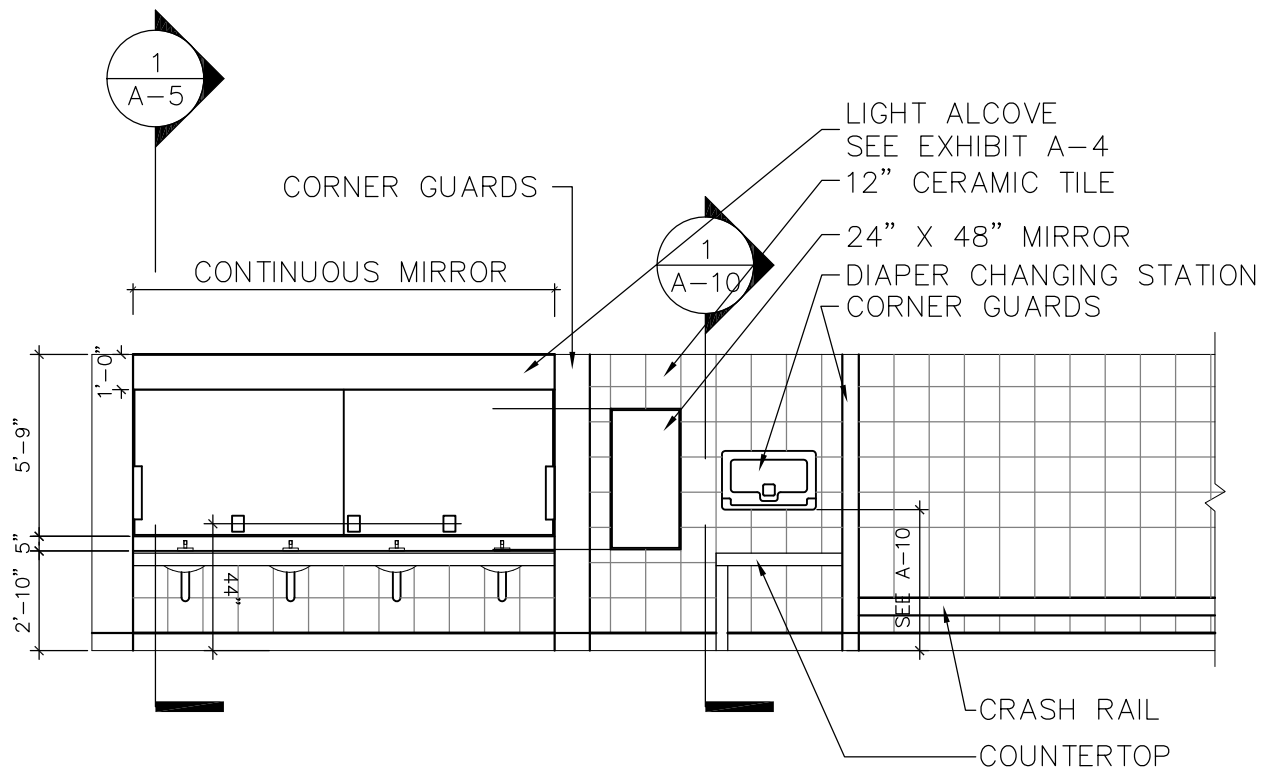
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A-17

MEN'S RESTROOM

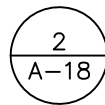
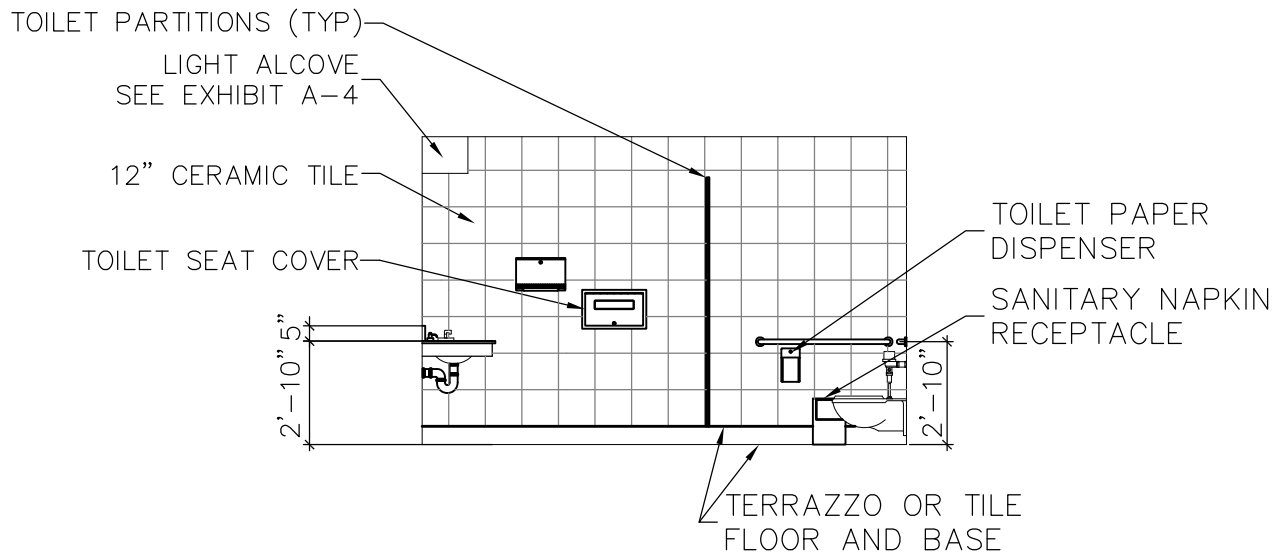
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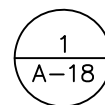
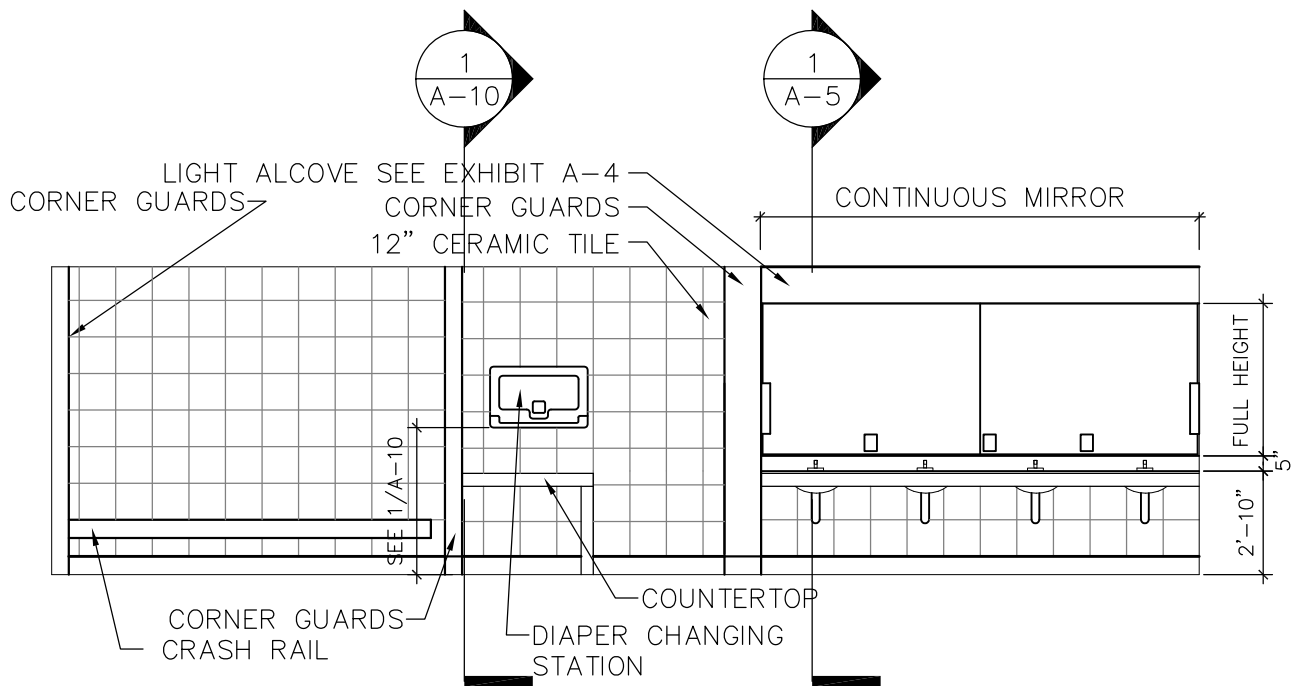
MEN'S RESTROOM

NOT TO SCALE



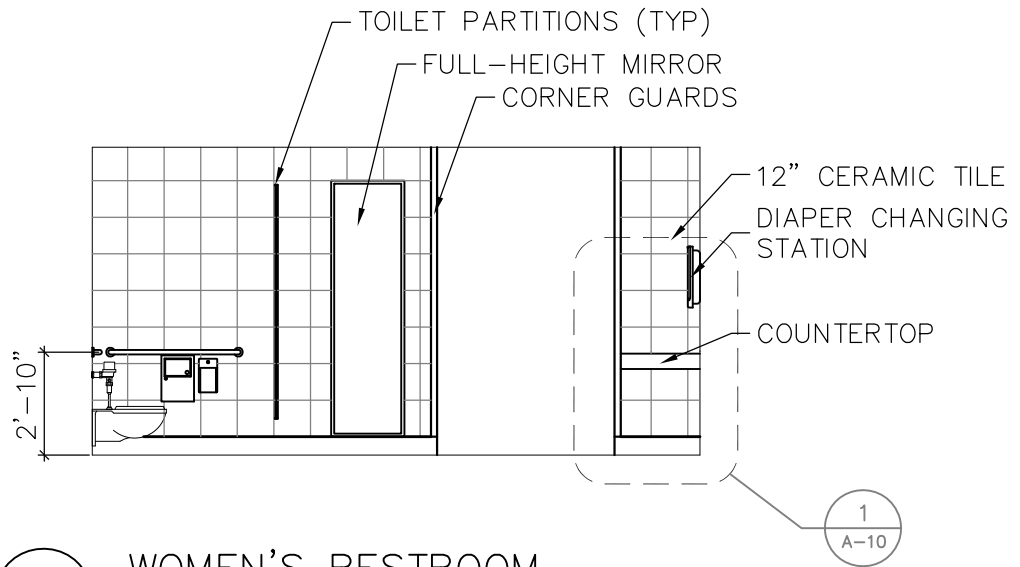
WOMEN'S RESTROOM

NOT TO SCALE



WOMEN'S RESTROOM

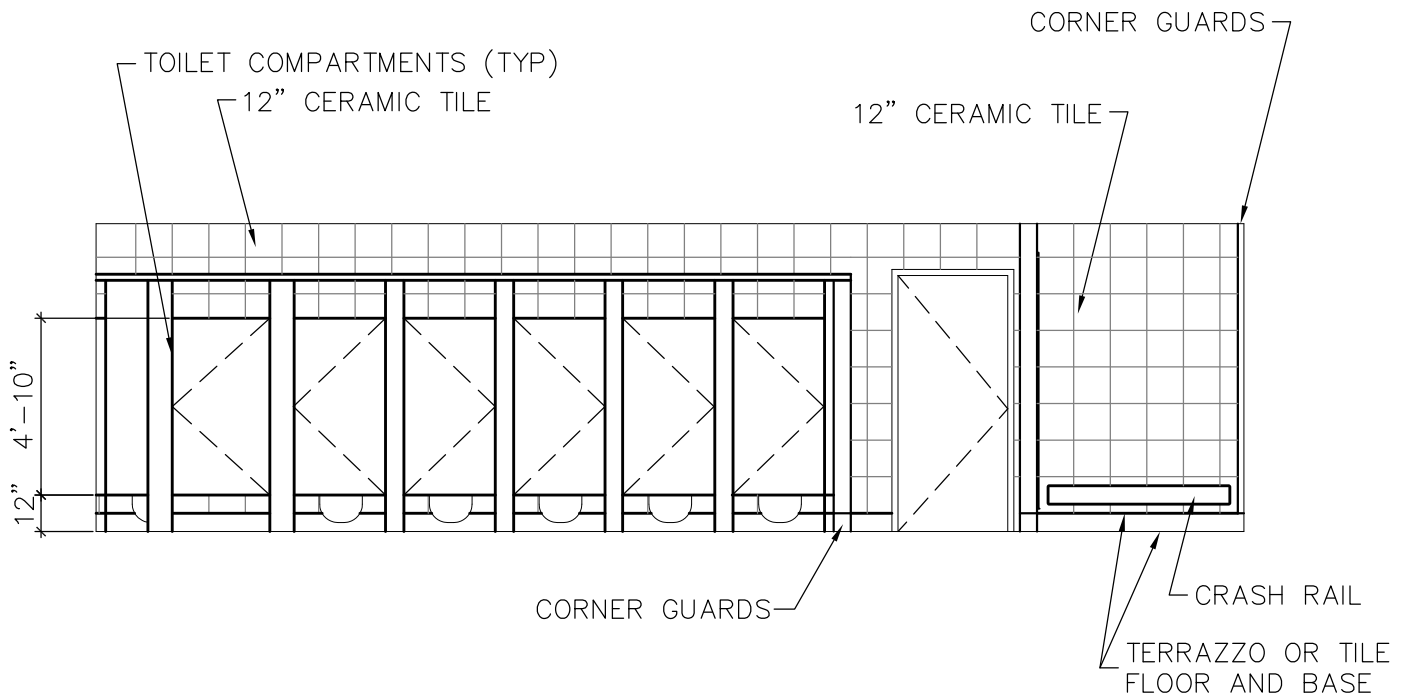
NOT TO SCALE



2
A-19

WOMEN'S RESTROOM

NOT TO SCALE



1
A-19

WOMEN'S RESTROOM

NOT TO SCALE

11.9 DOORS/WINDOWS

11.9.1 Roll-up Doors

1. High Hazard Applications

Fabric roll-up doors at “high hazard” locations are not permitted. Fabric roll-up doors do not provide a fire rating, and therefore provide a hazard when used at improper locations. “High hazard” applications include, but are not limited to, mechanical, switch gear, and electrical substation rooms. When fire rated doors are required, metal roll-up doors shall be specified.

11.9.2 Door Numbers

All BWI Marshall projects which involve the allocation or change of door numbers shall be coordinated with the Division Chief, Fire Prevention Division. The Fire Prevention Division has been assigned the responsibility of door management and shall provide guidance when new or replacement numbers are needed.

11.9.3 Sterile Area Access Doors

In accordance with TSA mandate 5142-04-10A2, any proposal to increase the number of sterile area access doors (eg new construction) must be approved by TSA’s Federal Security Director.

11.9.4 Window Opaque

All projects at BWI Marshall shall be designed and specified per the following requirements wherever the work requires the obscuring or covering of existing exterior windows in the terminal facility:

Terminal A/B (Where Exterior Wall Panel or Spandrel Glass is WHITE)

1. Provide tinting of windows where required to opaque existing vision glass windows. Provide product as follows or an approved equal:
 - a. Lumar – Window Film – NRM W PS3
 - b. 3M – Fasara –San Marino
2. Product color is to closely match installed white spandrel glass.
3. Prior to installation, review glass surface and verify submitted film is compatible with surface.
4. Warranty – provide minimum ten year installation and material warranty.

5. Install window film as recommended by manufacturer and published guidelines from the International Window Film Association.

Terminal A/B and Concourses A and B (Where Exterior Wall Panel or Spandrel Glass is BLACK)

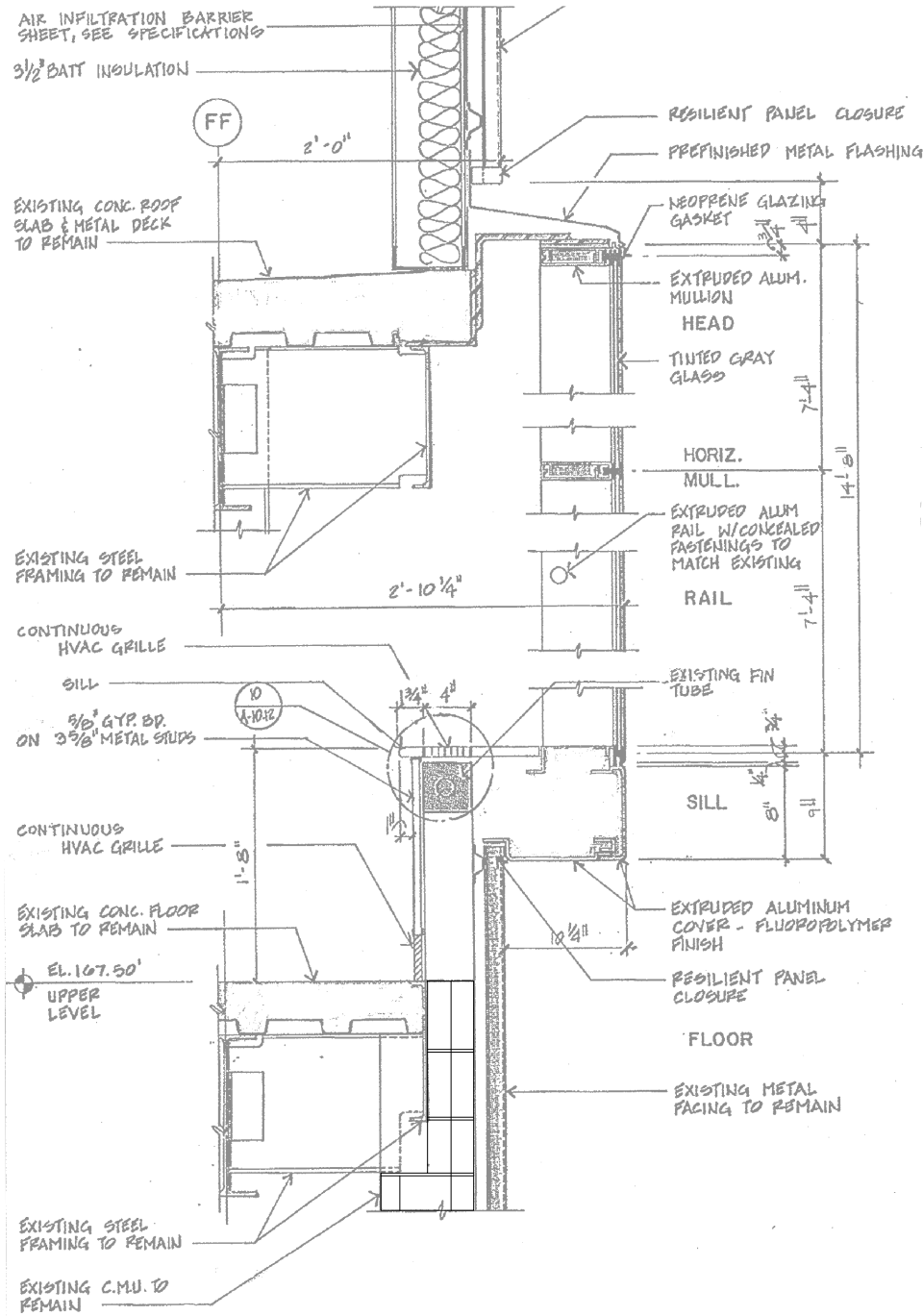
1. Provide infill panels where required to opaque existing vision glass windows. Provide hardboard panel (HBD) product as follows or approved equal.
 - a. Omega Foam - Ply HBD by Laminators Inc.
 - i. 0.013 “Stucco” aluminum face on window side with polyester paint finish; color black.
 - ii. 1/8” Tempered Hardboard Stabilizers.
 - iii. Polyisocyanurate Foam Core.
 - iv. Manufacturer’s standard white smooth finish on interior side of panels.
2. Install infill panels as detailed to interior of window frames wherever windows are required to be covered by tenant space requirements. See exhibits Horizontal Hardboard Panel, Concourse A & B, and A/B; and Vertical Hardboard Panel, Concourse B.
3. Provide manufacturer’s standard panel product warranty.

Terminals C and D

1. Prior to installing panels specified below, remove all reheat coils, fin tube radiation, covers, and other devices, and abandon piping back to the main line. Demolition must provide for continuation of existing downstream service. Temporary outages may be required by demolition, but the piping loop must be retained to service existing downstream units which remain.
2. Provide infill panels where required to opaque existing vision glass windows. Provide hardboard panel (HBD) product as follows, or approved equal.
 - a. Omega Foam - Ply HBD by Laminators Inc.
 - i. 0.013 “Stucco” aluminum face on window side with polyester paint finish; color black.
 - ii. 1/8” Tempered Hardboard Stabilizers.
 - iii. Polyisocyanurate Foam Core.
 - iv. Manufacturer’s standard white smooth finish on interior side of panels.

1. Install infill panels as detailed to interior of window jambs wherever windows are required to be covered by tenant space requirements. See exhibits for Wall Section – Standard Detail @ Domestic Terminal and Details @ Hardboard Panel.
2. Provide interior gypsum wallboard assembly of 3-5/8” 20 gauge steel studs with 5/8” Type X gypsum wallboard and un-faced batt insulation to interior of space as illustrated in the Wall Section – Standard Detail @ Domestic Terminal.
3. Provide panel manufacturer’s standard product warranty.

Designer should refer to the following 5 exhibits.



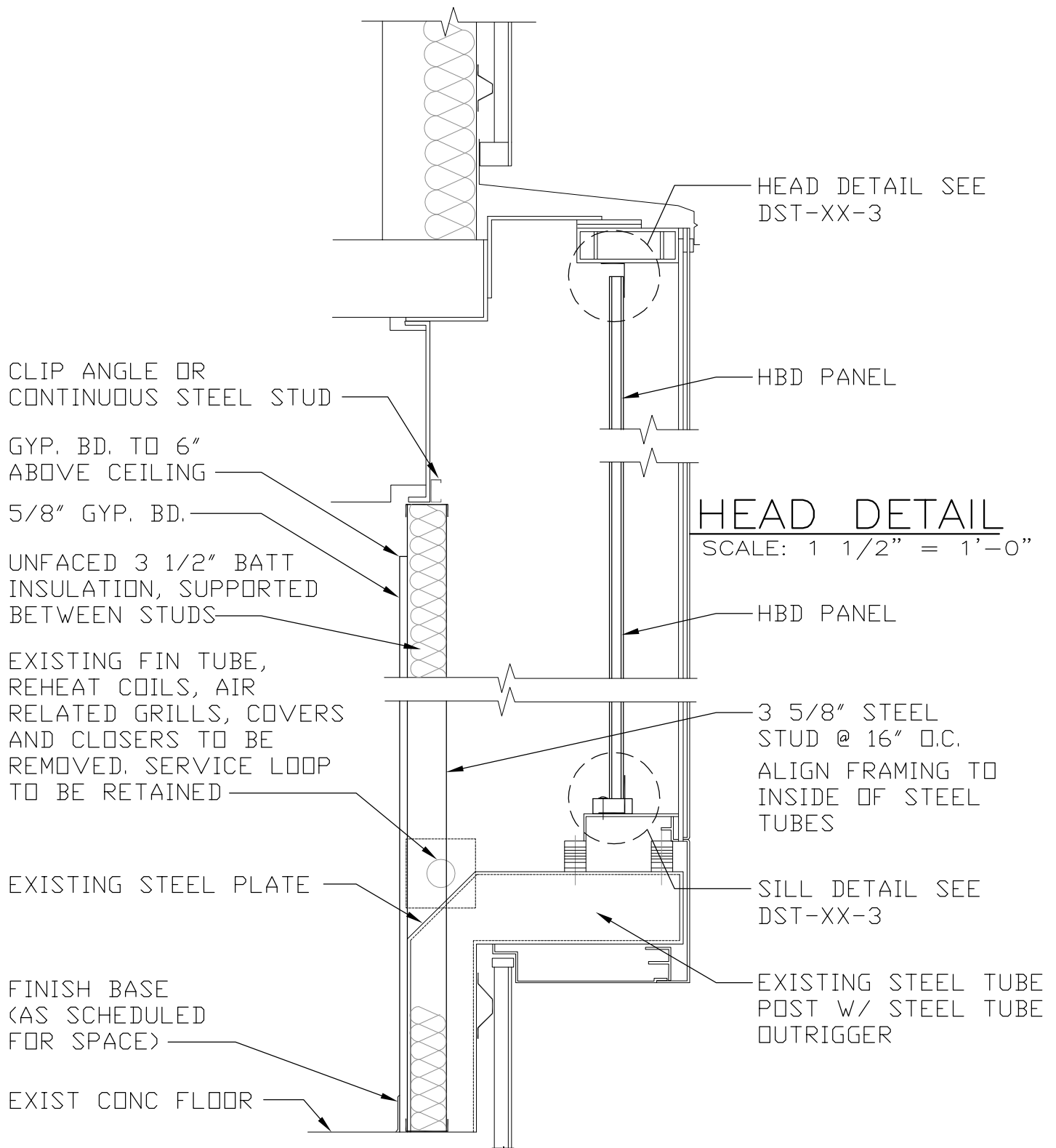
EXISTING WALL SECTION

SCALE: N.T.S.

NOTE:

THIS DETAIL IS TAKEN FROM ARCHIVED CONSTRUCTION DOCUMENTS AND IS PROVIDED FOR REFERENCE. ALL INFORMATION MUST BE VERIFIED IN THE FIELD.

SHEET TITLE: EXISTING WALL SECTION @ DOMESTIC TERMINAL



HEAD DETAIL
SCALE: 1 1/2" = 1'-0"

SILL DETAIL
SCALE: 1 1/2" = 1'-0"

1 1/2"x2 1/4"x1/8"
LLV ALUMINUM ANGLE CLIP
@ CENTER OF WINDOW
BLACK PAINT ON WINDOW SIDE

HBD PANEL
COLOR BLACK
ON WINDOW SIDE

EXISTING WINDOW

CONTINUOUS 4"x1/8"
ALUMINUM PLATE

ALUMINUM POP RIVETS
12" O.C. STAGGERED

1 1/2"x2 1/4"x1/8"
LLV ALUMINUM ANGLE CLIPS
W/ 1"x1"x2 1/4" ALUMINUM
TUBE SHIM - 2 PER PANEL
EQUALLY SPACED

SS ST SCREWS
AND WASHERS

1/4" CAP SCREWS, WASHERS
AND LOCK NUTS OR SEX
BOLTS 24" O.C. PTD. BLACK

HBD PANEL

CONTINUOUS
1 1/2"x2 1/4"x1/8"
ALUMINUM ANGLE
FASTEN 18" O.C.
W/ 1/2"x 8 SS ST
SCREWS AND WASHERS

HEAD DETAIL

SCALE: 3" = 1'-0"

JOINT DETAIL

SCALE: 3" = 1'-0"

SILL DETAIL

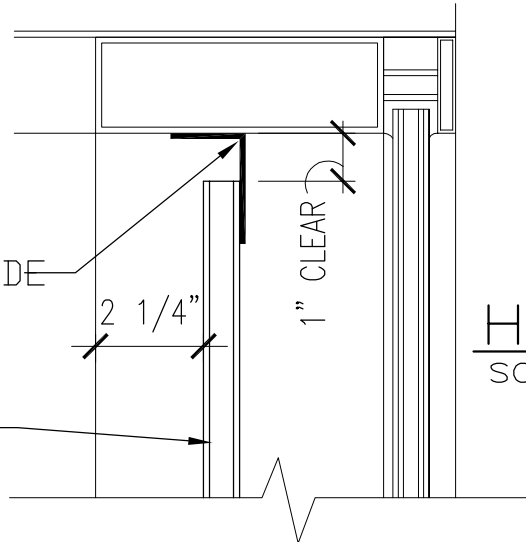
SCALE: 3" = 1'-0"

JAMB DETAIL

SCALE: 3" = 1'-0"

1 1/2"x2 1/4"x1/8"
LLV ALUMINUM ANGLE CLIP
@ CENTER OF WINDOW.
BLACK PAINT ON WINDOW SIDE

HBD PANEL
WINDOW SIDE COLOR
BLACK; "STUCCO" FINISH

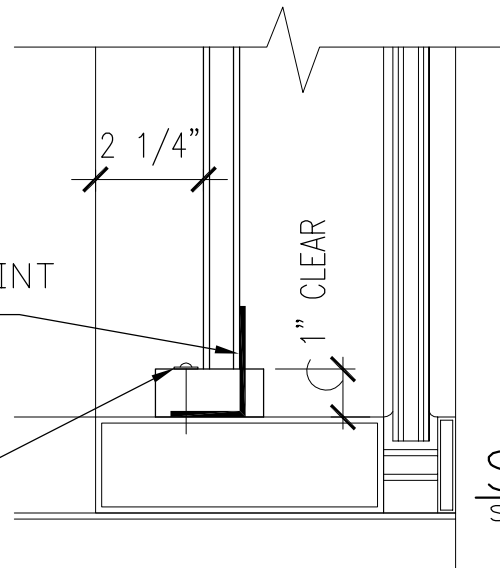


HEAD DETAIL

SCALE: 3" = 1'-0"

1 1/2"x2 1/4"x1/8"
LLV ALUMINUM ANGLE CLIPS
W/ 1"x1"x 2 1/4" ALUMINUM
TUBE SHIM - 2 PER PANEL
EQUALLY SPACED. BLACK PAINT
ON WINDOW SIDE OF CLIPS

SS ST SCREWS
AND WASHERS



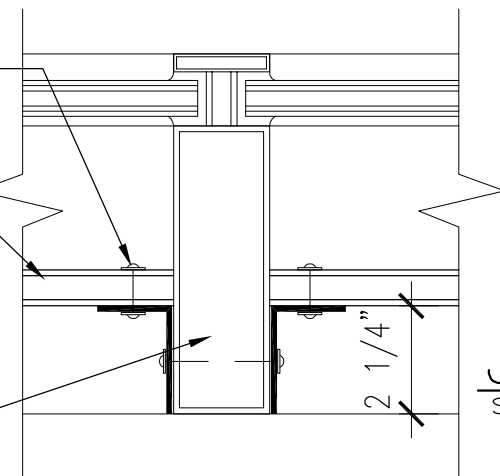
SILL DETAIL

SCALE: 3" = 1'-0"

1/4" CAP SCREWS, WASHERS
AND LOCK NUTS OR SEX
BOLTS 24" O.C. PTD. BLACK

HBD PANEL

CONTINUOUS
1 1/2"x2 1/4"x1/8"
ALUMINUM ANGLE
FASTEN 18" O.C.
W/ 1/2" x 8 SS ST
SCREWS AND WASHERS

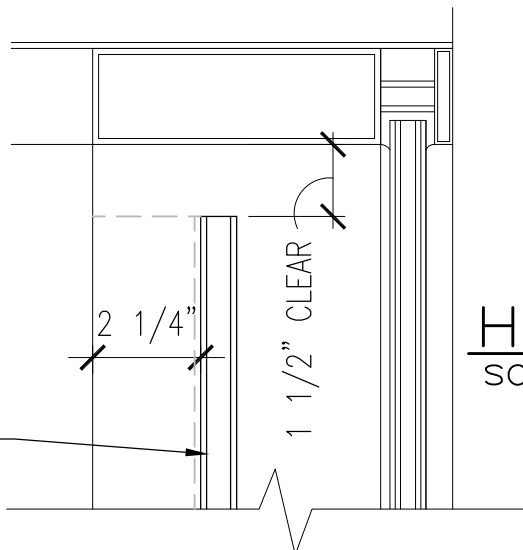


JAMB DETAIL

SCALE: 3" = 1'-0"

CONDITION 1 -
BEHIND GLAZED PANELS WHERE MAJOR DIMENSION IS HORIZONTAL

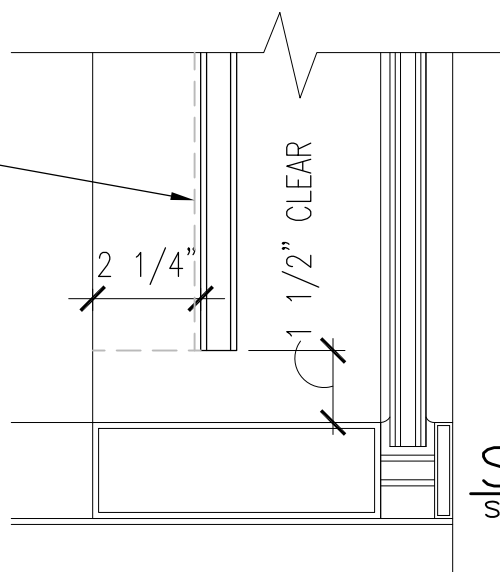
HBD PANEL
WINDOW SIDE COLOR
BLACK; "STUCCO" FINISH



HEAD DETAIL

SCALE: 3" = 1'-0"

LINE OF
CONTINUOUS ALUM ANGLE



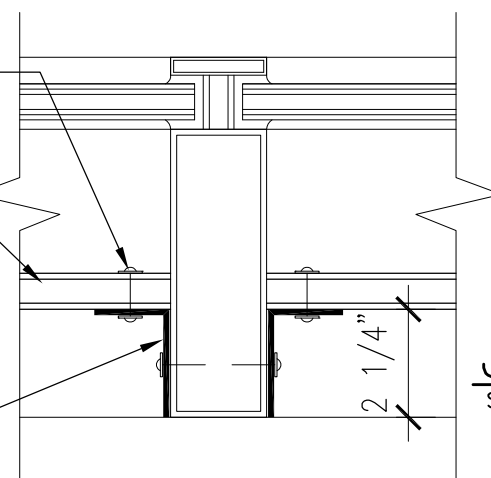
SILL DETAIL

SCALE: 3" = 1'-0"

1/4" CAP SCREWS, WASHERS
AND LOCK NUTS OR SEX
BOLTS 24" O.C. PTD. BLACK

HBD PANEL

CONTINUOUS
1 1/2"x2 1/4"x1/8"
ALUMINUM ANGLE
FASTEN 18" O.C.
W/ 1/2" x 8 SS ST
SCREWS AND WASHERS



JAMB DETAIL

SCALE: 3" = 1'-0"

CONDITION 2 —
BEHIND GLAZED PANELS WHERE MAJOR DIMENSION IS VERTICAL

11.10 FURNISHINGS

11.10.1 Holdroom Tandem Seating

1. Domestic Terminal: Seating in most holdrooms is provided and installed by the designated airlines. Seating in MAA holdrooms is provided and installed by the MAA.
2. International Terminal: Seating is provided by the MAA. It is the “Eames Tandem Sling Seating” manufactured by Herman Miller, Inc., Zeeland, Michigan.

11.10.2 Exterior Benches and Bike Racks

1. Exterior Benches: Benches are manufactured by Landscape Forms, Inc. of Kalamazoo, MI. They are “Petroskey Group” with metal rod seat inserts. The color and finish is “Hollyberry” powdercoat.
2. Bike Racks: Bike racks are manufactured by Landscape Forms, Inc. of Kalamazoo, MI. They are “Pi Rack”. The color and finish is “Grotto” powdercoat.

11.10.3 Trash Receptacles

Division of Maintenance must approve trash receptacles.

11.10.4 Master Clock System

All electronic clocks shall operate on the Simplex Master Clock System. Cut sheets for electronic clocks with analog faces are available by contacting the MAA Resident Architect. Digital clocks shall be designed with red characters.

11.11 PASSENGER CONVEYANCE

11.11.1 Elevators

11.11.1.1 Elevator Pre-Inspection

Pre-inspection requirements are found in COMAR Public Safety Article, Title 12, Subtitle 8, Annotated Code of Maryland. The contract documents shall require the contractor to procure and conduct the pre-inspection and submit the required written certifications.

§12-801. Final acceptance inspection.

- (a) *Required-* The Commissioner shall conduct a final acceptance

inspection on completion of the installation, modification, or alteration of an elevator unit before it is placed in service.

(b) *Inspection checklist*- The Commissioner shall provide an inspection checklist that specifies the requirements for compliance with the Safety Code and other regulations adopted by the Commissioner.

(c) *Duties of contractor*- At least 15 days before a scheduled final acceptance inspection for an elevator unit being installed, modified, or altered in the State, the contractor, owner, or lessee shall submit to the Commissioner a written certification that:

- (1) the elevator plans and construction documents have been reviewed by a qualified elevator inspector;
- (2) the qualified elevator inspector has certified that the elevator unit as constructed and installed complies with this subtitle, its regulations, and the safety code; and
- (3) the elements indicated on the inspection checklist are operational, have been tested, and are functional.

(d) *Failure to meet criteria*- If an inspector arrives to inspect an elevator unit at the designated time and the elevator unit does not meet the criteria established in subsection (c) of this section, the inspector may cancel the inspection and charge the contractor a fee in accordance with § 12-809 of this subtitle.

11.11.2 LIFT-Net Monitoring System

All passenger conveyance equipment being installed or refurbished, including elevators, lifts, escalators, and moving walks shall be compatible with the Airport's LIFT-Net system as provided by Integrated Display Systems, Inc. and shall be connected to the LIFT-Net system as part of the contract to install the conveyance. The work shall include any hardware and programming required for connection to the system.

11.12 TERMINAL STAIRTOWER RAMP ACCESS

11.12.1 General Design Considerations

A. Reference Standards: Comply with Section 7.1 Code Requirements. Particular attention should be given to COMAR 05.02.02 Maryland State Accessibility Code, Americans with Disabilities Act Accessibility Standards, International Building Code, and NFPA 101 Life Safety Code.

- B. Hand/Guardrails: All BWI exterior gate ramps will have handrails and guard railings as shown on the following exhibits. These rails will meet or exceed the code requirements. The rails are intended to direct pedestrians to the ramp and entry door.
- C. Door Landing: The exterior landing will be at the same elevation as the interior of the building. Provide a guardrail on each side of the landing to indicate the elevation difference between the landing and the adjacent sidewalk.
- D. Doors: Provide new door, frame, and hardware as required to comply with ADA standards and changed exterior building conditions modified to comply with this standard.
- E. Threshold: Provide ADA compliant extruded aluminum thresholds with integral weather seal.
- F. Bollards: Provide as required to protect the ramp from vehicular traffic in accordance with Section 8.1 General Site Work and Utilities.
- G. Pavement Walkways: Provide a walkway path, delineated by pavement paint, extending 5'-0" toward the aircraft parking area from the end of the access ramp.

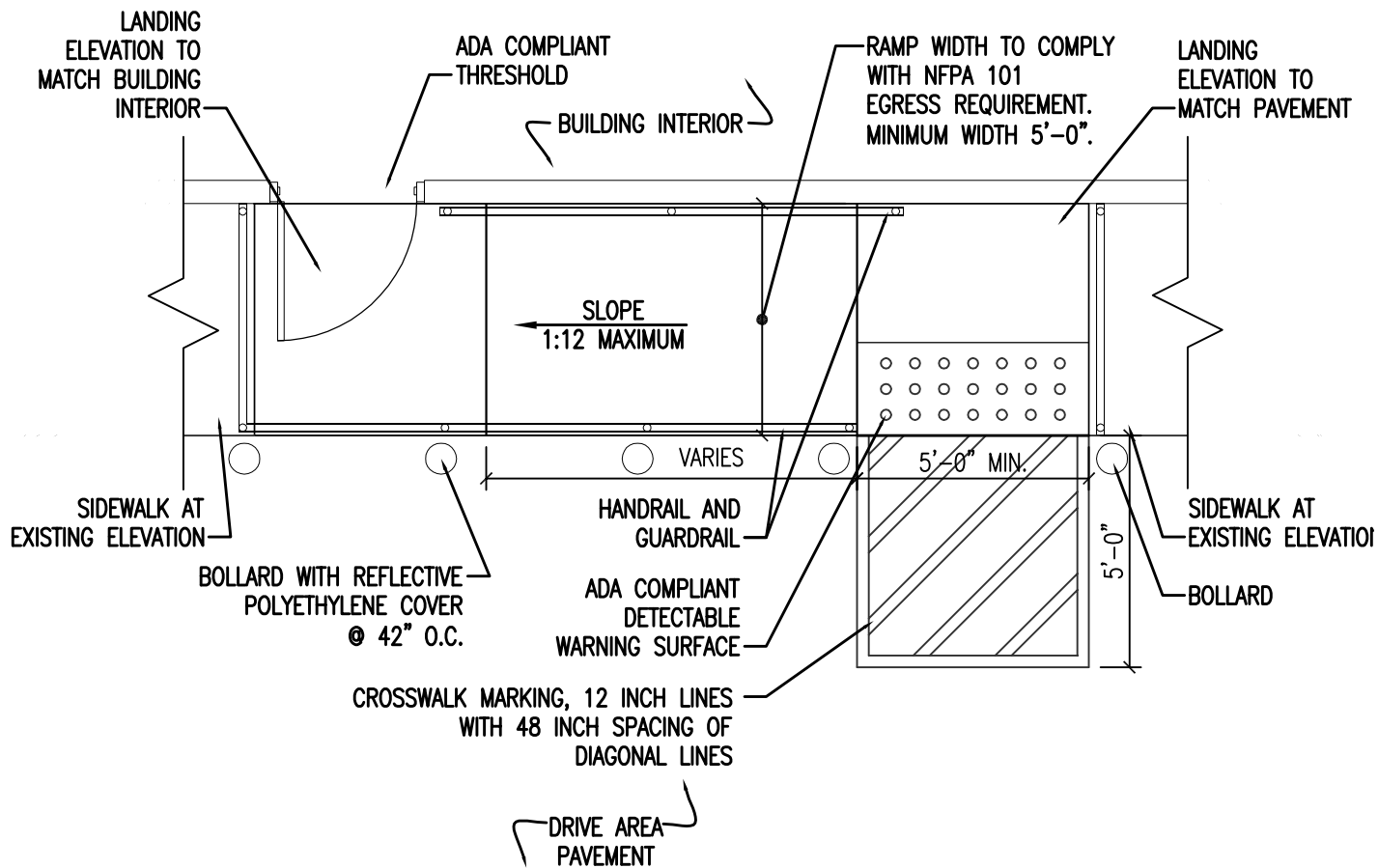
11.12.2 Ramp Configuration

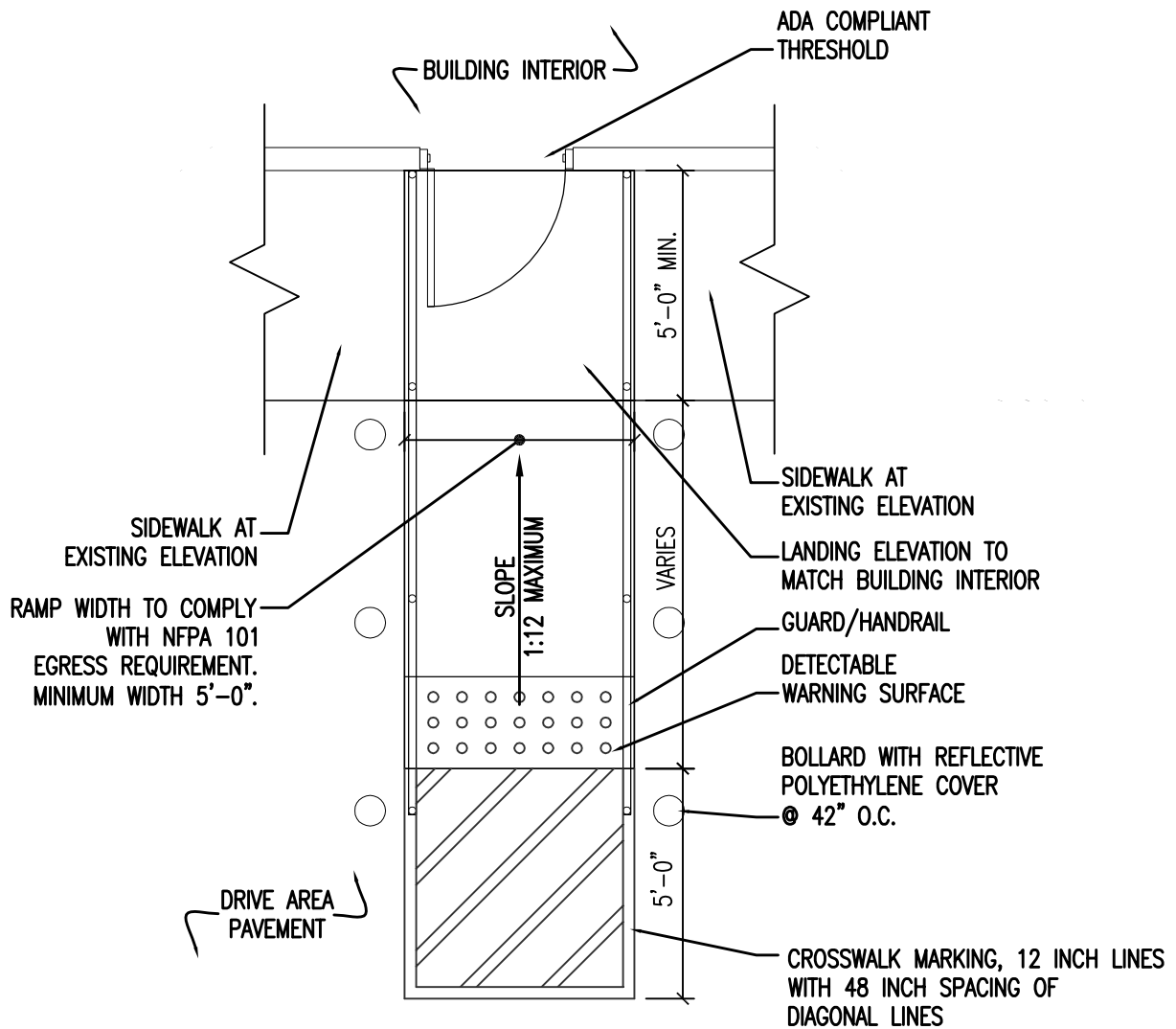
Each location identified for a new ramp should be studied during the initial design process to ensure the location does not impact:

- A. Vehicular traffic and parking spaces
- B. Apron vehicle traffic and parking
- C. Aircraft traffic and parking
- D. Ground Service Equipment (GSE) locations

The configuration and geometry of ramps may vary depending on physical constraints surrounding the exterior doors. It is expected that most ramps can be configured in a manner similar to the following exhibits. The actual configuration of doors and curbs will vary around the perimeter of the concourses. It is the design professional's responsibility to modify the designs to suit each field condition while maintaining the intent of the design standard.

Design ramps in accordance with the following Exhibits. The first exhibit is applicable where the ramp will be located parallel with the building and integrated into the existing sidewalk. The second exhibit is applicable where the ramp will be located perpendicular to the building.





11.12.3 Construction Requirements

A. Ramp Pavement:

1. Concrete: 3000 psi @ 28 days, complying with ACI 301.
2. Finish: Light Broom.
3. Detectable Warning Surface: ADA compliant 1-3/8 inch thick precast concrete core, reinforced epoxy tiles.

B. Pavement Markings: Provide pavement paint to comply with Chapter 8.

C. Handrails and Guardrails:

1. Galvanized steel pipe or tube. 1-1/2 inch outside diameter.
2. Capable of withstanding following; concentrated load of 890 N (200 pounds) applied at any point in any direction and uniform load of 730 N/m (50 PLF) applied in any direction. Concentrated and uniform loads above need not be applied simultaneously.
3. Paint: In accordance with MPI EXT 5.3B, Alkyd System.

D. Vehicular Traffic Protection: Bollards in accordance with Section 8.1.

E. Doors, Frames, and Hardware:

1. Doors and frames: Provide galvanized seamless hollow metal doors with welded frames. Comply with SDI-100, Level 3, Model 2.
2. Hinges: Stainless steel ball bearing type.
3. Locksets: Lever type complying with ADA standards. Provide lever that returns to door face, to avoid possibility of catching fire hoses in an emergency situation.
4. Cores: Provide in accordance with MAA Design Standard Appendix D.

F. Lighting:

1. Purpose: Provide pedestrian lighting for ramps.
2. Lighting Level: Minimum of 5 footcandles with an average uniformity of 3 to 1 of lighting on the ramp.
3. Comply with Chapter 19 of MAA Design Standards.

4. Light Fixture: Wall pack type fixture, 250w/120v with metal halide lamp with top visor and side shields. UL/CUL Listed for wet locations at 40C. UL Listed Marine Outdoor. Class I, Division 2 Class II, Div 1 & 2 Class III, Div 1 & 2. Provide Holophane Predator or similar.

11.13 BUILDING AUTOMATION SYSTEM

Building Automation System (BAS) for the Baltimore Washington International Thurgood Marshall Airport (BWI Marshall Airport) shall be provided as outlined herein and according to the referenced Specifications located in Appendix D and guidelines described below.

The existing BWI Marshall Airport Building Automation System (BAS) is a Johnson Controls (JCI) Metasys system incorporating JCI legacy N2 protocol (old system) and BACnet MS/TP (New system). All current and future BAS modifications and additions must be performed by an authorized factory branch of Johnson Controls and will be required to communicate through the BWI Marshall Airport BAS site director which is a JCI Metasys ADX server.

The existing BAS system currently communicates on both Arcnet and Ethernet. Only minor modifications or additions will be performed with the JCI N2 protocol, except for remote facilities. Programming and modifications to the existing Person Machine Interface (PMI) archive and Network Integration Engine (NIE), and ADX server must be performed by persons regularly employed by Johnson Controls. BAS modifications or additions of size, such as additions of multiple HVAC systems or units, are required to communicate on the BWI Marshall Airport Ethernet through a JCI Network Automation Engine (NAE) or JCI Network Control Engine (NCE) on BACnet MS/TP at a baud rate of 38400. All work must be performed by an authorized representative of Johnson Controls, and any available software updates must be identified during design, so updates occur as part of the execution of the project.

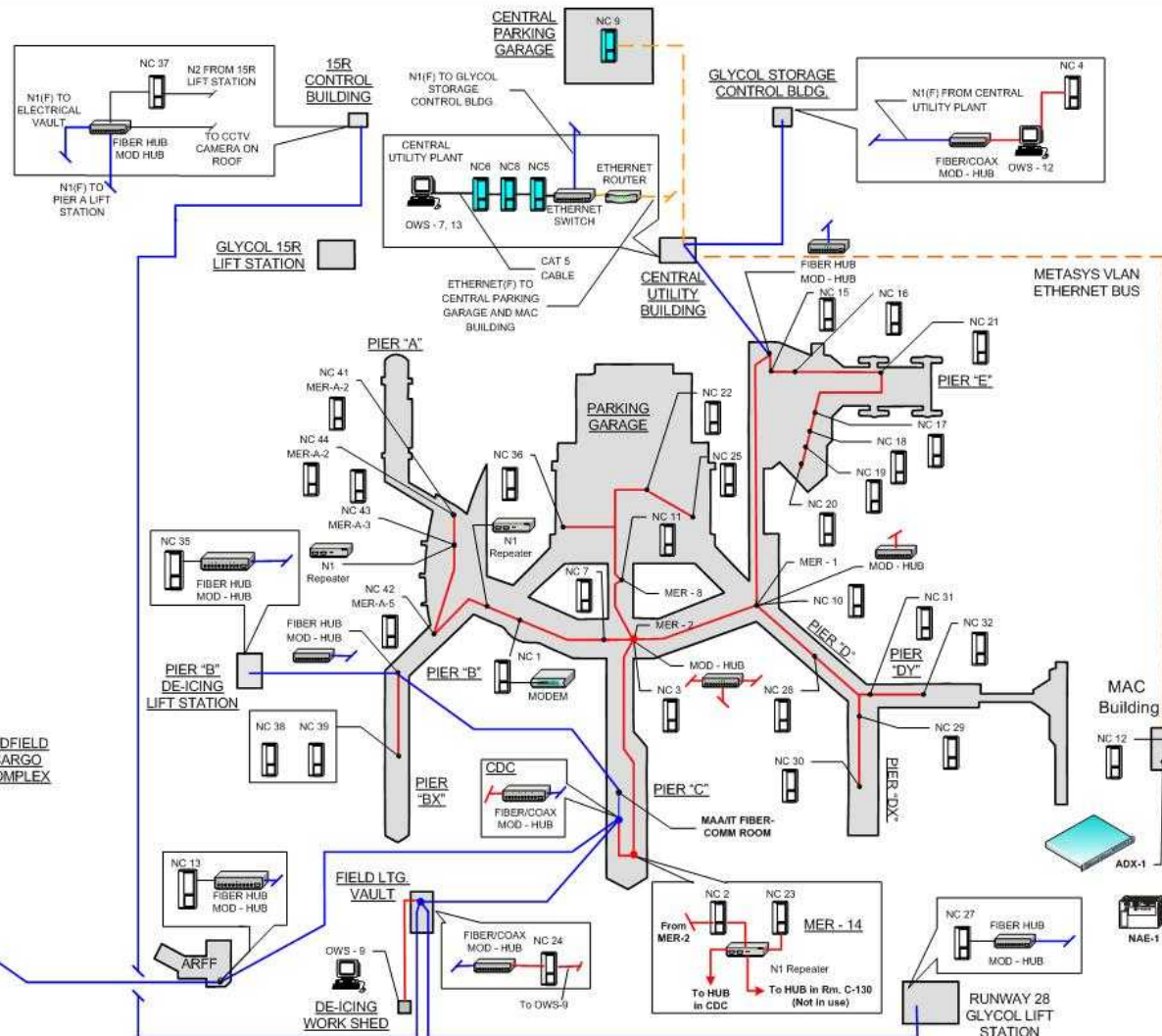
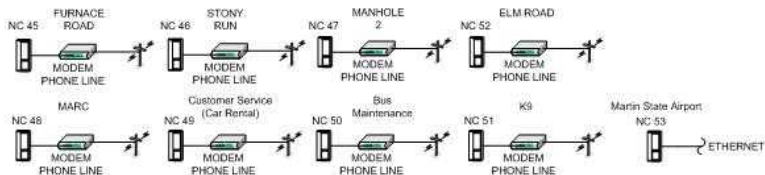
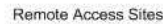
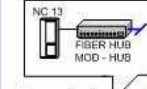
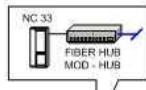
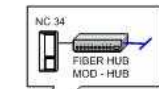
The old version of BAS is based on N2 protocols and covers majority of the Airport BAS system.

The new BAS system is a BACnet, Web-Based, JCI Metasys system that was installed in 2009.

The server that serves the BACnet, Web-based controls, is located in the MAC Building. A combination of one Application and Data Server (ADS), four Network Integration Engines (NIE's) and one Network Automation Engine (NAE) are major components of the server. The ADS provides 25 simultaneous access on the BWI Marshall Airport Ethernet system. Four Operator's Work Station (OWS) are also located in the MAC Building.

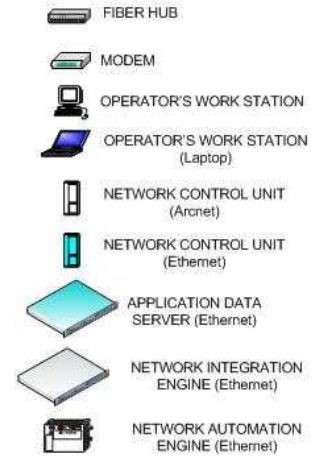
Refer to Metasys Network Map at BWI Marshall Airport detail on the following page for all existing controls and communication network.

The NIE integrates the old Metasys N2-based BAS into the new generation of technology that includes the internet, Information Technology (IT) and enterprise level global communication.



LEGEND

- FIBER OPTIC N1 BUS ARCNET
- CO-AXIAL CABLE N1 BUS ARCNET
- FIBER OPTIC N1 BUS ETHERNET
- CO-AXIAL CABLE N1 BUS ETHERNET



Station	Location
NC-1	Main Street
NC-2	Main Street
NC-3	Main Street
NC-4	Main Street
NC-5	Main Street
NC-6	Main Street
NC-7	Main Street
NC-8	Main Street
NC-9	Main Street
NC-10	Main Street
NC-11	Main Street
NC-12	Main Street
NC-13	Main Street
NC-14	Main Street
NC-15	Main Street
NC-16	Main Street
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NC-98	Main Street
NC-99	Main Street
NC-100	Main Street

Drawing Title
**BWI AIRPORT METASYS
NETWORK MAP**

Project Title	BALTIMORE WASHINGTON AIRPORT
---------------	---



Johnson Controls, Inc.
60 Loveton Circle
Sparks
MD 21152
Phone: 410-584-1160
Fax: 410-527-2730

DRAWING NUMBER:

All new controls shall be BACnet MS/TP direct digital controls as manufactured by Johnson Controls, except for remote facilities. A minimum of one Network Automation Engine (NAE) shall be installed as a Web-based extension to the existing Metasys ADX server network.

The old NC system shall be removed for major renovations where required and replaced with new NAE system. A major renovation is defined as a project that involves modification to the source component(s) of an HVAC system such as an air handler or central plant modification. Minor renovations involve the sub-systems or terminal units such as the VAV boxes, unit heaters, convectors, fan coil units, and space reheats. Each application needs to be explored for availability of BACnet network near the project location to identify the most cost effective approach, and impact on future projects.

New controls shall be designed and installed to meet the project specific requirements, MAA standards and sequence of operation. All new or updated software shall be installed in control units and operator workstations. Connect and configure equipment software to achieve sequence of operation.

Remote Facilities: There are several remote buildings and facilities that communicate with the existing BWI Marshall BAS (METASYS) by dial-up modem and they cannot be upgraded to the new system. These facilities are; Furnace Road, Stony Run, Manhole 2, Elm Road, MARC, Customer Service (Car Rental), Bus Maintenance, and K9. These facilities shall be handled separately, on a case-by-case basis and upgraded when a proper line of communication and network is available.

Ventilation shall be based on Demand-Controlled Ventilation (DCV), using CO₂ sensors. DCV shall be based on the indoor CO₂ level, compared with outside CO₂ level, to make adjustment to the rate of outside air to the building. CO₂ sensors shall be installed in spaces, return air duct, supply air duct as required and outside as a reference point to the inside level of the CO₂. Minimum outside air shall be provided for pressurization, exhaust systems, and to meet non-human pollutant levels as required. Refer to Section 1.13.2 for a sample of DCV program/ software description.

Airflow Measuring System shall be Thermal Dispersion type. Refer to Appendix D for partial language that shall be used when specifying Airflow Measuring System at BWI Marshall Airport.

Flow meters shall be turbine type. Refer to Appendix D for partial language that shall be used when specifying flow meters at BWI Marshall Airport.

Spare Parts: Projects that involve the removal or replacement of N2 legacy equipment will require that all N2 application specific controllers and NCM supervisory controllers be turned over to the MAA as spare parts. Major renovations and additions utilizing BACnet MS/TP can require one application specific controller (FEC product) as a spare for each type utilized for the project.

Control system shall consist of sensors, indicators, actuators, final control elements, interface equipment, other apparatus, accessories, and software connected to distributed controllers

operating in multiuser, multitasking environment on token-passing network and programmed to control mechanical systems. An operator workstation permits interface with the network via dynamic color graphics with each mechanical system, building floor plan, and control device depicted by point-and-click graphics.

Control system shall include the Building Lighting Control System. Guidelines for the lighting controls are defined in the electrical specifications. The current standard for lighting control integration with the BAS system is BACnet MS/TP “smart breakers”. A notation on the mechanical plans and BAS specification should be made, so the mechanical contractor (the typical contracting agent for BAS) carries the BAS networking of the lighting controls in their scope of work.

Designers shall coordinate with Johnson Controls throughout the design process for modifications or additions to the BWI Marshall Airport BAS. Contact Mr. Erik Badders (410-527-2607/erik.a.badders@jci.com) at Johnson Controls, so existing BAS capacity can be assessed and proper implementation of new Metasys controls occurs.

11.13.1 Design Guidelines

Designers shall prepare design drawings and specifications as follows:

1. Review, revise and update part one of the BAS specifications as required to suit the project scope of work.
2. Review, revise and update part two of the BAS specifications as required to suit the project scope of work.
3. Include part three, execution, in accordance with MASTERSPEC and project scope of work.
4. Provide sequence of operation and show on the drawings.
5. Provide general controls riser diagram
6. Provide equipment controls riser diagrams, including, but not limited to, air handling units, pumps, exhaust fans, VAV boxes, heat exchangers, fan coils, unit heaters, cabinet heaters, chillers, cooling towers and boilers.
7. Provide composite BAS riser diagram of entire system, showing locations of all controllers, including but not limited to terminal equipment controllers (VAV boxes, reheat coils, finned tube, etc.) for new and existing.
8. All control valves for chilled and heating water systems shall be two way valves unless approved by the MAA for using three way valves or as required by the specific project requirements.
9. All control dampers shall be low leakage type.

10. All actuators for valves and dampers shall be electric type except for large valves and dampers that pneumatic actuators can be provided where pneumatic system is available or new pneumatic system is required due to the size of the project.
11. Provide all required software for all equipment controllers and equipment, including but not limited to ADX, NAE, NIE, FEC, etc. Install all required software on the two (2) MAA provided laptops. Provide all wiring, cables and all devices necessary to connect to controllers and the network. Provide training on all software and systems.
12. Include BAS commissioning by the BAS supplier (JCI) in the specifications as required. Coordinate with the MAA.
13. Coordinate Variable Frequency Drives (VFD) operation with the sequence of operation and JCI.
14. VFD's shall have minimum analog and digital inputs and outputs as shown on the sample specification. Coordinate with electrical for the VFD's requirements. Refer to appendix D for VFD's special requirements.
15. Provide additional work station and laptops as required. Coordinate with the MAA.
16. Review, revise and update warranty for the BAS system. Coordinate with the MAA.
17. Provide composite list of all required software, hardware, controllers, sensors, etc., required for the operation of the Metasys Extended Architecture system.
18. Include controls for lighting, emergency generators, switchgear/substation, and other systems and equipment as required by the scope of the work.

11.13.2 Existing Demand-Controlled Ventilation (DCV) Software

The following describes the existing DCV software at BWI Marshall Airport. Designers shall ensure that all future designs are compatible with the following:

1. Ventilation Control Application.
 - a. ASHRAE Standard 62-2004, Ventilation for Acceptable Indoor Air Quality, provides a procedure to determine outdoor air flow rates for buildings: The "Ventilation Rate Procedure."
 - b. Hardware and software for DCV shall be designed and installed to respond to CO2 level in less than five (5) minutes.

2. Software Features: The following software features shall be part of the DCV application.
- a. CO2 Multiplexer--Controls the sampling sequence and storing of the three measured CO2 concentrations.
 - b. CO2 Sensor Autozero function--Causes the controller to read outdoor air CO2 concentrations for one hour each day for the auto zeroing algorithm in the CO2 sensor.
 - c. Outdoor Air Flow Calculator--Uses the CO2 concentration data to calculate the outdoor air flow rate.
 - d. Outdoor Air (ODA) Flow Controller--Uses the outdoor air flow rate as a controlled variable input for closed loop PI control of outdoor air flow. The primary setpoint is determined by the Outdoor Air Flow Controller's Setpoint Selector.
 - e. Outdoor Air Flow Controller Backup--Takes over control when the ODA Flow Calculator output is not dependable for any reason. This is a redundancy that is not required for outdoor air flow control but is provided for space pressurization considerations.
 - f. Outdoor Air Flow Setpoint Selector (with CO2 High Limit Control)--The Setpoint Selector determines the setpoint of the Outdoor Air Flow Controller based on the highest of three signals: Scheduled setpoint based on estimated occupancy, space pressurization (i.e., volume matching) setpoint, and the CO2 high limit control setpoint. The CO2 high limit control function supplements the scheduled outdoor air flow function, addressing any higher than expected occupancy periods.
 - g. Return Air CO2 Alarm capability--Alerts building operators to conditions of high CO2 levels, indicating loss of ventilation control, or conditions of low CO2 levels indicating a CO2 sensor fault.
 - h. Controller Manager--Selects between the Outdoor Air Flow Controller and the conventional discharge air temperature controller/economizer for control of the mixed air dampers.
 - i. CO2 Concentration Values Check--Warns the operator if the CO2 concentration values are not in the proper relationship; supply air CO2 concentration should be higher than that of the outdoor air and lower than that of the return air.
 - j. Lead Ventilation--Provides ventilation prior to occupancy, diluting building source contaminants to acceptable levels.
 - k. Trend Tool--This Excel worksheet, in conjunction with an OWS and Metalink™, provides expanded graphic presentation of trend data.

- l. Outdoor Air Actuator Ramp Generator--Diagnostic software process compound ramps outdoor air damper through 0%, 50% and 100% positions for precommissioning tests and ventilation control verification.
 - m. Trend Automator--Starts and stops trending of object attributes when the air handling unit is started and stopped. This avoids wasted disk space which occurs if trending continues during equipment off periods.
 - n. Reliability Checker--Replaces unreliable trend data with zero.
 - o. Outdoor Air Flow Calculator - Energy Balance Method--Uses mixed, return and outdoor air temperature data to calculate the outdoor air flow rate for comparison purposes (not for control).
3. Measurement of Outdoor Air Flow Rate

The following are methods/options that can be used for measuring the Outdoor Air Flow Rates.

- Option 1 requires specific software as described in this section and is being used at BWI Marshall Airport.
- Option 2 requires modified software, written specially for multiple CO₂ sensors, and operating with a dedicated Outdoor Air Flow Measuring system.

The preferred option shall be based on the latest installations at BWI Marshall Airport and shall be reviewed and approved by the MAA prior to design and installation.

Option 1:

- a. Outdoor air flow is measured indirectly, using the “CO₂ Concentration Balance” measurement method. In the “CO₂ Concentration Balance” method, the outdoor air flow is calculated from supply air flow (measured directly via airflow measuring station), and from three CO₂ concentrations. Outdoor, supply, and return air CO₂ concentrations are used to compute the fraction of outdoor air in the supply air stream. This provides a calculated outdoor air flow value as a controlled variable input for the Outdoor Air Flow Controller.
- b. The volumetric concentration balance for the outdoor and return air streams being mixed can be calculated for any “tracer gas” injected into the air streams. Since human respiration generates significant amounts of CO₂ in the return air stream and CO₂ sensors are available, CO₂ is a good tracer gas for this method.

Option 2:

- a. Provide duct-mounted air flow measuring system for outdoor air flow measuring and multiple CO₂ sensors for supply and/or return air ducts and

outdoor air. The CO₂ measurement program shall be modified if duct-mounted air flow measuring is utilized and multiple CO₂ sensors are installed.

4. Implementation of Outdoor Air Flow Software Control Strategies

- a. The multiplexed method of CO₂ measurement that is used to provide accurate CO₂ concentration values for the Outdoor Air Flow Calculator has additional capabilities in that it can compensate for exhaust air bypass and mixing plenum air leaks. It is the only method that can distinguish between outdoor and re-entrained return or exhaust air.
- b. The method is derived from equations describing the mixing of the outdoor and return air streams in a common air handling unit. Each of these air streams contains some concentration of the tracer gas, CO₂
- c. The outdoor air flow rate can then be determined as

$$CFM_{OA} = \frac{CO_{2,RA} - CO_{2,SA}}{CO_{2,RA} - CO_{2,OA}} CFM_{SA}$$

using the supply air volumetric flow rate in CFM (or m³/sec) and the CO₂ concentrations in ppm (parts per million).

- d. The expression $CO_{2,RA} - CO_{2,SA} / CO_{2,RA} - CO_{2,OA}$ can be viewed as a “flow coefficient” that determines the “outdoor air fraction” in the supply air. The typical return air CO₂ concentration in an occupied building is in the range of 500 to 1000 ppm while the outdoor air CO₂ concentration is in the range of 350 to 450 ppm. The mixing of the outdoor and return air streams will always cause the supply air CO₂ concentration to be higher than that of the outdoor air and lower than that of the return air. When the outdoor and exhaust air dampers are fully closed and all the return air is being recirculated, the supply air CO₂ concentration is equal to that of the return air and the flow coefficient will have a value of zero, correctly indicating that no outdoor air is being introduced into the space. When the outdoor and exhaust air dampers are fully open, the supply air CO₂ concentration is equal to that of the outdoor air and the flow coefficient will have value of one, indicating that the air handling unit is using 100% outdoor air.
- e. Single CO₂ sensor with a sampling air pump and appropriate software is used to measure and store, in sequence, CO₂ concentrations of the three air streams. Two solenoid air valves are used to connect the appropriate sampling line to the air sampling pump and to the sensor. Adequate time is provided for purging each sampling line and for the time response of the CO₂ sensor.

- f. With the use of a single CO₂ sensor, the relative differences between CO₂ concentrations can be measured with an error of less than 5 ppm. The effect of sensing errors such as drift, temperature effect and short term output variations will be identical for all three CO₂ measurements. Because the flow coefficient requires only calculation of the ratio of the CO₂ differentials, the identical errors in the individual measurements will cancel out. Only infrequent field calibration of the CO₂ sensor is required because only the differentials are used, rather than absolute values.
- g. The return air CO₂ concentration, one of the three CO₂ concentrations read and stored during the multiplexing cycle, can be utilized in some cases for purposes other than indirect outdoor air flow calculation. For example, it can be used for CO₂ high limit control and for Return Air CO₂ Alarms. For these applications, when an absolute CO₂ measurement is needed, accurate CO₂ sensor calibration is required.

5. CO₂ Sensing Point Location:

- a. Selection of the CO₂ sensing locations should be as follows. The sampling tube (typically a 1/4 inch diameter plastic tube) is inserted into the duct in any convenient and easily accessible section of the ductwork. Note that, contrary to temperature sensing, the CO₂ concentration in mixed air is identical to the CO₂ concentration in the supply air. Therefore, there is never any need to sense CO₂ in the mixed air plenum where an averaging sensing probe would be required. Because the CO₂ concentration of an air stream is not affected by heating coils, cooling coils or humidifiers, the sensing point for the supply can be located downstream of the supply fan to ensure that the outdoor and return air streams are well mixed and have minimum stratification. The return air sensing point can be located in the return air duct, upstream or downstream of the return fan.
- b. The supply air sensing point is subject to the fastest changes in CO₂ concentration, as the linked dampers change position. When presented with choices regarding equipment location, mount the controller in a location that will minimize the length of the supply air sensing tube, using a tube of up to 30 feet, in length.
- c. The outdoor air sensing point should be located in free air outside the building or, alternatively, in the outdoor air intake. If the outdoor air CO₂ sample is obtained from a location that is isolated from the building exhausts, the CO₂ Concentration Balance method will automatically compensate for air which short-cycles from the exhaust louvers to the outdoor air intake. Either location compensates for air which short-

cycles from the fan room into the mixing plenum. By placing the outdoor air CO₂ sensing point in a location that is isolated from the building exhausts, this method allows calculation of the true fresh air portion of the outdoor air flow intake from the three CO₂ measurements and the supply air flow. The outdoor CO₂ sensing point, if placed in the outdoor air intake duct for convenience reasons, should be placed far enough on the upstream side of the outdoor air damper so that its reading is not affected by a possible “backwash” of the mixed air at larger outdoor air damper openings. A good practical test is to check the outdoor air CO₂ sensing point reading while positioning the outdoor air damper from its fully closed to its fully open position and verify that the sensor reading does not change.

11.14 ARCHITECTURAL WOODWORK

11.14.1 General

Architectural Woodwork for MAA projects are to be designed, constructed, and installed in compliance with the recommendations and appropriate quality grade(s) as defined in the latest edition of the Architectural Woodwork Standards (AWS), published jointly by the Architectural Woodwork Institute (AWI), the Architectural Woodwork Manufacturers Association of Canada (AWMAC), and the Woodwork Institute (WI).

11.14.1.1 Types of Woodwork

Types of woodwork covered by this Standard are listed by Section in the AWS, including casework, doors, countertops, and trim.

11.14.1.2 Fire Protection Requirements

Refer to Design Standards Chapter 15 Fire Suppression Systems, Article 15.4 Fire Protection Information for Architects and Engineers, regarding architectural woodwork fire protection requirements.

11.14.2 AWS Quality Grades

AWS includes three levels of quality, ranging from lowest to highest: Economy, Custom, and Premium. Each quality level addresses such items as permitted materials, appearance, detailing, finishes, and fabrication and installation tolerances for woodwork. Architectural woodwork quality grade for manufacture and installation shall be “Custom” for MAA projects, unless otherwise specified by the designer and approved by MAA’s Project Manager.

11.14.2.1 Modifications

Certain improvements to the specified quality grade, for example, Premium grade wood veneer faces for Custom grade wood doors, may be specified.

11.14.2.2 Option

Economy grade may be considered for certain types and locations of woodwork, subject to approval by the MAA's Project Manager.

11.14.3 AWI Quality Certification Program (QCP)

Specifications for architectural woodwork for MAA projects shall include the requirement(s) that the project be registered with AWI's Quality Certification Program, which shall include manufacture and installation by AWI-Certified woodworking firms, certified for the applicable categories of the work. Project registration with AWI QCP by the woodworker is required immediately following construction contract award. Prior to Substantial Completion, each project is to be issued a Certificate of Compliance by the woodworker indicating the project has been completed under the auspices of the AWI QCP.

11.14.3.1 Submittal Requirements for QCP Projects

Action and Informational Submittals are to include the following requirements:

11.14.3.1.1 Shop Drawings

Action Submittals for QCP projects are to bear AWI QCP labels indicating the project's registration number. Shop Drawings not bearing labels may be reviewed and marked for resubmittal, but are not to be marked as approved (or approved as noted) by the Designer until shop drawings indicate compliance with requirements and labels are attached.

11.14.3.1.2 Compliance Certificates

Informational Submittals of AWI Quality Certification Program Certificates of Compliance. Certificates of Compliance are to be delivered to MAA Office of Design and Construction, Division of Architecture, prior to Project Closeout.

11.14.3.2 Inspection

Fabrication and installation of registered projects shall be inspected by an AWI QCP inspector for compliance with the AWS quality level specified, and a Project Compliance Inspection Report will be filed with the Engineer. The Report shall indicate any deficiencies that require correction prior to

recommendation that a certificate be issued. A follow up site inspection shall be performed to verify that corrections have been satisfactorily completed, and an updated Report shall be filed with the Engineer. Project Specifications may include requirement for Informational Submittals of Reports.

11.14.3.2.1 Labels

AWI QCP labels are to be affixed to woodwork receiving Certificates of Compliance by the woodworker in an inconspicuous location determined by the MAA Office of Design and Construction, Division of Architecture.

11.14.3.3 Selection of Qualified Woodworkers

A list of qualified woodworkers may be included in each section of the specifications requiring AWI certification. Information regarding the QCP and AWI-Certified woodworkers is available from AWI QCP's website: www.awiqcp.org. Check boxes for certified sections may be selected to narrow the search for qualified woodworkers. A complete list of certified sections applicable to each contractor is displayed following selection of the listed contractors from the search results.

11.14.3.3.1 Recommendation

It is recommended that one section at a time be selected. Selection of multiple sections may yield inaccurate results, which may inadvertently disqualify otherwise qualified woodworkers.

11.14.3.4 Economy Grade Woodwork

Certification for Economy grade woodwork is not required.

11.14.3.5 Wood Doors

Flush wood doors produced by reputable manufacturers generally will not require certification. Certification may be specified for flush wood doors integral with wall paneling, stile and rail doors, sketchface doors, and similar special doors and applications. Compliance with Architectural Woodwork Standards is, nevertheless, required for quality grade specified.

11.14.3.6 Enforcement

Any or all AWI QCP requirements may be waived at the discretion of MAA Office of Design and Construction, Division of Architecture; however, compliance with requirements of paragraphs 11.14.1 and 11.14.2 is still required.

11.14.3.6.1 Modifications to Woodwork

Proposed future work involving modifications to woodwork that has received a Certificate of Compliance is to be reviewed and approved in writing by the MAA Office of Design and Construction, Division of Architecture, prior to proceeding with any proposed modification.

CHAPTER 12 STRUCTURAL AND STRUCTURAL SYSTEMS

12.1 MATERIALS

12.1.1 Reinforced Concrete (With Subcategories)

All projects shall be designed based on cast-in place concrete principles. However, the contract specifications should allow for the submission of pre-cast concrete alternatives. The specifications should require the Contractor to submit the required design documentation and calculations to support the substitution of pre-cast concrete. MAA approval is required prior to proceeding with pre-cast applications.

12.2 BOMB MITIGATION DESIGN

Criteria exist for the design of terminal and building facilities to mitigate a potential vehicle bomb attack at the terminal curbside. These criteria can be obtained by contacting the MAA Manager of Office of Design & Construction.

12.3 TRASH COMPACTOR FALL PROTECTION SYSTEMS

The fall protection system consists of vertical and horizontal safety posts (details are on the following pages) and must adhere to the regulations listed below:

All design loads shall be as per the current MAA adopted edition of the International Building Code (IBC).

All Construction shall be compliant with the following OSHA standards:

1910.23(e)(1)

A standard railing shall consist of top rail, intermediate rail, and posts, and shall have a vertical height of 42 inches nominal from upper surface to top rail. The top rail shall be smooth-surfaced throughout the length of the railing. The intermediate rail shall be approximately 21 inches below the top rail. The ends of the rails shall not overhang the terminal posts except where such overhang does not constitute a projection hazard.

1910.23(c)(1)

Every open-sided floor or platform 4 feet or more above adjacent floor or ground level shall be guarded by a standard railing (or the equivalent as specified in paragraph (e)(3) of this section) on all open sides except where there is entrance to a ramp, stairway, or fixed ladder. The railing shall be provided with a toe board wherever, beneath the open sides.

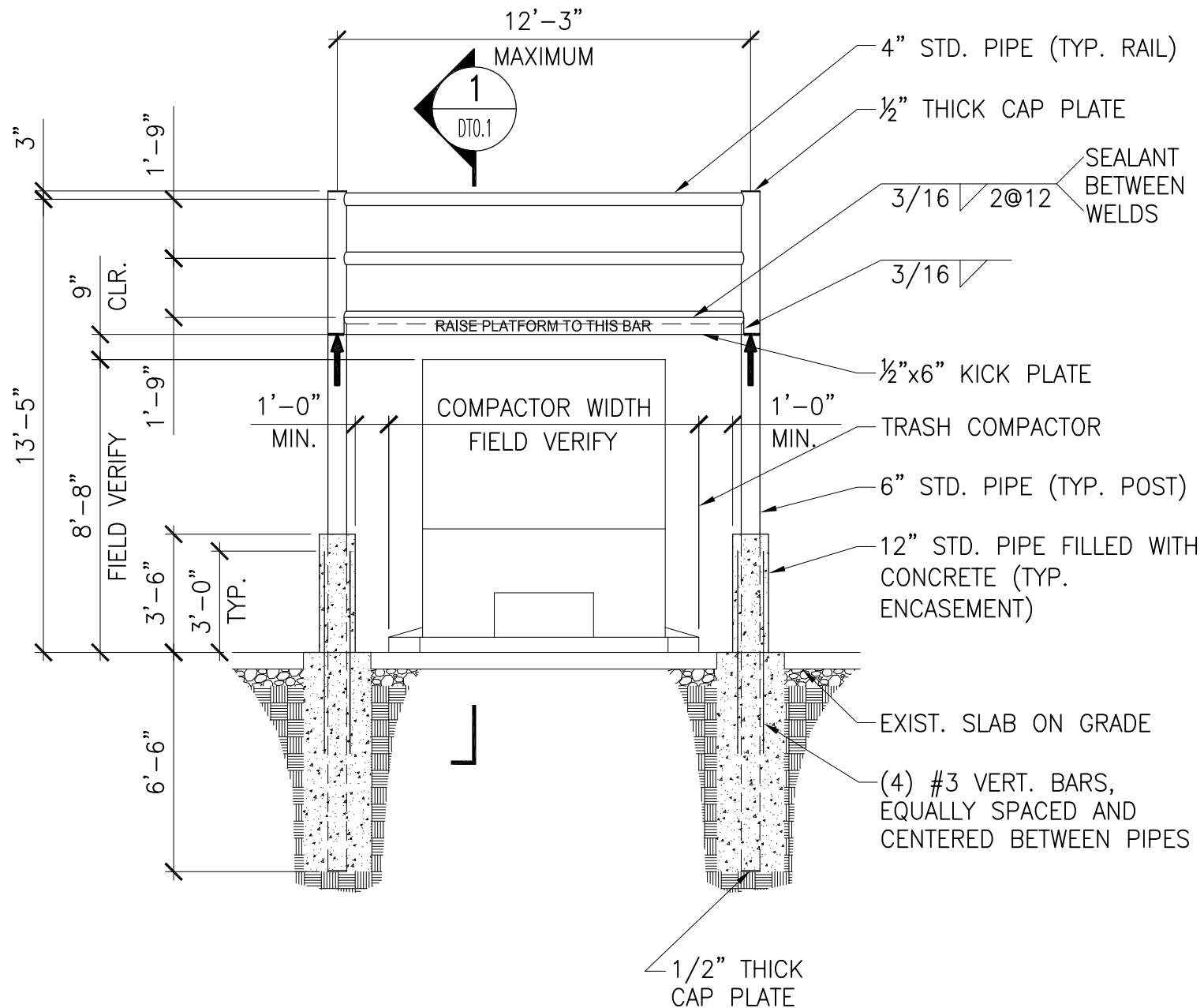
1910.23(e)(3)(iv)

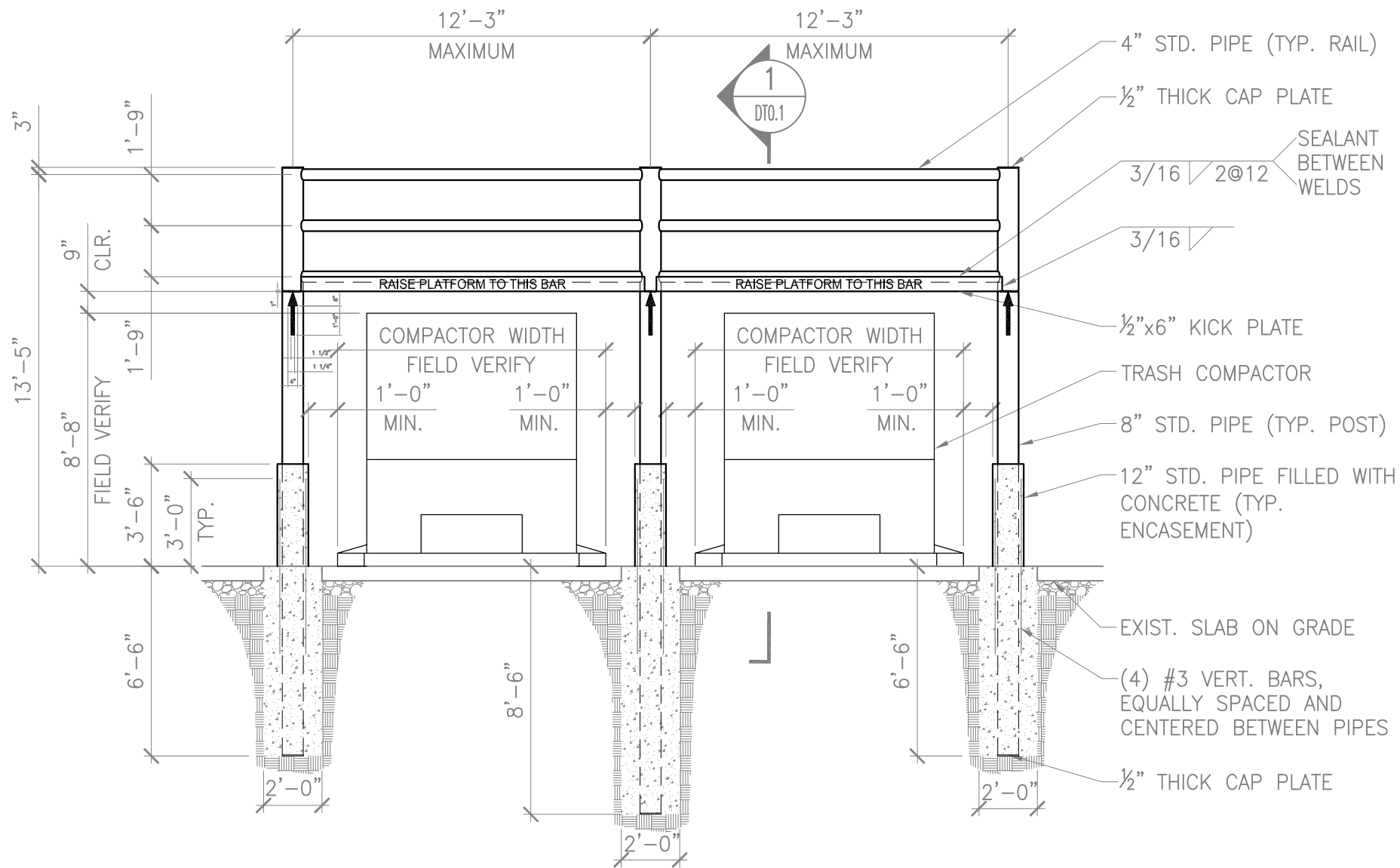
The anchoring of posts and framing of members for railings of all types shall be of such construction that the completed structure shall be capable of withstanding a load of at least 200 pounds applied in any direction at any point on the top rail.

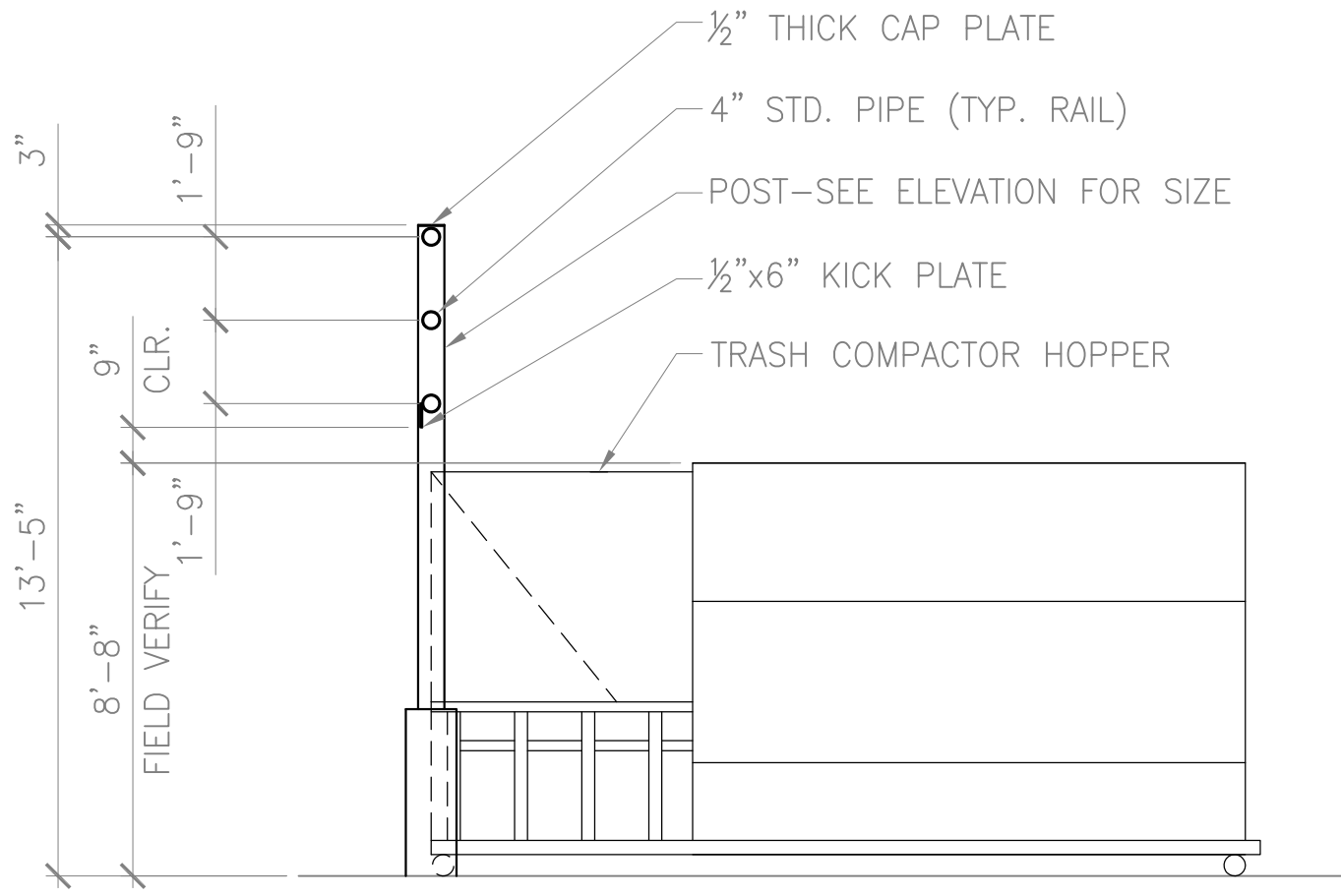
1910.23(e)(3)(v)(b)

A strength to withstand at least the minimum requirement of 200 pounds top pressure.

Because of the various dimensions of the trash compactors at the airport, dimensions for the safety posts will vary. Dimensions of the trash compactor requiring protection should be field verified before the design is to be submitted for construction. Any changes to these details should be submitted to the MAA Office of Design & Construction so that the changes can be incorporated into a revised notes standard.







SECTION 1

SCALE: 1/4"=1'-0"

NOTE:

CENTERLINE OF RAILING POSTS SHALL BE ALIGNED WITH
EDGE OF TRASH COMPACTOR HOPPER.

12.4 CORE DRILLING OF CONCRETE FLOORS

The decision to core drill or not to core drill should be made by a qualified engineer (designer or resident engineer) based on the evidence from the documentation and nondestructive testing. Existing documentation of the structure should be reviewed to determine preliminary information on size and spacing of embedded objects.

Core drilling of concrete floors (on-grade, elevated, and post-tensioned) must be preceded by nondestructive testing (NDT) to show that no embedded conduits or structural reinforcing will be cut in the proposed location.

Nondestructive testing methods to determine the presence of reinforcing steel in concrete include electromagnetic sensor metal locators, x-rays or ground penetrating radar (GPR). The testing method used must be approved in advance by the resident engineer as being suitable for the application.

Safety precautions must be taken when utilizing x-ray techniques. For use of x-rays, access must be available to the both surfaces of the structure for placement of the x-ray source and the receptor (film).

Concrete dust, chips, water, etc. should be contained during core drilling. Safety should be practiced to assure that no one is directly below the core drilling location during the drilling.

12.5 TERMINAL BUILDING HEAD KNOCKERS

Terminal building head knocker structures shall be provided at each end of each at-grade through traffic vehicle passageway (tunnel) that traverses beneath an elevated portion of the terminal building. The free-standing head knockers shall protect the face of the building by preventing oversized vehicles from passing and making contact with the at the tunnel entrance.

12.5.1 Location

Head knockers shall be located at each end of each through vehicle passageway to protect the overhead portion of the building above the passageway. The head knockers shall clear span the full width of the passage and neither the head knocker frame nor any of its components or supports shall impede vehicle travel below the posted clear height or within the full width of the travel lanes.

The centerline of head knocker structures shall be located a minimum of 5'-0" from the face of the building and shall not be positioned any further from the face of the building then would allow passage of vehicles between the head knocker and the building. If conditions, such as adjacent existing building elements or equipment, require the head knocker to be closer to the building than 5'-0", coordinate location with BWI Operations and verify clearances with existing building foundations.

Head knockers shall provide 7'-10" clearance. If a lower clearance is required to protect building elements, coordinate with BWI Operations for approval.

Head knockers must be positioned clear of existing and anticipated airfield and building infrastructure elements, such as sidewalks, below grade-utilities and high-mast light poles. Clearance must be maintained around high-mast light poles for lowering of the fixtures for maintenance. Head knockers must not reduce the width of Vehicle Service Road (VSR) lanes or other vehicle pathways

Head knocker locations shall not impede fire truck access, including roof access, or access to or from egress doors or walkways. Head knocker supports shall not be positioned within in the path of sidewalks or protection curbs, unless there is no other acceptable location, and only with the approval of the BWI Fire Marshal. Head knockers shall not impede, block or otherwise obstruct any fire suppression systems to include, but not limited to, fire hydrants (free standing or wall hydrants), fire department automatic sprinkler or sprinkler/standpipe connections, fire pump connections or test headers, and should not impact established fire lane markings as required in COMAR, Title 21, Subtitle 10, Section 21-1003(m) as well as stipulated in NFPA 1, Fire Code, Chapter 18.

Final location of head knockers must be approved by the BWI Fire Marshal.

12.5.2 Civil

Head knockers shall be installed to clear span existing drive aisles. Existing lane pavement markings shall remain. A painted STOP line marking, including a painted stop bar shall be installed in the direction of travel in each lane at each head knocker.

Field investigation of existing utilities, either as part of the design or mandated for the contractor, shall be performed to aid in locating the head knockers clear of existing foundations and to prevent damaging utilities during construction.

Pavement repairs shall be included for the areas at the head knocker foundations and for trenching required for installation of electrical conduits.

12.5.3 Structural System

Head knockers shall be designed to resist a horizontal 10,000 pound concentrated load applied at any location along the length of the head knocker frame. The frame shall also resist other code applicable structural loads.

The head knocker structure shall be a welded steel frame composed of hollow structural sections. A top and bottom horizontal section of equal size shall be provided to support attached signage and resist applied loads. Intermediate, equally spaced vertical hollow structural sections shall also be provided to connect the top and bottom sections and provide signage support. Spacing of the intermediate sections shall not exceed 5'-0".

The base of the steel frame shall be elevated above grade a minimum of 4'-0" on concrete pedestals. The reinforced concrete pedestals shall be 2'-6" in diameter.

Foundations shall be provided to resist the applied and self-weight loads on the frame, signage and attachments. Foundation placement must be clear of existing foundations and utilities. Foundations shall be reinforced concrete drilled piers, or reinforced concrete spread footings if below grade obstructions make drilled piers impractical. Offset foundations to accommodate head knocker placement must be structurally adequate. Foundation design soil and subgrade parameters are site specific and shall be determined by the designer.

The steel frame shall have a multi-coat, high-performance epoxy coating. Color shall be Safety Yellow.

12.5.4 Signage

The head knocker frame shall include Caution, Clearance and Stop signs mounted over the clear drive aisle. Each head knocker shall include Pedestrian Warning signs attached to the vertical columns, reflective stripes on the concrete pedestals and a MAA User Authorization sign mounted to the face of the building. The Caution/Clearance/Stop sign shall accommodate surface mounting of signal lights. Signage lettering and colors are as indicated. Signs shall be fabricated from sheet aluminum, with joints as indicated and mounted to the head knocker frame with banding strap and universal channel clamps attached to sign with rivets. Do not screw the signage directly to the head knocker frame. Wall mounted signage shall be screwed directly to the metal panel or masonry exterior wall of the building.

Signage shall be governed by the standards and requirements of the following publications or their subsequent revisions:

FHWA	"Manual on Uniform Traffic Control Devices", 2009 Edition (M.U.T.C.D.)
MDSHA	"Maryland Manual on Uniform Traffic Control Devices", 2011 Edition (MdMUTCD)
AASHTO	"Highway Safety Design and Operations Guide", 1997 Edition
AASHTO	"Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals", 2001 Edition (Category II for all Overhead and Cantilever Sign Structures)

The disposition of existing signage shall be coordinated with BWI Airport Operations.

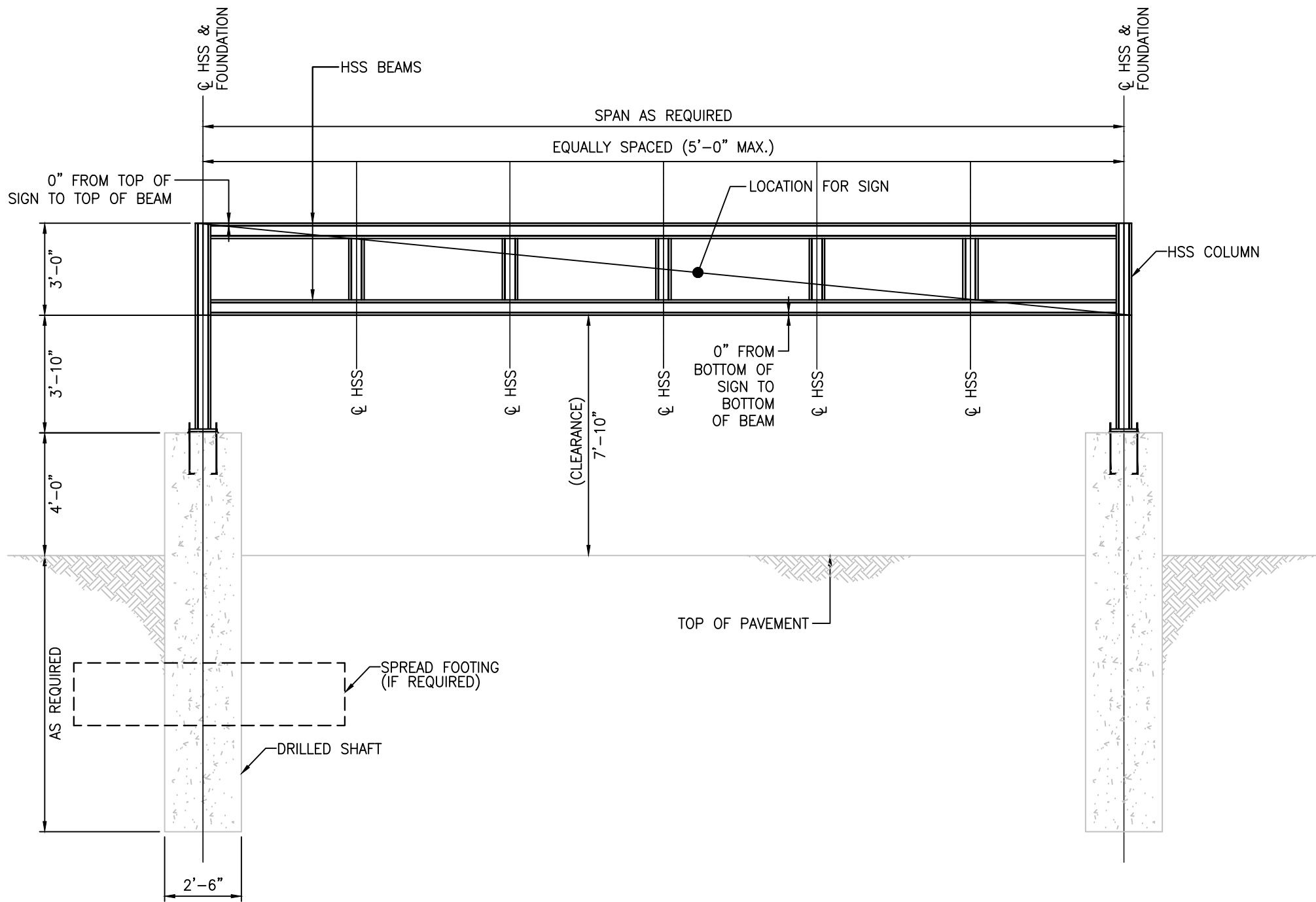
12.5.5 Electrical

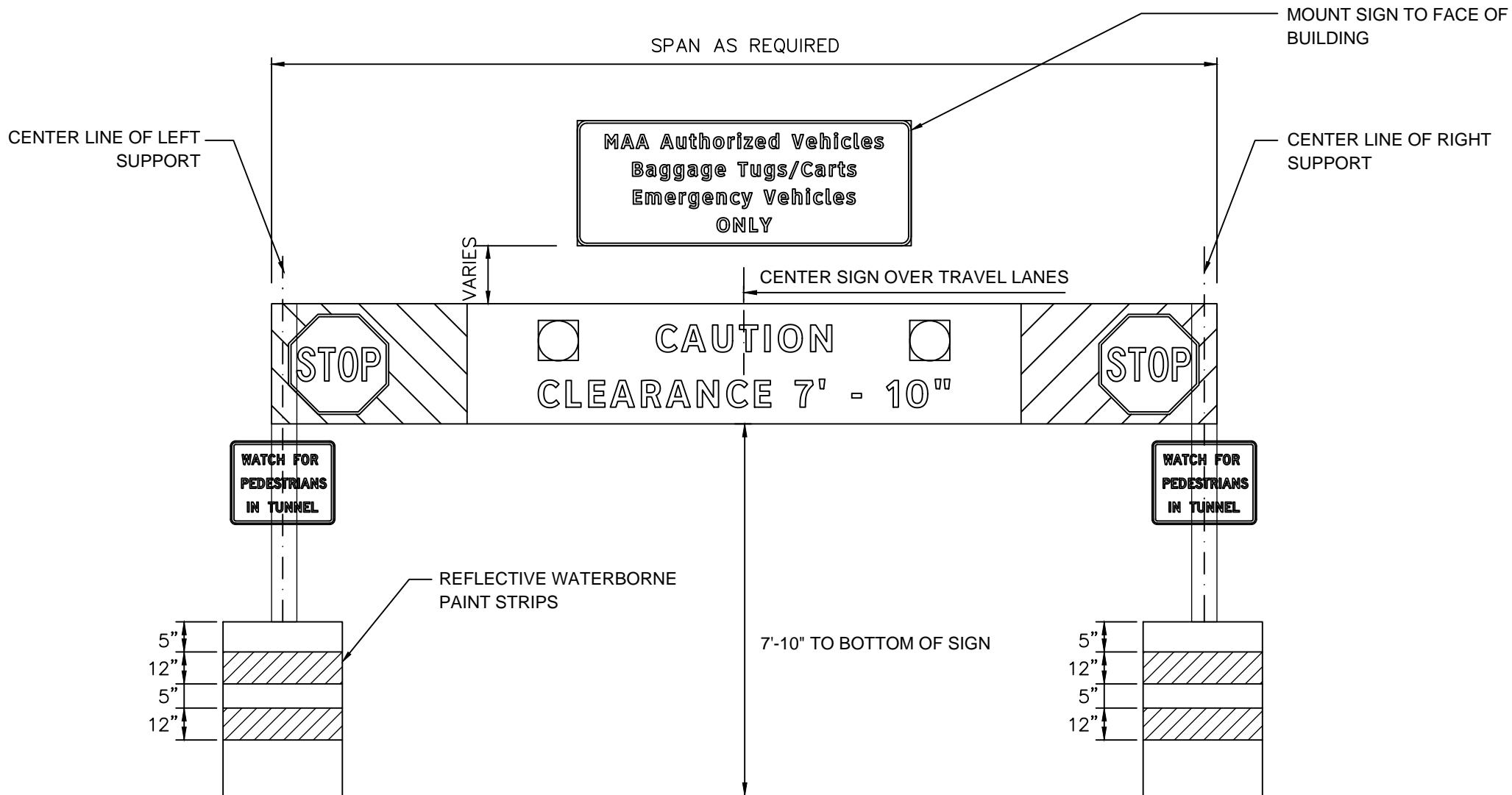
Each head knocker shall be equipped with two 120V red LED flashing 12-inch diameter signal light fixtures with glass lens and aluminum enclosures. The fixtures shall be surface mounted to the signage. Power for the lights shall be provided from the existing signal light circuit or from a nearby panel as required. Wiring shall be copper. All exterior conduits (exposed and underground) shall be rigid galvanized steel and a minimum of 1-inch. Junction boxes shall be cast metal weatherproof type FS. Conduit from the sign frame to the face of the terminal building shall be installed below grade. Do not mount conduit overhead. Conduit shall be surface mounted to the head knocker frame and embedded within the concrete pedestal.

Each head knocker frame shall be grounded with a #8 bare copper conductor and ¾" x 10ft. copper ground rod.

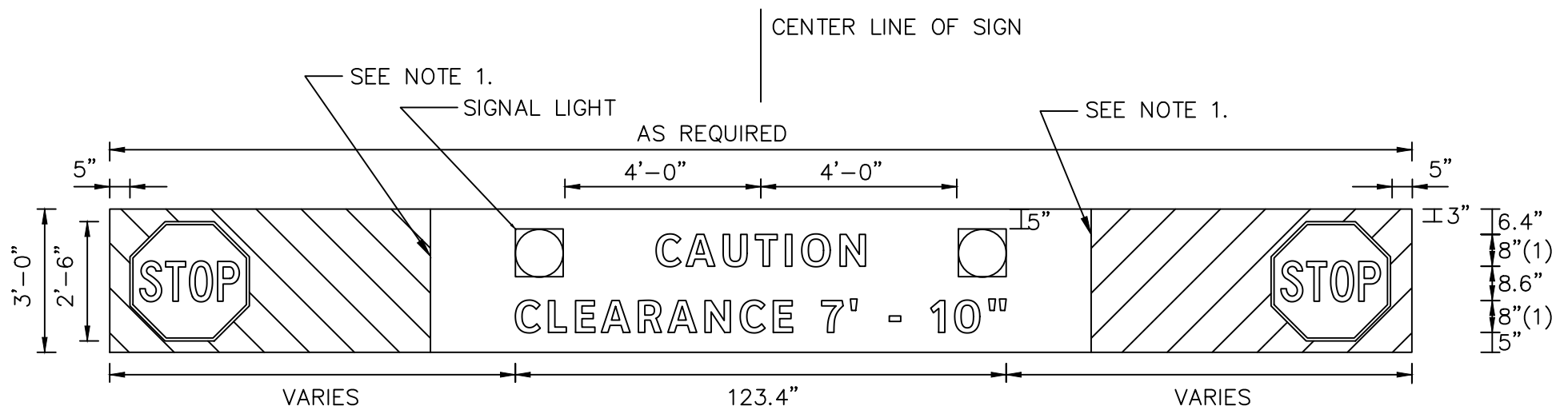
12.5.6 Head Knocker Exhibits and Standard Details

The following pages include standard head knocker elevations and signage details to be utilized for head knocker designs.





NOTE: SIGN ATTACHMENT TO THE STRUCTURE SHALL COMPLY WITH MDSHA STANDARD FOR SIGN SUPPORT ATTACHMENT. SEE STANDARD NO. MD813.08-01 FOR FURTHER DETAILS.



MATERIAL: EXTRUDED ALUMINUM
THICKNESS: 0.125"

NOTE:

1. CONSTRUCT SIGN IN THREE PANELS, PROVIDE JOINT AT TRANSITION FROM CAUTION/CLEARANCE TO STRIPED.
2. CENTER CAUTION/CLEARANCE PORTION OF SIGN OVER TRAVEL LANES.

FONT:

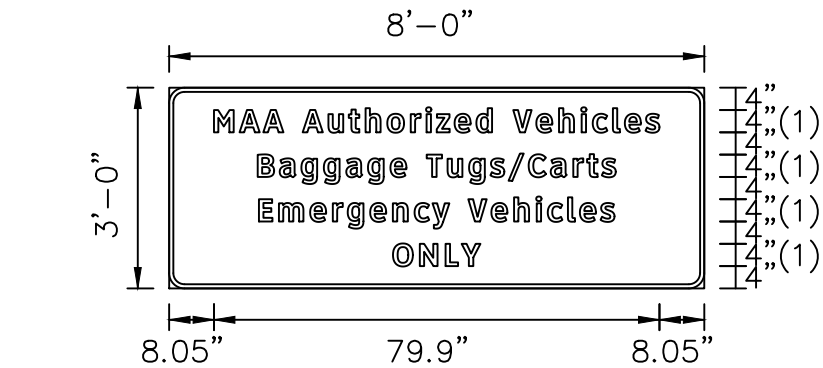
(1) CLEARVIEWHWY-4-B
PANEL STYLE: WARNING_RECTANGULAR.SSI
M.U.T.C.D.: 2009 EDITION

COLORS:

LEGEND - BLACK

BACKGROUND - YELLOW (RETROREFLECTIVE)

STRIPE - BLACK (WIDTH = 4" SPACE=4" @ 45 DEGS)



BORDER:
R 2.75"
TH 0.75"

FONT:

(1) CLEARVIEW HWY-4-B

PANEL STYLE: GUIDE_CON_DESTINATION.SSI

M.U.T.C.D.: 2009 EDITION

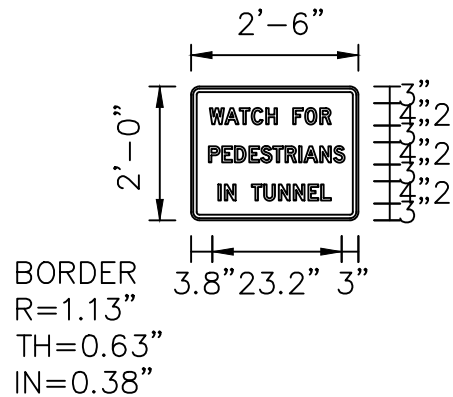
MATERIAL: SHEET ALUMINUM

THICKNESS: 0.125"

COLORS:

LEGEND - BLACK

BACKGROUND - YELLOW (RETROREFLECTIVE)



MATERIAL: SHEET ALUMINUM
THICKNESS: 0.080"

FONT:

(2) CLEARVIEW HWY-1B

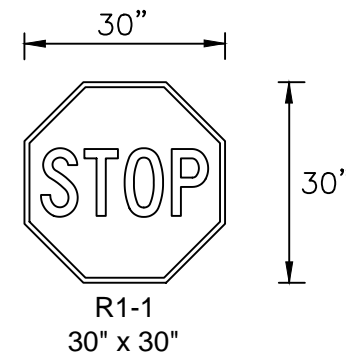
PANEL STYLE: REGULATORY.SSI

M.U.T.C.D.: 2009 EDITION

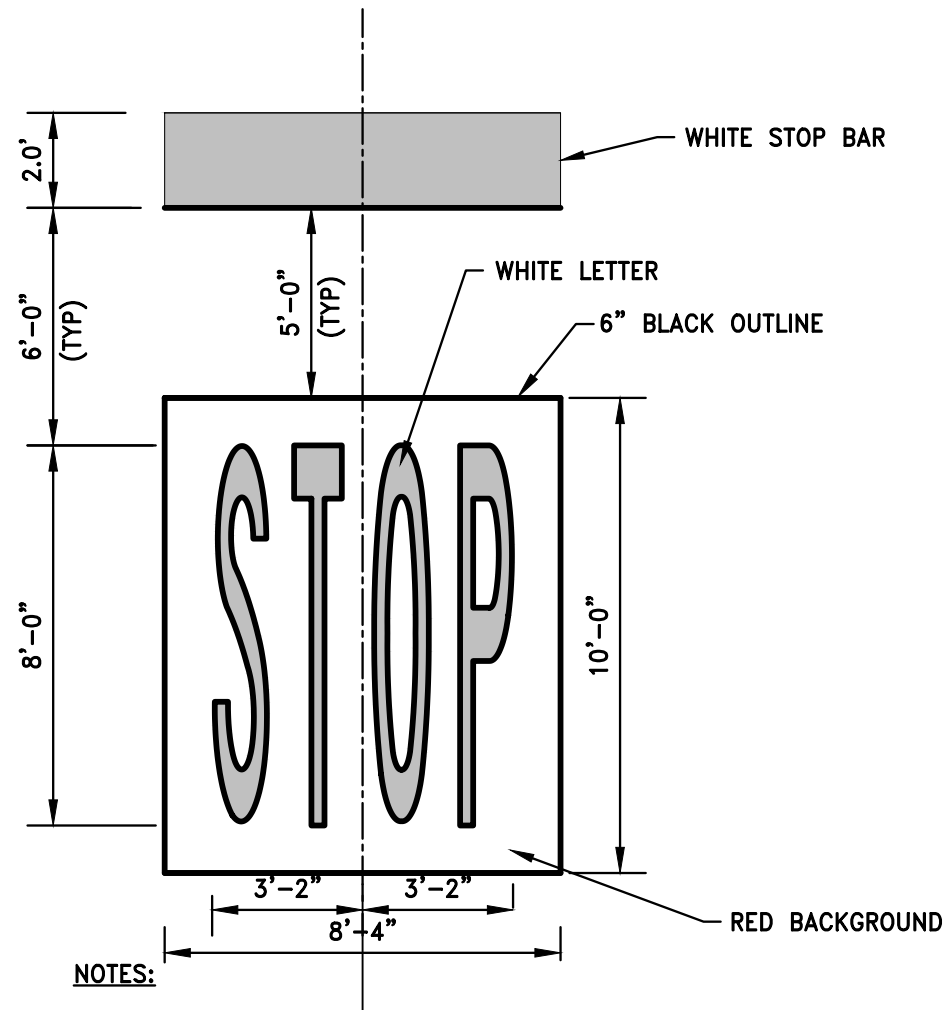
COLORS:

LEGEND - WHITE

BACKGROUND - RED
(RETROREFLECTIVE)



MATERIAL: SHEET ALUMINUM
THICKNESS: 0.080"



NOTES:

1. PAVEMENT MARKINGS SHALL BE THERMOPLASTIC IN ACCORDANCE WITH MDSHA SPECIFICATION MD-553. THE WORD "STOP" SHALL BE INSTALLED WITH GLASS BEADS.
2. CENTER MARKINGS WITHIN LANE.

HEAD KOCKER PAVEMENT MARKING

NOT TO SCALE

CHAPTER 13 HEATING, VENTILATION, AND AIR CONDITIONING (HVAC)

The Chief, HVAC Systems and the DOM must approve the design of proposed mechanical systems. The HVAC system shall be designed in accordance with the Maryland Department of General Services (DGS). The HVAC systems shall be tied to the Facility Management System (FMS) (BWI Marshall only).

13.1 DUCTWORK

13.1.1 Duct Liner

Unless otherwise approved by MAA, duct liners on supply ducts shall not be used. Where sound acoustics are a concern in public spaces, all insulation shall be installed on the exterior of the ductwork.

For critical non-public spaces where noise control is required, duct silencers shall be utilized, where space allows. If space for duct silencers is not available, then only the low velocity ducts shall be lined. No duct liner shall be provided in high velocity ducts, especially in ductwork on the supply to variable air volume terminals.

Return ducts to air handling units from return ceiling plenum spaces may have duct liners if the designer feels they are necessary.

When utilized duct liner shall be installed with anti-microbial products. In addition, reinforcing shall be provided for the liner material to guarantee that the liner will not peel away from the duct wall. All duct liners shall comply with building code and fire code requirements for smoke development and flame spread limits and shall be listed by UL or FM.

13.2 PARTICULATE AIR FILTRATION

Design documents shall require the contractor to install filters to prevent passage of unfiltered air for projects that create excessive dust/demolition adjacent to the terminal building. Construction documents shall locate air handling equipment that requires filtration during construction. The Contractor shall be required to replace filters at cost at the end of construction, as well as replacement of filters during the construction duration, in coordination with MAA Maintenance.

13.3 CO₂ DEMAND VENTILATION

For holdroom, baggage claim, ticketing, and other areas with large assemblies (occupancy), provide demand controlled outdoor air ventilation based on carbon dioxide concentrations within the occupied space, per ASHRAE/IESNA Standard 90.1 – 1999 Users Manual Regarding Ventilation Control with CO₂.

13.4 HVAC PIPE FLUSHING

All newly installed HVAC piping systems shall be cleaned and flushed prior to placing the pipe into operation. These HVAC piping systems include chilled water piping, condenser water piping, high temperature hot water (HTHW) piping, and primary / secondary heating water piping. This design standard is intended to cover HVAC piping installed at BWI Marshall and Martin State Airports as part of the Maryland Aviation Administration capital projects, as well as tenant improvements, and other equipment procurements.

13.4.1 Background

Due to the increase in occurrences of contaminated HVAC piping systems during construction at the Airport, the following standard has been created. It is the intention of this standard to provide Contractors with methods to clean and flush all new HVAC piping prior to placing the piping into operation. This will reduce the chance of damage to the chilled water, HTHW, and heating water systems within the Main Terminal and Central Utility Plant.

13.4.2 Design Specification Requirements:

Add the following in PART 3 of applicable hydronic piping specification sections.

“3.XX CLEANING AND FLUSHING OF PIPING SYSTEMS

- A. The following applies to all temporary and permanent HVAC piping installations, both aboveground and underground. All of the following items must be completed prior to placing new connected HVAC pipes into operation with existing and/or new piping systems. The following items apply to condenser water piping, chilled water piping, high temperature hot water (HTHW) piping, and heating water piping systems.
 - 1. Use clean potable water source. If not available from the Airport’s water supply, then the Contractor must provide his own source of clean potable water. If high volumes of water are to be drawn from the Airport’s water supply system, then the Contractor will provide a strainer to remove sand and grit which may be drawn from this water supply system.
 - 2. The Contractor shall provide temporary pumps and strainers with fine mesh screens to obtain minimum eight (8) feet per second flushing velocity within the HVAC piping systems.
 - 3. ***(This should be deleted if not desired for a particular project. This option may be considered if pre-approved by MAA Maintenance and Engineering, and if the logistics and costs for temporary pumps cannot be easily provided by the Contractor.)*** It may be possible to use existing pumps in the HVAC system, or pumps which are new as part of this project to

obtain the minimum eight feet per second flushing velocity. If the Contractor wishes to utilize any new pumps or existing pumps within the HVAC piping system to obtain the minimum flushing velocity, this must be approved by the Engineer and MAA Maintenance. In addition, the Contractor shall provide additional strainers with fine mesh screens to insert into the existing strainers during flushing operations. Once the flushing is complete, the temporary strainers will be replaced with new strainer inserts matching existing and/or new pumps as utilized. In addition, if the new or existing pumps are used, the Contractor shall replace all pump seals after flushing operations, and then provide an additional set of pumps seals for Maintenance's use.

4. During the flushing operation, the Contractor shall add chemicals (cleaning agent) as necessary to clean all piping process oils and dirt/debris from within the piping systems. These chemicals shall not harm the new piping systems and any connected piping systems, including all valves, pumps, equipment, seals, gaskets, and other items associated with the piping systems. All cleaning agents subject to approval by the Engineer and MAA Maintenance.
5. The cleaning operation for each section of piping installed shall be for a minimum of three (3) hours, or as necessary to completely clean all pipes. This water shall then be drained. Once drained, the piping shall be flushed with clean potable water.
6. *(Delete this item if #3 is selected, or if not necessary due to the size of the piping additions.)* After the cleaning and flushing operations are completed, the Contractor shall provide an additional set of pump seals and strainer inserts for each existing pump in each respective HVAC piping system which has been effected by this project. The pump seals and strainer inserts shall match existing.
7. *(Consider the following for applicable projects with underground piping installations.)* For underground pipes installed, prior to flushing the piping systems as described above, the Contractor shall provide television inspection of the entire pipe installation. This can be accomplished as the pipes are installed in several hundred foot sections (or the limit of the camera equipment used by the Contractor). The Contractor shall provide DVDs of the pipe interiors to show that no (or very minimal) excavation and backfill dirt has entered the piping systems. Two copies of these pipe inspections shall be provided to the Engineer. The DVDs should clearly indicate the date, time, and section of piping being videoed. If these DVDs indicate that there are large amounts of debris within the piping system, the Engineer may either direct the Contractor to open the pipes in the areas of question and clean them out, or have the Contractor re-record the pipe

sections after the pipes are flushed. This will be at no additional cost to the MAA.

- B. The above noted items are minimum requirements for the Contractor to complete to clean and flush the HVAC piping systems. The Contractor is fully responsible for a satisfactory flushing operation. Any damage to existing pumps, boilers, chillers, cooling towers, control valves, and other associated items within the piping systems due to poor flushing and cleaning of the piping systems will be the responsibility of the Contractor. The Contractor shall make all necessary repairs at no additional cost to the Owner.
- C. After flushing and refilling each HVAC piping system, provide chemicals (match existing chemicals used by MAA Maintenance) to bring new piping additions and existing piping system which are effected back to existing Central Plant or Terminal Piping system chemical level conditions. Coordinate introduction and verification of chemical concentrations with MAA Maintenance through the Engineer.”

13.5 HYDROSTATIC WATER PIPE TESTING

Please refer to Section 14.3 for hydrostatic water pipe testing requirements.

13.6 BOILERS AND PRESSURE VESSELS

All Boiler and/or Pressure Vessel installations shall meet the following requirements:

1. As defined by the State of Maryland “Boiler and Pressure Vessel Safety Act,” no Boiler or Pressure Vessel installation may be legally operated that has not been registered and issued a Certificate of Inspection by the Chief Boiler Inspector.
2. The Technical Provisions/Specifications for new and renovation projects at BWI Thurgood Marshall Airport and Martin State Airport shall contain references to COMAR 09.12.01 when applicable. Part I – General Information shall contain a statement of Contractor’s responsibilities, including payment of fees by the Contractor for State inspections.
3. The Technical Specification related to boiler or pressure vessel installation shall include the following statement, “State law requires that the Installer notify the State of Maryland, DLLR not less than 30 days prior to commencement of installation. The Contractor shall fill out and submit the “Notice of Installation” form. The Contractor must also notify the Construction Manager (CM) so that the MAA boiler insurance inspector may be notified.” The information should be included in “Part 3 Execution” of the technical specification.

4. The Technical Specification related to boiler or pressure vessel installation shall include the following statement, “The Contractor shall be responsible for obtaining the Air Quality General Permit to Construct as applicable. A copy of all permit applications, and approvals must be provided to the Environmental Compliance division in the Office of Planning and Environmental Services.” The information should be included in “Part 3 Execution” of the technical specification. The website for the permit can be found below.

The following references are provided for additional Maryland State information/requirements for Boiler and Pressure Vessel Installation:

Maryland Code: Public Safety: Title 12. Building and Material Codes; Other Safety Provisions: Subtitle 9. Boiler and Pressure Vessel Safety Act.
COMAR: Title 09 Department of Labor, Licensing, and Regulation Subtitle 12 Division of Labor and Industry Chapter 01 Board of Boiler Rules (COMAR 09.12.01).
DLLR: www.dllr.state.md.us/labor/boil.html includes links to applicable provisions of the Maryland Code and COMAR.
MDE: www.mde.state.md.us/Permits/AirMangementPermits/AirPermit/index.asp
Forms: State: [Notice of Installation of a Boiler or Pressure Vessel or
www.dllr.state.md.us/forms/boilersnewinstall.xls](http://www.dllr.state.md.us/forms/boilersnewinstall.xls)
ASME: www.asme.org
800-THE-ASME.
State libraries.

13.7 NATURAL GAS PIPING

All Natural Gas Piping installations shall be designed and specified per the following requirements:

1. Material for Natural Gas Piping (above ground and underground) shall be ASTM A 53, Grade B, Schedule 40, Type E or S.
 - a. Protective Coating for Underground Piping: Factory-applied, three-layer coating of epoxy, adhesive, and polyethylene (PE).
2. Material for Underground Natural Gas Piping shall be PE Pipe, ASTM D 2513, SDR 11.
 - a. PE Fittings: ASTM D 2683, socket-fusion type or ASTM D 3261, butt-fusion type with dimensions matching PE pipe.
 - b. PE Transition Fittings: Factory-fabricated fittings with PE pipe complying with ASTM D 2513, SDR 11; and steel pipe complying with ASTM A 53/A 53M, black steel, Schedule 40, Type E or S, Grade B.

3. Natural Gas Piping shall be constructed with threaded joints for gas pressure 5.0 PSIG or less.
4. Natural Gas Piping shall be constructed with welded joints for gas pressure higher than 5.0 PSIG.
5. Corrosion protection shall be provided for gas pipes installed underground, encased in concrete, and in wet or corrosive environments.
6. Exposed gas pipes subject to damage shall be protected. All installations shall follow NFPA 54 and ANSI Z 223.1, Current Editions. Piping installed aboveground shall be securely supported from physical damage by vehicles or hand trucks, dollies, platform trucks, etc. Provide shields, bollards or pipe sleeve to protect exposed gas pipes as required.
7. Exposed natural gas piping shall be protected against mechanical damage in accordance with requirements of NFPA 54-7.2.
8. Comply with NFPA 54 and the International Fuel Gas Code for design, installation and purging of natural-gas piping.
9. Outdoor Natural Gas Piping Installations
 - a. All underground natural-gas piping installations must be buried at least 36 inches below finished grade. If natural gas piping must be installed less than 36 inches below finished grade, it must be installed in an appropriate containment conduit
 - b. Trench Backfill
 1. The gas pipe shall be placed in the trench on top of a minimum of 6 inches of aggregate bedding material, which also extends to 4 inches above the top of pipe and compacted. If the gas pipe is to be installed in an area with new bituminous or concrete pavement, then the aggregate bedding material shall be extended above new gas to the bottom of proposed subbase material. Compaction of earth or aggregate material in pipe trench shall only be accomplished by using hand mechanical tampers until the backfill material has been placed a minimum of 2 feet above the gas pipe.
10. Indoor Natural Gas Piping Installations
 - a. Above Ceiling Installations: Natural-gas piping, fittings, valves, and regulators may be installed in accessible concealed ceiling spaces. Natural gas piping in concealed ceiling spaces does not require containment conduit. Provide proper access in locations where

appropriate for maintenance and shut offs. Natural gas pipes must be identified utilizing permanent labels as required by code.

b. In-Floor Installations

Natural-gas piping may be installed in cast-in-place concrete interior floors with a minimum of 1½ inches of concrete cover. Natural gas piping installed in interior floors must have welded joints and protective coating. All in-floor natural-gas piping installations must be in containment conduits constructed of steel pipe with welded joints. A vent pipe must be provided from containment conduit to outdoors and terminated with weatherproof vent cap cover. Gas pipes shall not be in physical contact with other metallic structures such as reinforcing rods or electrically neutral conductors. Do not embed piping in concrete slabs containing quick-set additives or cinder aggregate. Provide proper access in locations where appropriate for maintenance and shut offs.

c. In-Floor Channels

Natural-gas piping may be installed in floor channels where appropriate and not in public view. Channels must have cover and be open to space above for ventilation.

10. Prohibited Locations:

- a. Natural gas pipes shall not be installed in or through circulating air ducts, clothes or trash chutes, chimneys, or gas vents (flues), ventilating ducts, or dumbwaiter or elevator shafts.
- b. Natural gas pipes shall not be installed in solid walls or partitions.
- c. Natural gas pipes shall not be installed on roofs of any building except branch pipes to roof mounted HVAC equipment. Branch Pipes shall be mounted on pipe stands.
- d. Natural gas pipes shall not be installed on the exterior fascia of any building except where it may need to enter buildings or branch pipes to exterior equipment.
- e. Natural gas pipes shall not be installed in Electrical and Communication Rooms.

11. LABELING AND IDENTIFYING

- a. Underground gas pipes:
 - 1. Detectable Warning Tape: Acid- and alkali-resistant, PE film warning tape manufactured for marking and identifying

underground utilities, a minimum of 6 inches (150 mm) wide and 4 mils (0.1 mm) thick, continuously inscribed with a description of utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches (750) deep; colored yellow.

- b. Aboveground Pipe Labels:
 - 1. Preprinted, color-coded, with lettering indicating service, and showing flow direction.
 - 2. Spaced at maximum intervals of 25 feet along each run, and 2 feet on either side of wall penetrations.

12. VALVE TAGS

- a. Install ceiling tags for above ceiling mounted valves, ceiling tags shall be provided for all kinds of ceilings including suspended ceilings.

13.8 KITCHEN HOODS

“Type I and II Commercial-Kitchen Hoods” shall be designed, fabricated and installed according to this design standard.

During major kitchen renovations, the design engineer should evaluate the existing system(s) to determine if it complies with MAA adopted codes and standards. Analysis on the existing system shall be included in the design documents. If the system does not comply, the designer shall meet prior to design document submission with office of Fire Marshal (OFM), Office of Maintenance and Utilities (OMU), and the MAA project manager to determine the extent of upgrading to operate the system(s) safely and within code compliance.

13.8.1 Design, Fabrication and installation of kitchen hoods

Kitchen hoods shall be designed, fabricated, installed, and tested in accordance with NFPA 96 and approved manufacturers’ design guidelines.

13.8.2 Type I Exhaust Hood Design

Designers shall review and include the following requirements in the contract documents regarding design of Type I exhaust hoods:

- 1. The rate of supply airflow (CFM) from make-up air unit shall be 80% of the exhaust airflow (CFM). Balance between the make-up airflow and exhaust airflow shall be provided through the building air distribution system and rooftop or air handling unit(s), dedicated for the dining and kitchen areas. Provide table of devices/ equipment and air balance in accordance with air balance schedule as included in this DST.

2. Overall kitchen and dining areas shall be negative versus other spaces, including corridors, offices and hold rooms.

13.8.3 Type II Exhaust Hood Design

Designer shall include the following requirements in the contract documents regarding operation of Type II exhaust hoods:

1. Make up air shall be provided by the building air distribution system or by a dedicated outdoor make up air unit where required by MAA, Office of Maintenance and Utilities (OMU). Designer shall coordinate with OMU during the design or major renovations of type II exhaust hoods.
2. Hood Controls shall be a hood or wall mounted control cabinet. Sequence of operation shall be as follows:
 - a. Exhaust Fan: On-off switches shall start and stop the exhaust fan.
 - b. Interlock the exhaust fan with any cooking appliances located under the kitchen hood to begin ventilation when the cooking appliances are turned on.
 - c. Interlock the exhaust fan with make-up air unit if provided.

13.8.4 Air Balance

Include air balance schedule for the kitchen and dining areas per the Air Balance Schedule on the following pages.

13.9 EXHAUSTS AIR DUCTS AND EXHAUST FANS FOR KITCHEN HOODS

“Exhaust and Make-up Air Ducts and Exhaust Fans for Commercial-Kitchen Hoods” shall be designed, fabricated, installed, and tested according to this design standard.

During major kitchen renovations, the design engineer should evaluate the existing system(s) to determine if it complies with MAA adopted codes and standards. Analysis on the existing system shall be included in the design documents. If the system does not comply, the designer shall meet prior to design document submission with office of Fire Marshal (OFM), Office of Maintenance and Utilities (OMU), and the MAA project manager to determine the extent of upgrading to operate the system(s) safely and within code compliance.

13.9.1 Design, Fabrication and Installation of exhaust system(s) and exhaust fans

Exhaust system(s) and exhaust fans shall be designed, fabricated, and installed in accordance with NFPA 96 and approved manufacturers’ design guidelines.

Date: _____

Air Balance Schedule- Kitchen area/ Dining Area							
Unit/ Area	OA, provided	OA, Required	SA	RA	EA	Balance	Remarks
Hood MAU							
Exhaust Fan(s)							
Kitchen RTU/AHU							
Dining area RTU/AHU							
Airport Central Air system: VAV's or Const. air to kitchen/ dining areas							
Transfer air from other areas							
Total for OA							
Total for EA							
Total for SA							
Total for RA							

Abbreviation:

MAU	Make up Air unit
RTU	Rooftop Unit
AHU	Air Handling Unit
VAV	Variable Air volume
Const. Air	Constant Air
OA	Outside Air
SA	Supply air
RA	Return air
EA	Exhaust Air

CHAPTER 14 PLUMBING

14.1 BACKFLOW PREVENTERS

All Compartment Sinks, Mop, and Service Sinks installed shall be equipped with backflow preventers in accordance with the following requirements:

1. Backflow preventers shall be installed on cold and hot water lines that serve sinks.
2. Backflow preventers shall be double check valve type, equal to Watts, Model 9D.
3. Backflow preventers shall be equipped with integral strainer, ball shut off valves, and drain connection.
4. Backflow preventers shall be all bronze construction with stainless steel internal parts.

14.2 GREASE INTERCEPTORS

All food and beverage facilities and other facilities where liquid containing grease is discharged into the sanitary sewer system shall be equipped with Automatic Grease Interceptors:

1. Grease Interceptors shall be automatic grease recovery type made of 304 Stainless Steel and internally lined with molded polyethylene equipped with the following devices:
 - a. Rotating gear hydrophobic wheel assembly for automatic grease or oil removal.
 - b. Integral flow control device.
 - c. Self-regulating enclosed electric immersion heater.
 - d. Vent connection.
 - e. Integral gas trap.
 - f. Programmable 24-hour multi-event time control.
 - g. Gasket and fully removable 304 Stainless Steel lid.
 - h. Electric motor with thermal overload protection and automatic reset switch.
 - i. Removable solids strainer basket.

- j. Removable translucent collection container.
- 2. Grease Interceptors shall be Big Dipper as manufactured by Thermaco or approved equal.
- 3. Grease Interceptors shall be floor mounted.
- 4. Grease Interceptors shall be designed and located with sufficient clearances and space for service and maintenance.

14.3 HYDROSTATIC WATER PIPE TESTING

14.3.1 General

- 1. Use ambient temperature water as a testing medium unless there is risk of damage due to freezing.
- 2. Provide temporary restraints for expansion joints that cannot sustain reactions due to test pressure.
- 3. Isolate equipment from piping.
- 4. Install safety valve, set at a pressure of no more than one-third higher than test pressure, to protect system during test.
- 5. Provide signs where piping is under hydrostatic pressure.
- 6. Test pressure during examination shall be monitored and adjusted for the corresponding ambient temperature.
- 7. Prepare test and inspection report.

14.3.2 Hydronic Piping

- 1. Isolate expansion tanks and determine that hydronic system is full of water.
- 2. Subject piping system to hydrostatic test pressure that is not less than 1.5 times the system's working pressure. Test pressure shall not exceed maximum pressure for any vessel, pump, valve, or other component in system under test. Verify that stress due to pressure at bottom of vertical runs does not exceed 90 percent of specified minimum yield strength or 1.7 times "SE" value in Appendix A in ASME B31.9, "Building Services Piping."

3. After hydrostatic test pressure has been applied for at least 30 minutes, examine piping, joints and connections for leakage. Eliminate leaks by tightening, repairing, or replacing components, and repeat hydrostatic test until there are no leaks.

14.3.3 Domestic Water Piping

1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired.
2. Isolate test area. Subject piping to static water pressure of 50 psig (345 kPa) above operating pressure without exceeding pressure rating of piping system materials, and allow to stand for 4 hours. Leaks and loss in test pressure constitute defects that must be repaired.

CHAPTER 15 FIRE SUPPRESSION SYSTEMS

15.1 FIRE SUPPRESSION SYSTEMS

Fire protection equipment shall be reviewed and approved by the OFM.

15.1.1 Sprinkler Systems

15.1.1.1 Dry Pipe Sprinkler Systems

Dry pipe sprinkler systems are for areas subject to freezing, such as Parking Garages, Baggage Make-up areas, and unheated building spaces such as intake plenums, hangars, storage spaces, etc. This design standard is intended to cover dry sprinkler systems installed at BWI Marshall and Martin State Airports as part of the MAA capital projects as well as tenant improvements, and other equipment procurements.

1. All dry sprinkler piping NPS 2-inch and smaller: Galvanized, standard weight (Schedule 40) steel pipe with threaded ends; cast- or malleable-iron (galvanized) threaded fittings; and threaded joints.
2. All dry sprinkler piping NPS 2-1/2 inches to NPS 8-inches: Galvanized, standard weight (Schedule 40) steel pipe with grooved ends; steel, grooved-end (galvanized) fittings; steel, keyed couplings; and grooved joints. Gasket seals for grooved end couplings shall be approved by the pipe manufacturer for dry pipe applications.
3. All dry sprinkler piping NPS 10 inches or larger: Galvanized, (Schedule 30) steel pipe with grooved ends; steel, grooved-end (galvanized) fittings; steel, keyed couplings; and grooved joints. Gasket seals for grooved end couplings shall be approved by the pipe manufacturer for dry-pipe service applications.

15.1.1.2 Sprinkler for Dumpsters and Chutes

1. Vertical chutes shall be protected by automatic sprinklers in accordance with NFPA 13 and 82.
2. Provide sprinkler head above the top service opening of the chute.
3. Provide additional sprinklers as required by NFPA 13.
4. Intermediate sprinkler heads shall be recessed type.
5. Sprinkler heads shall be dry type heads suitable for use in areas subject to freezing.

6. Sprinkler heads shall be accessible. Provide access panels on chutes and enclosures per NFPA 82.

15.1.2 Fire Hydrants

Fire hydrants shall be designed and installed in accordance with the requirements of NFPA 1141 and NFPA 24 and shall be located so that fire hoses connected to the hydrant shall not impede streets, roadways, et cetera.

15.1.2.1 Description

Fire hydrant installation shall include, but not necessarily be limited to, furnishing and installing fire hydrants or relocation of fire hydrants in accordance with the Contract Documents. All materials for fire hydrant installation or relocation will be furnished by the Contractor. (See attached Above Ground Fire Hydrant Setting Detail within the following pages).

15.1.2.2 Related Work Specified Elsewhere

1. Trench excavation, backfill, and compaction;
2. Water pipe, fitting, and appurtenance installation;
3. Water valve and appurtenance installation.

15.1.2.3 Referenced Standards From National Fire Protection Association (NFPA)

The most recent edition of the following NFPA applies to these Specifications.

13 - Installation of Sprinkler Systems

24 - Private Fire Service Mains

170 - Standard for Fire Safety Symbols

291 - Fire Flow Testing and Marking of Hydrants

1963 - Fire Hose Connections

15.1.2.4 Quality Assurance

1. Materials

The contractor will inspect all materials before and after installation to ensure compliance with the Contract Documents.

2. Field Tests

- a. Fire hydrants installed at the same time as a new water main shall be tested, after installation, by the Contractor, along with the water main, in accordance with following standards that apply: NFPA 13, 24, and 291.
- b. Fire hydrants installed on an existing water main shall be visually inspected by the OFM before the excavation is backfilled. The hydrant, valve, and connecting pipe shall be leak free under line pressure when tested in accordance with NFPA 24 pressure testing requirements. The installing Contractor shall furnish a completed "Contractor's Material and Test Certificate for Underground Piping" to the OFM at the time of inspection (see Exhibit on the following pages).
- c. A flow test shall be conducted in accordance with NFPA 24 by the contractor and witnessed by the OFM. The Contractor must request the inspection at least 48 hours prior to the anticipated date of testing.

15.1.2.5 Submittals

1. Shop drawings shall be submitted as specified in the "Maryland Aviation Administration Standard Provisions for Construction Contracts" for the fire hydrants furnished, and shall include the following information: Production description, parts list, valve and hose connection sizes, operating nut style, and direction of opening.
2. All submittals shall be subject to OFM approval.

15.1.2.6 Fire Hydrants

1. The Contractor may furnish fire hydrants manufactured by American Darling, Model B-62-B; Kennedy Valve, Model K-81-A; or Mueller, Super Centurion 250.
2. Hydrant valve opening shall be at least 5-inch diameter, net. Inlet connection shall be 6-inch mechanical joint with accessories (glands, plain rubber gaskets, and stainless steel bolts and nuts).
3. Hose connections shall consist of two 2 1/2 -inch diameter hose connections and one 4 1/2 -inch diameter steamer or pumper connection threaded as follows: the 2 1/2 -inch nose nozzles shall have National Standard threads and the pumper connection shall have:
 - a. 4-1/2" NST outlet, for hydrants being installed on the public (non-air) side of the Terminal.
 - b. 5" Storz connections, for hydrants being installed on the (ramp) airfield side of the Terminal. (see the following details).

4. Operating nut shall be 5 sided, 1 5/16 inches from point to flat, and shall turn left (counterclockwise) to open.
5. Outer casting shall be one-piece cast iron, designed to permit its extension without excavating.
6. Hydrant design shall be such that when the barrel is broken, it may be replaced without excavating or breaking adjacent pavement; that the entire barrel, including all working parts, along with the main and waste valve seats, may be removed for inspection or repair without excavating or disturbing the ground; and that underground flanges with bolts and nuts are eliminated.
7. The main valve seal shall be compression type sealing against a bronze seat and the valve shall open against pressure.
8. Between elbow and top cap, the barrel shall be made in two parts connected by a swivel segment to permit facing the nozzles in any direction.
9. Bonnet shall be bolted to the standpipe and shall have cast on the top an arrow and the word "Open" indicating the direction for opening.
10. A self-opening drain valve shall be provided.
11. All hydrant caps shall be provided with chains that will not rust. Chains shall not be painted.
12. For ramp-side hydrants, Fire Hydrant shall be set within a gravel or crushed stone drainage, well extending the full width of the trench.
13. Hydrant leads shall be laid level on a firm foundation to ensure that the hydrant is set plumb. Backfill around the hydrant shall be compacted so as to obtain a density of at least 95% of maximum when measured in accordance with AASHTO T180, Method D.
14. Where hydrants are to be relocated, the Contractor shall ascertain whether or not the hydrant valve has been restrained before removing the hydrant to be relocated. The lead pipe shall be capped and blocked so that service can be restored to the parent main pending the removal or plugging of the mainline tee.
15. The outside of all fire hydrants above the breakaway flange shall be painted with two coats of OSHA orange industrial enamel paint, as manufactured by Sherwin Williams, or equal. The riser pipe from ground to breakaway flange shall be painted with two coats gloss black industrial enamel paint as

manufactured by Sherwin Williams, or equal before installation. The Hydrant bonnet shall be painted to indicate its gallons per minute (GPM) per NFPA 291.

16. International Symbol Signs meeting the requirements of NFPA 170 shall be attached on the Terminal siding located 10 feet above the ramp side fire hydrants, each as a 10" by 10" white on red reflective symbol sign. (See attached NFPA 170 Fire Safety Symbols).

15.1.2.7 Fire Hydrant Installation

1. Gravel or crushed stone for hydrant foundation shall meet the gradation requirements of AASHTO M 43, Size Number 57.
2. Fire hydrants shall be installed and restrained in accordance with NFPA 24, at the locations shown, and to elevations directed by the Engineer. Hydrants

15.1.2.8 Underground Fire Hydrants (Non-Aircraft Loading Areas)

Flush type fire hydrants shall be Mueller or approved equal with a 5 sided 5/16" operating nut, two 2½" diameter hose connection (with National Standard threads) and a 4½" diameter steamer or pumper connection (with Baltimore City threads).

Flush box shall be constructed of ASTM A126 Class B cast iron, with "Fire Hydrant" wording cast in cover.

15.1.2.9 Underground Fire Hydrants (Aircraft Loading Areas)

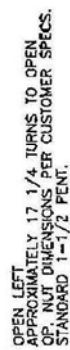
Flush type fire hydrants shall be Mueller or approved equal with a 5 sided 5/16" operating nut, two 2½" diameter hose connection (with National Standard threads) and a 5" diameter Storz pumper connection.

Designer shall provide details for a reinforced concrete structure around the underground fire hydrant. The cover shall be 36" x 36" Model HLC-4 by Bilco or equal, suitable for aircraft loading. Structure shall have a door with flush mounted hinges and stainless steel hardware, spring cushion operators, and hold open arm. Cover shall be painted red with a white Fire Hydrant Symbol, which is a minimum 2 feet long, painted to match the NFPA 170 Figure 4-2.5 (See the following exhibits).

15.1.2.10 Construction Phasing for Fire Hydrants and Water Mains

In accordance with Title 29 06.01, State Fire Prevention Code, the following applies to new construction: Section 41-2, Fire Safety During Construction, subsection 41-2.3.2, Water Supply – "Where underground water mains and

hydrants are to be provided, they shall be installed, completed, and in service prior to construction work.” OFM will allow the pad to be installed and the steel to be erected prior to the underground water mains and hydrants being in service.



(SAMPLE DRAWING)

SEE CAT. RECORD FOR RESPECTIVE PARTS OR SUB. ASS'YS

NOTE: SIZE AND STYLE OF OPERATING NUT, SHOE SIZE, AND
THREADING OF NOZZLES IS PER CUSTOMER SPECS.

ITEM	DESCRIPTION	QTY	MATERIAL	UNIT	CLASS 5
1	VALVE NUT	1	PAST IRON	1-10	
2	VALVE NUT SEAL	1	RUBBER		
3	HEX NUT	8	STEEL		
4	HEX NUT	1	STEEL		
5	SAFETY O-RING	2	RUBBER	1/2-200	
6	STAINLESS FLANGE NUT	8	STEEL	1/2-200	
7	DOWN RING HOUSING O-RING	1	RUBBER	1/2-200	
8	SLAVE	1	COPPER	1/2-200	
9	UPPER STEM PIN	1	STEEL	1/2-200	
10	HEX BOLT	6	STEEL	1/2-200	
11	HEX NUT	6	STEEL	1/2-200	
12	SHOE	1	DUCT IRON	1/2-200	



NOT TO SCALE

4-2.5* Fire Hydrant (All Types).

Characteristics: Square field; red background; white symbol.

Application: The identification and location of a fire hydrant.

Example: The location of fire hydrants, wall hydrants, underground hydrants, or other fire-fighting water supplies.

4-2.6 Automatic Sprinkler Control Valve.

Characteristics: Square field; red background; white symbol.

Application: The identification and location of an automatic sprinkler control valve.

Examples:

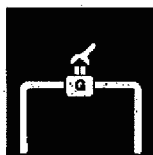
- The location of control valves for automatic sprinkler systems.
- On doors of rooms containing control valves.

4-2.7 Electric Panel or Electric Shutoff.

Characteristics: Square field; blue background; white symbol.

Application: The identification and location of an electrical panel or other electric shutoff device.

Example: The location of electric panels or other electric control devices that can be located in basements or mechanical rooms.

4-2.8 Gas Shutoff Valve.

Characteristics: Square field; red background; white symbol; red letter G.

Application: The location of a gas shutoff valve.

Examples:

- The location of gas shutoff valves.
- On doors of rooms containing gas shutoff valves.

4-2.9 Fire-Fighting Hose or Standpipe Outlet.

Characteristics: Square field; red background; white symbol.

Application: The location of a fire-fighting hose or a standpipe outlet.

Examples:

- The location of interior fire-fighting hose stations and standpipe outlets in buildings and structures.
- The location on bridges or elevated highways.

4-2.10 Fire Extinguisher.

Characteristics: Square field; red background; white symbol.

Application: The location of a fire extinguisher.

Example: The location of fire extinguishers in buildings and exterior locations.

4-2.11 Directional Arrow.

Characteristics: Square field; background (red or blue) to correspond to accompanying sign; or white symbol.

Application: Direction to the location of fire-fighting equipment or utility. Always used in conjunction with, and adjacent to, another symbol indicating the particular equipment or utility.

4-2.12 Diagonal Directional Arrow.

Characteristics: Square field; background (red or blue) to correspond to accompanying sign; white symbol.

Application: Direction to the location of fire-fighting equipment or utility. Always used in conjunction with, and adjacent to, another symbol indicating the particular equipment or utility.

Contractor's Material and Test Certificate for Underground Piping

PROCEDURE

Upon completion of work, inspection and tests shall be made by the contractor's representative and witnessed by an owner's representative. All defects shall be corrected and system left in service before contractor's personnel finally leave the job.

A certificate shall be filled out and signed by both representatives. Copies shall be prepared for approving authorities, owners, and contractor. It is understood the owner's representative's signature in no way prejudices any claim against contractor for faulty material, poor workmanship, or failure to comply with approving authority's requirements or local ordinances.

Property name		Date	
Property address			
Plans	Accepted by approving authorities (names)		
	Address		
	Installation conforms to accepted plans <input type="checkbox"/> Yes <input type="checkbox"/> No Equipment used is approved <input type="checkbox"/> Yes <input type="checkbox"/> No If no, state deviations		
Instructions	Has person in charge of fire equipment been instructed as to location of control valves and care and maintenance of this new equipment? If no, explain <input type="checkbox"/> Yes <input type="checkbox"/> No		
	Have copies of appropriate instructions and care and maintenance charts been left on premises? If no, explain <input type="checkbox"/> Yes <input type="checkbox"/> No		
Location	Supplies buildings		
Underground pipes and joints	Pipe types and class		Type joint
	Pipe conforms to _____ standard <input type="checkbox"/> Yes <input type="checkbox"/> No Fittings conform to _____ standard <input type="checkbox"/> Yes <input type="checkbox"/> No If no, explain		
	Joints needing anchorage clamped, strapped, or blocked in accordance with _____ standard <input type="checkbox"/> Yes <input type="checkbox"/> No If no, explain		
Test description	<p>Flushing: Flow the required rate until water is clear as indicated by no collection of foreign material in burlap bags at outlets such as hydrants and blow-offs. Flush at flows not less than 800 gpm (1478 L/min) for 4 in. pipe, 880 gpm (3331 L/min) for 6 in. pipe, 1560 gpm (5905 L/min) for 8 in. pipe, 2440 gpm (9235 L/min) for 10 in. pipe, and 3520 gpm (13,323 L/min) for 12 in. pipe. When supply cannot produce stipulated flow rates, obtain maximum available.</p> <p>Hydrostatic: All piping and attached appurtenances subjected to system working pressure shall be hydrostatically tested at 200 psi (13.8 bar) or 50 psi (3.4 bar) in excess of the system working pressure, whichever is greater, and shall maintain that pressure \pm 5 psi for 2 hours.</p> <p>Hydrostatic Testing Allowance: Where additional water is added to the system to maintain the test pressures required by 10.10.2.2.1, the amount of water shall be measured and shall not exceed the limits of the following equation (For metric equation, see 10.10.2.2.4):</p> $L = \frac{SD\sqrt{P}}{148,000}$ <p> L = testing allowance (makeup water), in gallons per hour S = length of pipe tested, in feet D = nominal diameter of the pipe, in inches P = average test pressure during the hydrostatic test, in pounds per square inch (gauge) </p>		
Flushing tests	New underground piping flushed according to _____ standard by (company) <input type="checkbox"/> Yes <input type="checkbox"/> No If no, explain		
	How flushing flow was obtained <input type="checkbox"/> Public water <input type="checkbox"/> Tank or reservoir <input type="checkbox"/> Fire pump		Through what type opening <input type="checkbox"/> Hydrant butt <input type="checkbox"/> Open pipe
	Lead-ins flushed according to _____ standard by (company) <input type="checkbox"/> Yes <input type="checkbox"/> No If no, explain		
	How flushing flow was obtained <input type="checkbox"/> Public water <input type="checkbox"/> Tank or reservoir <input type="checkbox"/> Fire pump		Through what type opening <input type="checkbox"/> Y connection to flange and spigot <input type="checkbox"/> Open pipe

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NFPA 24 (p. 1 of 2)

FIGURE 10.10.1 Sample of Contractor's Material and Test Certificate for Underground Piping.

SHEET TITLE: CONTRACTOR'S MATERIAL AND TEST CERTIFICATE
FOR UNDERGROUND PIPING

DATE: JULY 2009

Hydrostatic test	All new underground piping hydrostatically tested at _____ psi for _____ hours		Joints covered <input type="checkbox"/> Yes <input type="checkbox"/> No	
Leakage test	Total amount of leakage measured _____ gallons _____ hours			
	Allowable leakage _____ gallons _____ hours			
Hydrants	Number installed	Type and make	All operate satisfactorily <input type="checkbox"/> Yes <input type="checkbox"/> No	
Control valves	Water control valves left wide open If no, state reason		<input type="checkbox"/> Yes <input type="checkbox"/> No	
	Hose threads of fire department connections and hydrants interchangeable with those of fire department answering alarm		<input type="checkbox"/> Yes <input type="checkbox"/> No	
Remarks	Date left in service			
Signatures	Name of installing contractor			
	Tests witnessed by			
	For property owner (signed)	Title	Date	
	For installing contractor (signed)	Title	Date	
Additional explanation and notes				
<div style="display: flex; justify-content: space-between;"> © 2007 National Fire Protection Association NFPA 24 (p. 2 of 2) </div>				

FIGURE 10.10.1 Continued

SHEET TITLE: CONTRACTOR'S MATERIAL AND TEST CERTIFICATE
FOR UNDERGROUND PIPING

DATE: JULY 2009

15.1.3 Signature and Seal Requirements of Fire Protection Systems Design Documents and Reports

The following requirements shall be incorporated into the design and specifications of all projects at BWI Marshall and MTN Airports that include fire protection systems as defined herein:

Signature and Seal of Fire Protection and Fire Code Related Documents:

1. A qualified Professional Engineer who is a fire protection engineer shall be an integral part of the design team, and shall be involved in every aspect of the design as it relates to fire protection systems, smoke control design, and egress analysis. Sealing of design documents or reports which are prepared in accordance with this Section shall indicate that the documents are in compliance with applicable fire related codes and standards to the best of the engineer's knowledge and belief.
2. For the purpose of meeting this requirement, a qualified fire protection engineer is defined as an individual meeting one of the following conditions:
 - A Professional Engineer (PE) having a Bachelor of Science or Master of Science degree in Fire Protection Engineering from an ABET accredited university engineering program, plus a minimum of three (3) years work experience in fire protection engineering, and who provides written evidence of such experience to the OFM for review and acceptance of qualifications of experience.
 - A Professional Engineer who has passed the National Council of Examiners for Engineering and Surveys (NCEES) fire protection engineering written examination.
 - A registered PE in a closely related engineering discipline, with a minimum of five (5) years of applicable experience dedicated to fire protection engineering, and who provides written evidence of such experience to the OFM for review and acceptance of qualifications in the field of fire protection engineering, and whose documentation of experience is acceptable to the OFM.
3. Sealing Requirements: Fire protection and detection system(s) plans, specifications, drawings, submittals, shop drawings, reports, or other documents shall be signed and sealed, as required, pursuant to the Business Occupations and Professions Article, Section 14-403, Annotated Code of Maryland.

Application:

The design of the fire protection systems, special systems, and egress analysis, shall meet the requirements of Items 1, 2, and 3 above. The construction contract documents shall require the construction contractor's Fire Protection

Engineer sign and seal the fire protection system(s) design and any revision, in accordance with Item 3 above.

The following types of systems are considered fire protection systems for purposes of this Section:

- Fire Suppression Systems
- Fire Detection Systems
- Special Fire Protection Systems
- Smoke Control and Smoke Removal Systems
- Egress and Evacuation Systems (Specification Based or Performance Based Analysis)

Fire Suppression Systems

Fire protection system(s) include, but are not limited to: wet sprinkler systems, dry sprinkler systems, deluge systems, pre-action or fire cycle systems, dry chemical systems, wet chemical systems, carbon dioxide systems, clean agent systems, foam systems, and fire standpipe systems

A waiver of the above requirements for PE signature and seal may be requested for the design/renovation of wet sprinkler system(s) not exceeding 10 heads. This request shall be put in writing to the OFM.

Fire Detection Systems

A fire detection system shall be defined as a system that detects the presence of smoke, heat, and fire. This system shall send a signal to the main fire alarm panel and then activate occupant notification systems and alert the fire department. Fire detection system(s) include, but are not limited to: smoke detectors, heat detectors, pull stations, water flow switches, infrared detectors, beam detectors, horns and strobes, control modules, and monitor modules, smoke and heat detection systems, and flame detection systems.

The design of fire detection systems shall meet the requirements of 1, 2, and 3 above. Fire detection system(s) shall be designed and certified by the Consultant/Engineering firm preparing the construction contract documents prior to advertisement. The Consultant/Engineering firm, prior to issuance to the Contractor, shall certify any subsequent changes/revisions to the design.

A waiver of signature and seal requirements may be requested for the design/renovation of small system(s). This request shall be put in writing to the OFM. If a waiver is granted, the minimum stamp and signature required shall be NICET (National Institute for Certification in Engineering Technologies) Level III.

If the fire detection system is integrated or connected to the special fire protection system, no waiver will be granted.

Special Fire Protection Systems

A special fire protection system shall be defined as a system that is connected to, or controlled by the base fire detection system. Special fire protection system(s) include, but are not limited to: fire cycle or pre-action sprinkler systems, mist suppression systems, “clean agent” suppression systems.

Smoke Control and Smoke Removal Systems

Analysis shall include adequate calculations, details, and narrative of intended function and design rationale **of all** smoke removal systems and stair pressurization systems to demonstrate compliance with IBC Chapter 9 and NFPA 92A, and shall be subject to review and acceptance by the OFM.

Egress Analysis and Reports

Egress analysis shall include evaluation of spaces, or buildings, for compliance with all applicable emergency egress provisions of the currently adopted Editions of the NFPA Life Safety Code and the International Building Code, and other relevant codes and standards that apply. The analysis shall include emergency egress capacity, evacuation times (if applicable), travel distances, exit configuration, and all other fire protection aspects of egress design. The analysis shall be in written form and shall include all calculations that support the conclusions of the analysis.

Performance Based Egress Analysis

Performance based egress analysis, performed in accordance with NFPA 101, is permitted by the OFM, subject to a review of the qualifications of the preparer in accordance with the requirements of this Section. The OFM shall determine acceptance of the analysis for applicability to the conditions being evaluated. Contact the OFM for guidance.

15.2 FIRE ALARM AND LIFE SAFETY

15.2.1 BWI Marshall Fire Alarm System

The Maryland Aviation Administration (MAA) has adopted the Honeywell Fire Alarm system for BWI Marshall. All applicable contracts shall include the Honeywell Fire Alarm system as a sole source specification. The specified Honeywell Fire Alarm System should function, operate and be compatible with the existing BWI Marshall Fire Alarm system.

The specification should require the Contractor to submit a copy of the as-built fire alarm and sprinkler systems drawings to the Engineer for the BWI Marshall Fire Rescue Department (FRD).

The specifications should require the Contractor to design and submit to the Engineer a copy of the sprinkler layout on AutoCADD file on CD for the BWI Marshall Fire Rescue Department. The Contractor should also design and submit a copy of the fire alarm system floor plans on AutoCADD file on CD to the Engineer for Honeywell to

update the Fire Alarm Central Graphic Computer. All components of the fire alarm system shall be UL or FM listed.

15.2.2 Building Access Control

15.2.2.1 *Knox Box System*

All building contract documents should include the installation of the Knox Box System. The Knox Box System is a high security key box designed to give firefighters and emergency services immediate access to locked buildings, elevators, and other secured areas. The Knox Box System has been approved by the MAA as a sole source procurement.

During the design process, you will need to coordinate the number, size, and location of Knox Boxes with the OFM. The specifications shall require the contractor to complete the Authorization/Order form and obtain the MAA's authorized signature.

Refer to the standard Authorization/Order form in Appendix B.

15.2.3 Automated External Defibrillator (AED)

15.2.3.1 *AED Locations Affected by Construction*

Designer is required to add a note on the drawings to state:

"If an AED location is being affected by construction, the contractor shall call FRD and have an EMS lieutenant remove the AED and store it at the Fire Station. The person receiving the AED shall issue a received property receipt to the contractor acknowledging that the AED is in FRD possession. If the cabinet must be removed, then, once it has been removed, it is brought to the Fire Station until it can be re-installed. Both the cabinet and AED shall be stored and secured in the medical supply room at the Fire Station until it is re-installed. The removal and re-installation of the AED cabinets shall be performed by the contractor."

15.3 INTERFACE OF FIRE ALARM, LIFE SAFETY, AND SECURITY SYSTEMS AT BWI MARSHALL

The purpose of this section is to provide general and specific guidance to planners, designers, construction managers, contractors, tenants, and maintenance service providers for the renovation and new construction of areas at BWI Marshall Airport. The intent of this Standard is to supplement established and accepted codes, standards, and regulations. Any conflicts between this standard and other regulations, codes, or standards should be brought to the immediate attention of the Maryland Aviation Administration (MAA), MAA Office of the Fire Marshal (OFM) and the MAA Director of Office of Design & Construction.

Where references are made to specific editions or sections of codes and standards herein, they are meant to also apply to any subsequently adopted editions having corresponding requirements.

The requirements of this Standard should not be modified or revised without the written approval of the OFM and the MAA Director of Office of Design & Construction.

Purpose: To document and provide consistent and current guidance to all personnel performing design, construction, inspection, and field certifying design systems and assembly components.

Objective: Publish the criteria which are in place and which have been confirmed as the means by which all MAA representatives shall interpret the building code and standard references; with respect to new construction and renovation at BWI Marshall.

Policy: The Maryland Aviation Administration, as a branch of the Maryland Department of Transportation, shall follow all criteria in the Code of Maryland Regulation's Public Safety Articles 6 and 9, as well as Title 29, Subtitle 06, of the Fire Laws of Maryland.

Application: The standards and guidelines contained in this document are to be used in the design, construction, inspection, and certification of buildings and structures owned and operated by MAA, and tenant facilities in buildings owned and operated by MAA at BWI Marshall.

The fire related standards and guidelines in this document are also applicable to new and renovated fire alarm and fire detection systems at the Martin State Airport (MTN), to the extent deemed reasonable and necessary by the OFM, based on existing conditions, practical difficulty of compliance, and life safety considerations. Consult with the OFM for further guidance prior to development of plans and specifications for system improvements.

All designs that are found not to be in conformance with the fire related aspects of the Federal DOT Standards, or the currently adopted International Building Code or the Fire Laws of Maryland, shall be redesigned to meet code requirements and be resubmitted and approved by the OFM prior to being released for construction, or the cited item(s) may be appealed in accordance with the provisions of the Fire Laws of Maryland.

Review Standards: This standard will be reviewed annually by a committee made up of representatives from MAA Office of Design & Construction, Office of Construction Management, Office of Airport Operations, OFM, MAA Security, Maintenance, Procurement, and others as designated.

15.3.1 Existing Systems

15.3.1.1 *Existing Fire Detection and Alarm System*

The primary fire alarm systems serving BWI Marshall are the Honeywell XBSi Graphic Central System and the Honeywell EBI (Enterprise Building Integration) System).

Both systems receive signals from the following subsystems located throughout the Airport:

- Honeywell DeltaNet FS-90 Plus Fire Alarm Control Panels (FACP)
- Honeywell XLS 200 and 1000 Fire alarm Control Panels (FACP)

The signals report to a Honeywell Graphic Central System and EBI Graphics System located in the BWI Marshall Dispatch Center (BWI Dispatch) and the "watch room" at the Aircraft Rescue and Firefighting Station (ARFF).

15.3.1.2 *Controlled Access Security System (CASS)*

A Controlled Access Security System (CASS) is being installed to replace the legacy Infographics system. The Integrated Airport Security System (IASS) project is installing a SoftwareHouse C*Cure 9000 CASS system which includes distributed controllers that are connected via the MAA Local Area Network (LAN). The existing Infographics is currently maintained by Tyco Integrated Security and the C*Cure system is also being installed by Tyco Integrated Security. The objective of this system is to prevent unauthorized personnel entry into designated secured areas.

When required, the standard specification for CASS shall be obtained from the MAA Task Manager.

- Access to a secured area through a CASS equipped door is done by presenting a properly encoded contactless smartcard badge to a card reader and by entering an approved numeric Personal Identification Number (PIN) code at the card reader's keypad. Select portals will also have biometric verification in addition to the contactless smartcard and PIN code. With system approval, the doors locking mechanism is released allowing passage.
- A CASS equipped door is monitored for door position at all times. If the door is opened with approval (card reader plus PIN code and biometric if applicable) but is held open for more than the allowed preset time, an alarm is issued to the CASS alarm monitoring workstation and the policing authority and BWI Dispatch personnel are alerted. If the door is opened without approval (forced open) an alarm is issued to the

CASS alarm monitoring workstation and the policing authority and BWI Dispatch personnel are alerted.

- Equipment configurations on secured doors have varied throughout the Airport in the past. The IASS project is replacing the existing hardware and will bring all CASS controlled portals up to a consistent standard. The standard configuration for a single door used for emergency egress shall be as follows:
 - A combination card reader with keypad and possible biometric, crash bar (panic hardware), delayed egress magnetic lock, door status contacts and a white audio/visual alarm device shall be provided on the non-secured side of the door.
 - A green "Push to Enter" pushbutton or card reader with keypad shall be provided on the secured side of the door depending upon the location.
- Secured doors shall be connected by a hard-wired homerun to the nearest communication room and connected to an iStar panel that contains the card reader inputs as well as input and output ports. The iStar panels are connected to the MAA LAN which connects to the distribution level core switches via single mode fiber optic cabling. . The distribution level switches are connected to the core switches located in two diverse locations in the terminal, and this allows for data to route to the servers. There are two diversely located redundant servers. These servers are located in the BWI Dispatch Equipment Room Data Center and in the Kauffman Building Data Center. There are multiple alarm monitoring workstations located in various locations including the BWI Dispatch, Compliance, CBP, MDTA Police, and the TSA Operations Center.

CASS Interface at Emergency Egress Doors

Emergency egress doors equipped with CASS are configured as follows:

- Doors are equipped with delayed egress locks having 3 second nuisance delay to initiate the magnetic lock (mag-lock) release countdown, with a total release time of 15 seconds. During an emergency egress condition initiated locally, the delayed egress magnetic lock will release and the panic hardware (crash bar) will hold the door closed until the panic hardware device (crash bar) is depressed to retract the latch bolt. Upon opening the door, the local alarm will be activated and an alarm will be issued to the alarm monitoring workstation which will report to BWI Dispatch and MDTA Police.

In the International Terminal and E Concourse where large groups of doors are clustered together for use as emergency egress, only one door is configured with a

card reader/keypad, but all of the doors in each cluster are equipped with delayed egress magnetic locks and door position contacts and a sign stating "For Emergency Exit Only". Also provided are magnetic locks and door position contacts and a sign stating "For Emergency Exit Only, PUSH UNTIL ALARM SOUNDS. DOOR CAN BE OPENED IN 15 SECONDS" of not less than 1 inch high and not less than 1/8 inch in stroke width on a contrasting background. Upon activation of the delayed egress function on any door within the group, and upon completion of the countdown, all of the portals within the group will release and allow immediate egress. This allows large volumes of people to exit quickly. Upon initiation of the release process, the local alarm will sound and an alarm will be issued to the alarm monitoring workstation which will report to the MDTA Police and BWI Dispatch personnel.

CASS Interface with Fire Alarm System

When required, the standard specification for CASS with specifications on interfacing with the Fire Alarm System shall be obtained from the MAA Task Manager.

BWI Marshall Airport Facilities

It is the primary goal of the fire alarm and security systems interface that effective and reliable security needs are ensured while maintaining compliance with the egress requirements of Title 29 06.01, State Fire Prevention Code. As part of the BWI-Marshall Airport Security System improvements, the CASS and Fire Alarm systems will be integrated to allow for the automatic release of pre-designated emergency egress portals within evacuation zones based upon fire alarm activation to ensure compliance with the NFPA 101 Life Safety Code.

The interface between the fire alarm and the CASS will occur in the communication rooms. One or more fire alarm relays are being provided in each communication room. These relays will be interfaced with the magnetic lock power supplies such that activation of the relay will cause any door on that power supply that is an egress door to have power removed from the magnetic lock, allowing for immediate, non-delayed egress through those portals. Magnetic locks, both standard and delayed egress type, are required to be fail-safe in that removing the power from the magnetic lock will release the lock. Delayed egress locking hardware must be approved by the Office of the Fire Marshal and listed by Underwriter's Laboratories. Only egress doors specifically selected by the MAA, consistent with a predetermined emergency egress plan approved by the OFM, will release during a fire alarm. When the power is removed from the locks, the bond sensor on each lock will sense the change in state and will provide an alarm to the CASS to indicate that the doors are not locked. Simultaneously, a supervisory signal of loss of power will also be transmitted to the fire alarm control panel. In addition, the CASS monitors the position of the fire alarm relay and will provide an alarm to the alarm monitoring workstations noting that the fire alarm relay has been activated. This monitoring is a secondary function and is not intended to be part of the fire alarm system, but merely a system status for the CASS.

The above requirements for CASS-based integrated fire and security systems apply to all new work being undertaken at BWI-Marshall Airport Terminal Building and to all existing portions of the Terminal Building undergoing significant renovations or construction (e.g. - security system upgrades, tenant space renovations, significant Concourse improvements, et cetera). Where no new work is being undertaken, the OFM and the MAA Office of Security are to be contacted for guidance on applicable requirements.

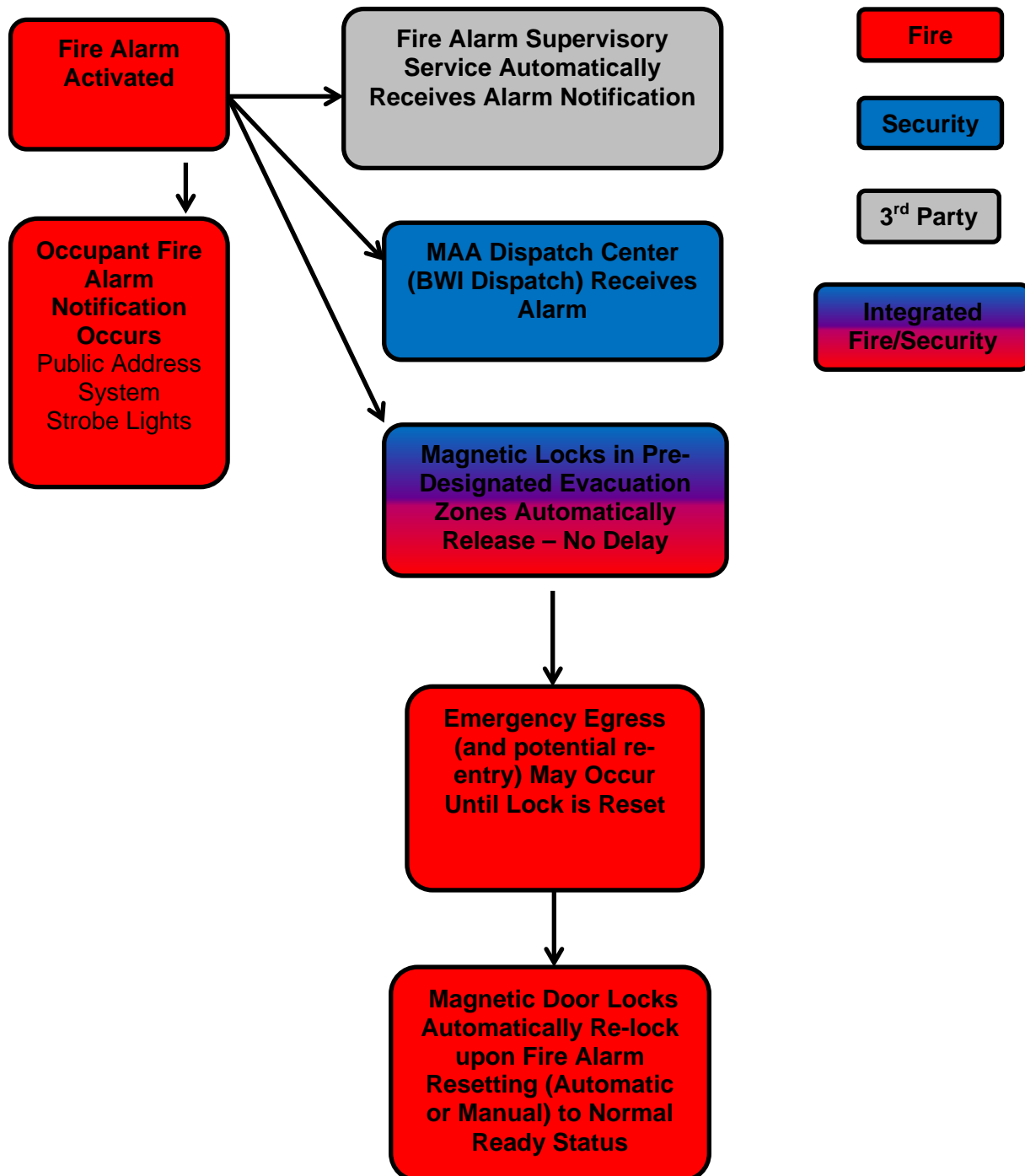
In addition to the automated security system and egress integration described above, emergency egress capabilities, regardless of fire alarm activation conditions, are required to comply with the NFPA 101 Life Safety Code. A three (3) second continuous pressure on the panic hardware device (or the door itself where an approved system utilizes door pressure only), a non-reversible fifteen (15) second delay sequence is to be initiated which will override any locking devices.

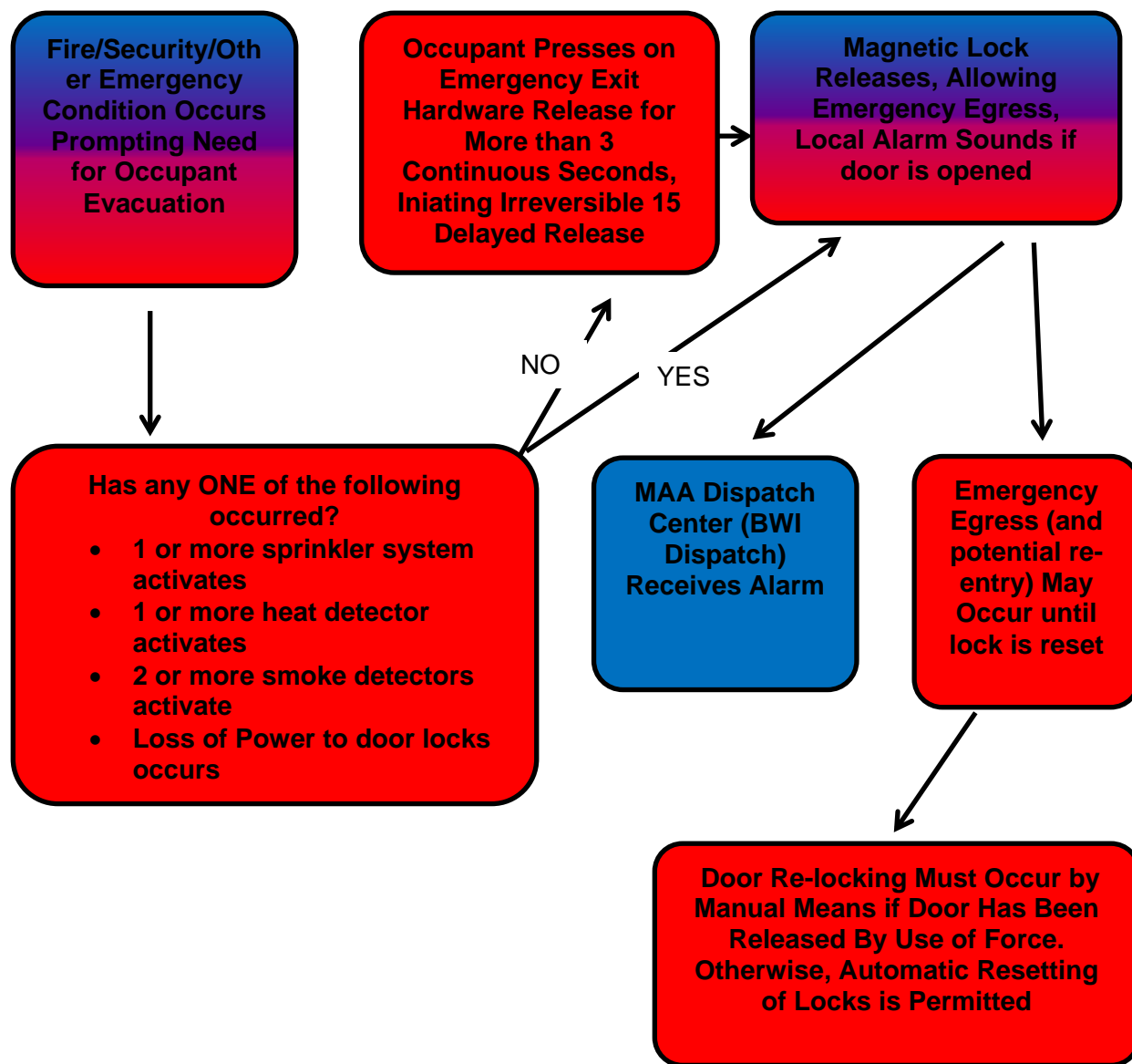
The intended interface between security and fire alarms systems and sequencing of actions is summarized in the diagrams included for the CASS-based systems at the BWI-Marshall Airport Terminal Building.

There are other standalone tenant-based systems that utilize local card swipe or other security equipment or systems within the BWI Marshall Airport Terminal Building that are not included in the CASS-based interface system (e.g. - Pathfinders, certain tenants and airlines, etc.). Additionally, there are out-buildings and other facilities at BWI-Marshall Airport and Martin State Airport which may have security systems that are not integrated with the CASS system. In those cases, the non-integrated systems which affect required exits or means of egress are required to comply with requirements of the NFPA 101 Life Safety Code, current Edition.

Other MAA Facilities and Tenant Spaces

MAA facilities and offices in non-MAA owned properties, and MAA leased properties and facilities that are not located at BWI Marshall Airport or Martin State Airport, are subject to the requirements of the codes which apply in the jurisdiction in which they reside, but in all cases the State Fire Prevention Code, and thereby the requirements of the NFPA 101 Life Safety Code, apply to all such spaces within the State of Maryland. When questions may occur regarding egress requirements regarding these facilities, contact the MAA Office of the Fire Marshal.

Emergency Egress During Fire Alarm Activation Conditions (Controlled Access Security Systems-Based Systems Only)

Emergency Egress During Non-Fire Alarm Activation Conditions (Controlled Access Security System-Based Systems Only)

Emergency Egress for non CASS-Based Security Systems and Devices

For all non CASS-Based systems and devices incorporating egress door locking hardware on required exits or means of egress, the requirements of the NFPA 101 Life Safety Code apply. Consult with the Office of the Fire Marshal regarding questions concerning specific requirements and approvals.

As part of the IASS project, the CASS and Fire Alarm systems will be integrated to allow for release of pre-designated emergency egress portals within evacuation zones based upon fire alarm activation. The interface between the fire alarm and the CASS will occur in the communication rooms. One or more fire alarm relays are being provided in each communication room. These relays will be interfaced with the magnetic lock power supplies such that activation of the relay will cause any door on that power supply that is an egress door to have power removed from the magnetic lock, allowing for immediate, non-delayed egress through those portals. Magnetic locks, both standard and delayed egress type, are fail safe in that removing the power from the magnetic lock will release the lock. Only egress doors specifically selected by the MAA, consistent with a predetermined emergency egress plan approved by the OFM, will release during a fire alarm. When the power is removed from the locks, the bond sensor on each lock will sense the change in state and will provide an alarm to the CASS to indicate that the doors are not locked. In addition, the CASS monitors the position of the fire alarm relay and will provide an alarm to the alarm monitoring workstations noting that the fire alarm relay has been activated. This monitoring is a secondary function and is not intended to be part of the fire alarm system, but merely a system status for the CASS.

Normal Operations

The PA System at the Airport provides a means to allow for general announcements to the entire Airport (all-call) or to selected zones from the BWI Dispatch. Paging/microphone stations exist throughout the concourses (piers) at ticket lift counters for use by airline personnel when making announcements within a specific holdroom. Announcements to selected zones are performed by entering a zone specific numeric code at a paging console keypad.

Emergency Operations

During emergency situations in the domestic terminal OFM personnel can communicate with BWI Dispatch personnel via radio or house phone and direct the operator to issue emergency/evacuation announcements to the entire Airport (all-call) or to selected zones within the terminal., BWI Marshall OFM personnel have a dedicated paging console/microphone located adjacent to the International Terminal fire alarm control panel by which they can make announcements directly. BWI Marshall OFM personnel would enter a numeric code at the paging console keypad and make the announcement to the corresponding PA zone. A system hierarchy exists whereby all emergency announcements take precedence over all other PA System activity, allowing BWI Marshall OFM personnel to have control at any time.

Voice Evacuation System Requirements

No stand-alone voice evacuation system exists at the Airport. The public address system, although not Underwriter Laboratories (U.L.) listed as a fire alarm voice evacuation system, is monitored 24 hours a day by airport communications (paging) personnel and BWI Dispatch personnel. Historically, this system was accepted by the State OFM for use as a voice evacuation system following the NFPA 101 Life Safety Code Section 8-3.4.1, Exception No.2 (1994 Edition.)

15.3.2 Design Criteria

15.3.2.1 Fire Detection and Alarm System

Fire Alarm Codes and Standards

The currently adopted editions of the following fire alarm systems codes and standards (as referenced in applicable State Laws and Regulations) apply to all fire alarm systems at BWI Marshall:

- National Fire Protection Association (NFPA) 72, National Fire Alarm Code
- The International Building Code (IBC)
- National Electric Code (NEC)
- NFPA 101, Life Safety Code
- Americans with Disabilities Act (ADA), 1990, Public Law 101-336.
- Underwriter's Laboratories (UL).
- Elevators, Dumbwaiters, Escalators and Moving Walks, Article 89, Section 49B and 64, Annotated Codes of Maryland
- Title 29 06.01, State Fire Prevention Code
- The International Existing Buildings Code (IEB)
- ANSI/ASME A17.1 Safety Code for Elevators and Escalators

Many significant codes and standards have been instituted since the installation of the existing fire alarm systems and devices. When renovations affecting the fire alarm system are identified, the scope of work should include bringing the area of renovation into compliance with the codes and standards referenced above.

Design Requirements of Local Authority Having Jurisdiction

The OFM is the local Authority Having Jurisdiction for MAA owned facilities. The Consultants must coordinate with the OFM during the design of fire detection and alarm systems. Submit relevant drawings and specifications to MAA FDE for transmittal to the OFM for review at each required submission. At a minimum MAA recommends meeting with the OFM prior to 50%

completion of design. General requirements of the OFM include, but are not limited to, the following:

- Conductors and Circuit Type:
 - Initiating circuits shall be Class A, Style D.
 - Indicating circuits shall be Class A
 - Only copper conductors shall be used. Conductor wire shall be solid. Stranded conductors will not be allowed. The only exception allowed for stranded wire will be for the installation of speakers in a fire alarm controlled voice evacuation system.
- Conductor Size:
 - Initiating circuits shall be a minimum of No. 14 AWG twisted pair. No. 16 AWG may be used, if pre-approved by the OFM, for initiating circuits, depending on electrical system design and manufacturer's requirements. No. 18 AWG shall not be permitted.
 - Indicating circuits shall be a minimum of No. 12 AWG.
- Conductor Requirements:
 - Insulation - THHN or THHW (NEC Article 310, Table 31016).
 - Voltage Rating- 600 volt.
 - Temperature Rating- 90°C/194°F.
 - No. 14 AWG shall have 6 turns per foot.
 - No. 16AWG shall have 10 turns per foot.
- Color Codes:
 - Work on new systems shall comply with equipment manufacturer's requirements.
 - Work on existing systems shall match existing color-coding of wire.
- Conduit:
 - All fire alarm wiring shall be in conduit complying with applicable NEC articles. (Exception: Existing speaker wiring which serves as part of the PA portion of the fire alarm system may remain as presently installed, without conduit, unless an area is renovated to an extent that the OFM determines that encasement in conduit is required.)
 - Identification of conduit and junction boxes will be done with red paint and wording that clearly identifies the installation as being a fire alarm system.
- Panel Connections:
 - Shall be on the left hand or right hand sides. No connections shall be done from the bottom.

- Top mount connections shall be permitted only if waterproof connectors are used.
- Power Supply:
 - All fire alarm systems shall be provided with a primary and a secondary power supply.
 - Secondary power shall automatically supply the energy to the system within 30 seconds. Secondary power shall be from a storage battery capable of operating the complete alarm system in normal or supervisory (non-alarm) mode for a period of 24 hours and at the end of this period, have sufficient capacity to operate the system, including alarm indicating devices in either alarm or supervisory mode for a period of 15 minutes. This requirement applies to new panel installations and any existing panels affected by renovation work.
 - The batteries in all FACP's shall be supervised.
 - An engine-driven generator with automatic transfer switch arranged in accordance with NFPA-72 may be used for secondary power in lieu of storage batteries.
- Fire Alarm Panel Location:
 - Shall be determined by the OFM only.
 - Shop drawings shall include a floor plan showing the location of the fire alarm panel.
 - Fire alarm system zones shall follow fire protection sprinkler zones.
 - Ideally, two equally sized (20,000 square feet maximum) fire alarm zones shall be provided within one 40,000 square foot (maximum) sprinkler zone.
- All public toilet rooms shall be provided with ADA compliant strobes. No duct smoke detectors shall be provided for the toilet room exhaust fans.
- All duct type smoke detectors shall be provided with remote test switches and indicator lights with identification signage. The test switches shall be readily accessible and have readily visible (below ceiling) indicators. Smoke detectors shall be provided with two sets of contacts. One set for alarm and one set to shut down related HVAC equipment. All duct detectors shall be accessible for inspection, maintenance, repair and replacement.
- Duct smoke detectors are not required to activate the audio voice evacuation system.

- All existing sprinkler water flow, switches and tamper switches shall be connected to the Honeywell XBSi or Enterprise Building Integration (EBI) system and alarm system.
- The Honeywell XBSi or EBI Graphical Central Computer shall be programmed with a specific designation of the alarm location (for example, boarding bridge gate number or other geographic locator).
- The BWI Marshall OFM and the MAA insurance underwriter have stated that manual fire pull stations shall be provided per code, or as required by OFM.
- Individual fire detection devices shall be provided for each electrical room, elevator machine room, and elevator shaft, storage room, and similar spaces per code, or as required by OFM.
- Provide power signal booster panels for long/heavily loaded indicating device circuits as required. All booster panels shall be monitored for "Trouble" conditions.
- Install a dedicated MAA "IN-HOUSE" telephone adjacent to all fire alarm control panels (FACP). This requirement applies to new panel installations and any existing panels affected by renovation work. Design shall include an empty conduit between the proposed telephone location and the nearest telephone closet. Coordinate with MAA Telecom Section, 410-859- 7629, for MAA to install the telephone.

Special Hazard Systems

Certain areas including Computer Rooms, High Voltage Electrical Rooms or other areas as determined by the OFM will be provided with Special Hazard Extinguishing Systems. These extinguishing systems consist of:

- Clean Agent Extinguishing Systems
 - Pre-Action Sprinkler Systems
 - Other systems as approved by the OFM.
- In all cases the Special Hazard Extinguishing Systems will be provided with a separate panel used for release of the extinguishing agent. The OFM shall make the sole determination of the type and quantity of initiating devices to be used to detect the emergency condition.
 - The Special Hazard Extinguishing System panels will be monitored by the Airport's Proprietary Receiving Station through a data gathering panel installed adjacent to the Special Agent panel.

The OFM will determine the type and quantity of alarms and/or trouble signals monitored by the Airport's Dispatch Center (BWI Dispatch).

- The Special Hazard area must be monitored by addressable initiating devices. In this case, the Special Hazard Panel will only be used for special functions and to release the extinguishing agent. An interface shall be provided between the Releasing Agent Panel and the local FS-90 fire alarm panel for selected monitoring functions.
- For MAA projects, the contract documents shall require all submittals for fire suppression and detection systems to be certified (stamped/sealed) by a registered fire protection engineer.
- For tenant projects being submitted under the building permit process, all construction documents shall be prepared by a design professional registered in the State of Maryland. The construction submittals pertaining to fire protection shall be reviewed, and certified (stamped/sealed) by a registered fire protection engineer working for the submitting party. MAA shall be prepared to provide names of qualified FPE's to tenants or may refer tenants to the OFM for additional information.
- Provide door number nameplates for all doors within a project's area. If a fire alarm device is located in the room, the nameplate shall have a red background with white letters; otherwise it will have a black background with white letters. Door number designations will be provided by the OFM.
 - The contract documents shall require that all sprinkler systems be installed by a Maryland licensed/certified installer who maintains a current license with the Office of the State Fire Marshal.
 - Provide signs for sprinkler control valves and inspectors test points. Provide signs on the exterior wall near wall hydrants and exterior sprinkler standpipes.
 - Label to be provided by Honeywell, Inc. for all fire alarm addressable devices with its FACP address.
 - Install a Knox Box as required by the OFM. The location is to be determined by the OFM.

A. Fire Alarm Indicating Devices

- Notification Signals:
 - Terminal Building - all areas will be zoned as either a public area or a tenant area.
 - Public areas shall have visual devices (strobe lights) and audible devices (horns). Normal audible notification shall come from terminal-wide public address (PA) system. In the event of a failure of the PA System, horns will be activated manually from the BWI Dispatch. All devices in this zone, horns and strobes, shall be activated separately via manual control from the BWI Dispatch.
 - Tenant areas shall have audio/visual (horn/strobe) notification. Publicly accessible portions of tenant spaces shall have public address speakers for voice fire alarm notification. All devices in this zone shall be automatically activated by the associated FS-90 FACP.
 - The limits of the tenant and public zones shall be determined by the OFM.
 - All other buildings (non-terminal) shall have audio/visual notification in accordance with NFPA-72 and the applicable sections of NFPA-101, Life Safety Code.
 - All areas within buildings equipped with audio notification devices (horns) shall follow ANSI/ASA S3.41-1990 (R2001), American National Standard Audible Emergency Evacuation Signal in accordance with NFPA-72.
 - The fire alarm notification signal shall be distinctly different in sound from other signals, i.e., security alarms.
- Remote Annunciators shall not be provided unless otherwise required by the OFM. An existing remote fire alarm command station annunciator is located in the Aircraft Traffic Control Tower (ATCT). This FACP is monitored by the Federal Aviation Administration (FAA).
- XBSi or EBI Central Color Graphic Computers shall be programmed and updated as required by expansions and modifications to the Fire Alarm System. Cost of programming and computer upgrades shall be included in the construction project along with associated construction costs.

- Floor Plan Graphic Requirements:
 - The BWI Dispatch Center uses color floor plans displayed on a Personal Computer to display alarmed device information to the BWI Dispatch Operator. These floor plans are a graphic representation of the building or area of the building with fire alarm initiating devices shown in their approximate location within the building or area.
 - The Electrical Engineer for the consultant for each construction or renovation project shall provide Electrical Floor Plans for installation into the Honeywell Fire Alarm computer system. These floor plans will be submitted both in paper form as well as in electronic form. The electronic form will consist of either a CD-ROM or other type of acceptable media.
 - The electronic form will be submitted to the OFM in the following format:
- AutoCAD (.dwg), current Release approved by MAA, see the CAD Standards Manual in Appendix H.
- Floor Plan with walls, doors, windows shown (no line over line).
- All associated font and shape files that define the drawing including X-References.
- Fire Alarm devices only (no furniture or plumbing fixtures).

B. Fire Alarm Initiating Devices

Addressable Interface Units (monitoring modules) shall be used to monitor indicating devices that are not otherwise equipped for multiplexed addressable communication such as sprinkler valve tamper switches.

- Manual Pull Stations shall be installed per code unless specifically directed otherwise by the OFM. Pull stations shall be addressable double action type without glass rod inserts. Provide waterproof Lexan covers on pull stations located outdoors and in parking garages.
- All surface mounted smoke detectors shall be addressable photoelectric type. Ionization type detectors are not permitted.
- Duct Smoke Detectors shall be addressable photoelectric type.
- Heat Detectors shall be addressable combination rate of rise and fixed temperature type within air-conditioned spaces.

- Pressure Switches for pre-action systems, shall be supplied with addressable monitoring modules.
- Water Flow Switches for sprinkler systems, shall be supplied with addressable monitoring modules for alarm, supervisory, and trouble conditions.
- Fire Extinguishing System Control Panels for fire suppression systems (such as carbon dioxide systems, Halon systems, foam systems, etc.) shall be supplied with addressable monitoring modules.

C. Fire Alarm Supervisory / Control Devices

- Sprinkler Valve tamper switches shall be connected to a monitoring module to determine the valve's open or closed position. Any change away from the "normal" position (normally open vs. normally closed) will initiate a supervisory signal on the system.
- Panel Faults. The FACP shall detect any faults in the wiring or devices and transmit a trouble signal to the XBSi or EBI system.
- Fire Extinguishing Systems. Monitoring modules shall be provided to monitor trouble and alarm status of fire suppression systems. Suppression systems will require the use of a UL listed agent release panel to perform those functions. All agent release panels shall be provided with sufficient auxiliary relay contacts to allow a Honeywell Fire Alarm Control Panel to monitor all suppression hazards. A new Fire Alarm Control Panel shall be provided, (unless sufficient points in an existing panel are authorized by OFM to be used), in addition to the agent release panel to facilitate this arrangement.
- Special provisions for exhausting noxious or hazardous atmospheres shall be designed on a per project basis. The design shall utilize HVAC systems and controls; zoning strategies and supplemental exhaust. Additional requirements include:
 - Provide a placard mounted next to the FACP that identifies each air handling unit (AHU) and the area that each unit serves. The graphic should show the entire project area.
 - BWI Marshall Fire and Rescue Department (FRD) personnel will talk directly to Central Utility Plant personnel via the "House" phone at the FACP. Using the placard/graphic BWI Marshall FRD personnel can direct Central Utility Plant personnel to put selected

AHUs in full exhaust mode or full pressurize mode to allow smoke to be drawn out of the applicable portion of the building.

- Control Modules. Elevator Controllers shall be provided with control modules for elevator recall functions, fire service indicating light and shunt trip disconnect for elevator main power supply.

D. Alarm Signal Transmission Equipment

- Airport Terminal Buildings - The only transmission media acceptable to the OFM for the transmission of fire alarm signals from the Terminal Building to the Airport Dispatch Center (BWI Dispatch) are:
 - Copper Wire
 - Fiber Optic Cable

Modems will not be used for signal transmission within the Terminal Buildings without specific prior approval of the OFM. If used, modems must be compatible with Honeywell equipment.

The transmission media will not be a mixture of copper and fiber conductors. The transmission media will be either copper wire from end-to-end or will be fiber optic cable from end-to-end.

- MAA Owned or Operated Remote Buildings - The BWI Marshall OFM will make the sole determination of whether an MAA-Owned or Operated Remote Building shall transmit signals via modems. If the OFM approves the fire alarm system signal transmission via modem communication, the following shall apply:
 - Modems will be supplied by the fire alarm equipment manufacturer and will be UL Listed for "Fire Alarm Signal Transmission" and be housed within the fire alarm control panel.
 - The modems supplied with the fire alarm system will be supplied with a secondary source of power either from storage batteries or from an Uninterruptible Power Supply (UPS).
 - The telecommunications signal equipment used to allow the fire alarm to be transmitted on the Verizon backbone will be supplied with a secondary source of power either from storage batteries or from an Uninterruptible Power Supply (UPS).
 - The Airport's Telecom Section will install the necessary jumpers to provide a communications path within the Airport.

Fire Alarm System Training

The consultant shall specify a minimum of on-site training as specified below for all panels, systems, and related equipment installed. The trainer shall be fully qualified and certified to provide such training. A panel shall be considered new, if it did not previously exist in the system and does not replace an existing panel of the current system architecture. A panel shall be considered updated/upgraded if the Contractor modifies 10%, or more, of the panel's addressable points. The Contractor shall schedule the training at least 15 working days prior to the completion of the project and notify MAA Division of Maintenance-HVAC Section. Contractor shall provide training manuals for all students attending the training (10 students).

EQUIPMENT	INITIAL/NEW	UPGRADE
Per new fire alarm panel	8 hours	2 hours
Per Central Upgrade (such as converting from Graphic Central Software to XBSi Software)	40 hours	8 hours
Per system upgrade	40 hours	8 hours
Per annunciator	4 hours	2 hours
Per FS90 plus command center	4 hours	2 hours

Specific training requirements to be determined with MAA Maintenance on a per project basis.

Supplemental Requirements

- Existing wiring shall be reused on renovation designs if the wiring meets the current requirements of the National Electrical Code for the intended application and is in good condition.
- Existing smoke detectors shall be replaced by addressable photoelectric type smoke detectors.
- Existing FS-90 Plus FACPs, if reused, shall be modified and upgraded as required. Provide all necessary additional power supplies, intelligent loop interface boards, communication boards, etc. If existing FS-90 Plus FACP is served by only one fire alarm intelligent loop (i.e., loop 'A'), then provide wiring for second loop (i.e., loop 'B') to the FACP.
- New battery calculations shall be performed for all existing FACPs, if modified or if devices are added. If existing batteries are found to be

inadequate, new batteries are to be provided. Backup battery power supplies shall be added to existing FACP, if no batteries are present.

- Monitoring modules shall be added to existing fire extinguishing systems, duct smoke detectors, sprinkler water flow switches and valve tamper switches to make all devices addressable to the FACP.
- Location indicating devices shall be added at each existing sprinkler water flow and valve tamper switches and where otherwise requested, in a visible location below the ceiling.
- Provide a smoke detector at the top of each unvented elevator hoist way, as required by code.
- Provide a smoke detector for elevator recall function in each elevator machine room.
- Provide shunt trip circuit breakers (with time delay) for each elevator controller. The delay time will be designated by the inspector in the field after timing the elevator recall operation. Provide a heat detector for each elevator room, pit and top of shaft having sprinklers added under the project scope, in accordance with ANSI/ASME A17.1, which requires power to elevators to be interrupted prior to sprinkler heads discharging. Heat detectors shall have rated temperature setting below associated sprinkler head settings.
- Provide elevator recall smoke detectors at each elevator landing (lobby). Connect smoke alarms to elevator controllers via a fire alarm control module and connect the devices to the XBSi or EBI system.
- Confirm that all existing elevator recall and shunt trip-initiating devices are connected to the FACP. If any existing devices are not connected to the FACP, provide an addressable monitoring module for the device and connect it to the appropriate FACP.
- Elevator systems shall be supplied with elevator recall control modules for associated smoke detectors, shunt trip breakers, and heat detectors.
- Provide Audio Visual devices as described in the previous section for “Fire Alarm Indicating Devices.”
- Provide a sprinkler valve tamper switch and addressable monitoring module for each sprinkler system zone valve.
- Alarms or trouble signals shall be transmitted to the Graphic Central Fire Alarm system for acknowledgment of alarm trouble status.

- Monitoring modules shall be supplied for all “clean agent” systems, foam systems or other fire suppression systems, so that the FACP on a hazard zone can supervise their status by hazard zone basis. See related discussion of special extinguishing systems in the Section titled "Special Hazard Systems" for additional requirements.
- Smoke detectors shall be placed in electric rooms, telephone rooms, computer rooms, storage rooms, transformer rooms, elevator lobbies, elevator machine rooms, the top of elevator shafts, and where otherwise required. Heat detectors (in lieu of smoke detectors) shall be placed in mechanical rooms, spaces prone to smoke detector false alarms, and spaces protected by fire extinguishing systems.
- Duct detectors shall be placed in HVAC units, downstream of air filters and ahead of any branch connections, in air supply systems having a capacity greater than 2,000 cfm, and at each story prior to the connection to a common return and prior to any recirculation or fresh air inlet connection in air return systems having a capacity greater than 15,000 cfm and servicing more than one story per NFPA 90A and the International Mechanical Code (IMC). Detectors shall shutdown units directly via auxiliary contacts, overriding the facility Building Management System. The duct detector rating must be compatible with the cfm of the duct and be tested in accordance with the air differential test of NFPA 72.

System Programming

- All projects shall provide unique designations that are easily recognizable, for rooms, spaces, areas and equipment to ensure easy identification of device locations.
- The following abbreviations will be used to standardize the terms used below:

SD—Smoke Detector
SHD—Smoke\Heat Detector
DD—Duct Detector
HD—Heat Detector
MPS—Manual Pull Station
WFS—Water flow Switch
VTs—Valve Tamper Switch
AHU—Air Handling Unit
Cntrl—Control
UL—Upper Level
LL—Lower Level
Mezz—Mezzanine
EMR—Electric\Electrical
FACP—Fire Alarm Control Panel

Tbl—Trouble
Shutdwn—Air Handling Unit Control
Alm—Alarm
AVC—Audio\Visual Control
MER—Mechanical
Rm—Room
Obsrv Lnge—Observation Lounge
Elev—Elevator
Pb—Power Booster
RTU—Roof Top Unit
Corr—Corridor
Arcl—Alternate Recall
MRcl—Main Recall
Maint-- Maintenance
Strg—Storage
SS-- Sprinkler
FA—Fire Alarm
Rtn—Return
Drc—Door Control
Sply—Supply
CM—Control Module
MM—Monitoring Module
AV—Audio/Visual Device
OB—Out Bound Baggage
IB—In Bound Baggage
L1—Level one (# notes floor level)

- All fire alarm system programming will be performed by Honeywell. The device descriptions shall be formatted as follows:

Fire Alarm Address Breakdowns

Example for A/B Concourse points:

Term A L1 Emer Gen Dry System AT105 1129 WFS

Term A	General Location
L1	Level 1
Emer Gen	Fire Area
Dry System	Type of system monitored
AT105	Door Number
1129	Fire Alarm Point Address
WFS	Device Type (water flow switch)

Example for all other areas on complex:

Concourse DX/LwrLvl Continental Ops near D10 (0206014) Smk Det

Concourse DX	General Location
LwrLvl	Level
Continental Ops near D10	Fire Area
(0206014)	Fire Alarm Point Address
Smk Det	Device Type (smoke detector)

Note: Because the alarm descriptors have been developed over many years and entered into software systems by different contractor personnel, some may vary, but generally the above format and logic are to be followed.

Life Safety

- Provide egress lighting per IBC 1006.0 and NFPA 101-7.9. As required by NFPA 101, provide a dedicated emergency white lighting fixture installed at each emergency exit door to illuminate the panic hardware (crash bar) and door signage. Also, as directed by the OFM, provide emergency lighting on the ramp side of emergency egress doors that exit to the airside. This lighting should be on the same circuit as the emergency lighting on the interior side of the door.
- Provide a CADD generated evacuation plan with a "you are here" designation and the egress paths clearly shown on a floor plan. Permanent signage, with the capability for changing inserts, shall be provided by the general contractor. See the sample in Section 7.1.1. Provide a floor plan submittal showing the proposed locations of the evacuation plans(s) for approval by the OFM.
- Provide L.E.D. type exit sign as required by code. Signs shall have red lettering and a white background encased or enclosed in an approved type box. Provide directional exit signs in the main corridor of the concourses (piers) to direct occupants to the exit stairs along the exterior holdroom walls.
- Self-illuminated exit signs are not permitted.
- Provide fire extinguishers in public areas, electrical rooms, mechanical rooms, and as required by NFPA 101. Provide extinguishers for tenant spaces with new or renovated construction of the types, sizes, and locations contained in NFPA 10, current edition.

15.3.2.2 Deliverables at Project Completion

At project completion, the Contractor shall provide the following deliverables in accordance with the requirements of NFPA 72 to the MAA Division of

Maintenance. The following must be provided within 30 days of final system approval by the OFM.

NFPA 72-14.6.1, "Permanent Records". After successful completion of acceptance tests satisfactory to the OFM, provide a set of reproducible as-built installation drawings, operation and maintenance manuals, and written sequence of operation to the building owner or his designated representative.

NFPA 72-10.6.2, Fire Alarm System Record of Completion

The preparation of a "Record of Completion" shall be the responsibility of a qualified and experienced installer, and shall be completed in accordance with NFPA 72.

Every system shall include the following documentation, which shall be delivered to the owner, or owner's representative, upon final acceptance of the system. A copy of each item listed below shall also be provided to the OFM in a media format (paper, electronic) that is acceptable to the OFM. Electronic record drawings shall be AutoCAD format and other electronic documents shall be Adobe pdf compatible.

- A. An owner's manual and installation instructions covering all systems equipment.
- B. Complete and up-to-date Record drawings that accurately reflect field conditions, including all approved changes.
- C. A Record of Completion form, prepared in accordance with NFPA 72-4.5.2.
- D. List of telephone numbers (including 24 hour emergency) and contact persons for all warranty issues.

The Contractor shall provide all hardware technology, software packages, software tools, equipment, cabling and manuals necessary to allow MAA staff to make modifications to the BWI Marshall database. Provide software in the format required by MAA.

15.3.2.3 Access Controlled Egress Doors

These requirements apply to typical access controlled emergency egress doors. The designer shall confirm any variance from this standard with MAA and FAA personnel.

- Magnetic locks will be mounted to the top of door/frames. Only when clearance issues prohibit the use of mag-locks, will the use of electric

door strikes be considered. Electric door strikes are not acceptable without the prior approval of the OFM.

- Provide panic hardware (crash bar) with door strike (this is not an electric door strike) and delayed egress magnetic locks that provide local alarm upon being activated and provide alarm to the BWI Dispatch upon activation of the non-reversible release countdown.
- Provide CASS system components. They are typically the door controller, combination card reader/keypad, door status contacts, audio/visual device and the door-locking device (mag-lock). Configure the system as follows:
 - CASS shall defeat the mag-lock for all personnel who use the combination card reader/keypad. This is an approved non-emergency egress.
 - The mag-lock will not release until a preset delay has expired. Pushing on the panic hardware for more than three (3) seconds starts the delay countdown.
 - In the event of an emergency, personnel will push on the panic hardware (crash bar), the local alarm will immediately sound and an alarm will be sent to the BWI Dispatch, and the delay countdown will begin. When the delay has expired, the audio/visual device will sound, the mag-lock will release and the CASS will alert the police and the BWI Dispatch of the alarm condition. The security system audio/visual device shall be coded differently from the fire alarm system audio/visual device.
 - The delay on release should be set to 15 seconds.
- Signage should be placed on each egress door, stating, "EMERGENCY EXIT ONLY. Delayed egress doors shall be additionally equipped with signage stating, "PUSH UNTIL ALARM SOUNDS, DOOR CAN BE OPENED IN 15 SECONDS".
- The upper level emergency egress stairwell door in all holdrooms will be the secured door (with CASS). Only approved exceptions will allow the secured door to be on the lower level (ramp level). The designer, MAA Security, and the tenants shall decide which stairs will be utilized by airline personnel who may not have a BWI Marshall Security Badge, but need access to lower level operations areas.
- The door control microprocessor is to be provided with a battery backup power supply.

- All door status contacts are to be interfaced with the door control panel that is design to send an immediate local and a remote police department alarm of unauthorized access. The panel is to be interfaced with the local door control microprocessor that is designed to send an immediate local and a remote police department alarm of unauthorized access with a local reset. The microprocessor is to be interfaced with the keypad/card reader access device and the secure side magnetic lock release device and be designed to distinguish the difference between an authorized and unauthorized access.
- All electronic panic hardware (crash bars) devices are to be directly wired to the magnetic lock to minimize chance of malfunction.
- All magnetic locks and access control electronics are to be on dedicated circuits and on a dedicated panel.
- Where egress doors are used in conjunction with operations, the release function from the secured side shall be coordinated with and approved by security.

15.3.2.4 Public Address System

- The Domestic Terminal, the International Terminal, and E Concourse, are served by the IED public address system. The IED system is a microprocessor based public address system with remote speakers located in holdrooms, public corridors, lobbies, restrooms, and concession areas. The speakers are connected to head end equipment via plenum rated cable in cable tray or in conduit (except in some older, unrenovated areas of the terminal where cable is strapped to structural steel above the ceiling).
- Projects that modify or add to public areas, areas of assembly, or areas presently served by the public address system shall include all necessary work to provide public address system coverage to the areas of the project. Provide instruction and maintenance manuals, as built drawings, and schematic one-line drawings for revisions to existing PA System and all new systems.
- Provide PA System training as required by the MAA project manager.
- Survivability of the public address system is critical since it provides voice evacuation to all public areas. All work must comply with applicable sections of NFPA 72. All circuits necessary for the operation of the notification appliances shall be protected until they enter the evacuation-signaling zone that they serve. Any of the following

methods shall be considered acceptable as meeting in the requirements of this subsection:

- (1) A 2-hour fire rated circuit integrity (CI) cable
 - (2) A 2-hour fire rated cable system (electrical circuit protective system)
 - (3) A 2-hour fire rated enclosure
 - (4) Performance alternatives approved by the authority having jurisdiction
 - (5) Buildings fully protected by an automatic sprinkler system installed in accordance with NFPA 13, "Standard for the Installation of Sprinkler Systems", and with the interconnecting wiring or cables used for the operation of notification appliances installed in metal raceways and in accordance with Article 760 of NFPA 70.
- It is preferred that all public address system wiring be run in conduit to the extent possible. However, wiring may be run in cable tray. Long runs of wire strapped to roof structures above suspended ceilings are prohibited. Coordinate with MAA and the OFM for approval of routing method.
 - All wire, which is not in conduit, shall be plenum rated.
 - For large renovation and new construction projects, create separate public address zones for dedicated use only by FRD personnel.

Coordinate with the OFM for identification of the limits of such zones.

15.3.3 Procurement Policies

15.3.3.1 *Fire Detection and Alarm System*

- All MAA-Owned buildings shall have a proprietary sole source Honeywell fire alarm system in accordance with NFPA-72.
 - The fire alarm contract documents shall define that Honeywell, Inc. will be responsible for furnishing and installing all FACPs, wire, devices, final connections, programming, start up and testing.
 - The general contractor will be responsible for coordinating with Honeywell, Inc. and furnishing and installing all conduit and junction/device boxes for the proposed fire alarm system. Honeywell will be responsible for wiring and connecting their system as part of the bid items.

- All non-MAA-Owned buildings on Airport property shall have a fire alarm system meeting the requirements for Central Station as outlined in NFPA-72. For existing buildings and systems, this does not have to be a Honeywell system.
- Any MAA owned outbuildings added to the MAA system must be provided with Honeywell fire alarm systems that are compatible with the existing systems they interface with.
- The installation shall be certificated by Underwriters Laboratories, Inc. (UL).
- The installation shall be placarded indicating the central station by name and telephone number.

15.3.3.2 Security System

- All CASS components and wiring will be furnished and installed by Tyco Integrated Security as part of the base contract. Tyco Integrated Security is the current Airport wide CASS installer/maintainer.
- All CASS system wiring shall be in conduit.
- The system shall be U.L. listed.

15.3.3.3 Public Address System

- All public address system work in the domestic terminal will be performed by MAA's approved Maintenance Contractors. All PA system work shall be funded through the respective project as part of the base bid. All modifications and additions shall be coordinated with MAA and the designated maintenance contractor prior to completion of construction documents.

15.4 FIRE PROTECTION INFORMATION FOR ARCHITECTS AND ENGINEERS

15.4.1 Use Classifications

The following use classifications are used by the OFM for various airport spaces. In the case of unusual spaces, consult the OFM to determine the assigned use classification.

USE CLASSIFICATIONS

Space or Area	OFM Classification Used
Airline Ticket Counter	A-3, Public Assembly (Public Areas)
Airline Ticket Office (ATO)	B, Office (Private Areas)
Baggage Claim	A-3, Public Assembly (Public Areas)
Baggage Make-Up / Baggage Screening	S-1, Moderate Hazard Storage
Baggage Service Office (BSO)	B - Office
Holdrooms	A-3, Public Assembly (Public Areas)
Offices	B, Office
Restaurant/Food Court Tenants	A-3, Public Assembly
Storage (Non-Hazardous)	S-1, Moderate Hazard Storage
Stores, Retail	M, Mercantile
Utility (Electrical, etc.)	S-1, Moderate Hazard Storage

The following definitions are provided:

CT	Central Terminal (All Areas, Upper and Lower Levels)
NT	North Terminal (All Areas, Upper and Lower Levels)
ST	South Terminal (All Areas, Upper and Lower Levels)
Throat	Generally refers to the Security Checkpoints at each Concourse entrance.
Main Exit	The exits to the Upper Level Curbside via the Vestibules at the Ticketing Lobby. All doors (including those labeled for “Entry” to the Ticketing Lobby) may be used in calculating the required egress width.
AHJ	Authority Having Jurisdiction

15.4.2 Special Fire Protection Interpretations and Requirements of the OFM

Architects and Engineers are referred to the applicable adopted Codes and Standards, and the MAA Design Standards, as the primary sources of fire related requirements. However, there are additional special requirements that are listed herein which apply to BWI Marshall and MTN projects. Some of these special requirements are due to the varying age of construction of the many portions of the Terminal Buildings and the particular fire and building codes that were in place at those times.

Other special requirements are due to the need for uniformity of methods and materials of construction for purposes of serviceability, reliability, or for operational compatibility and efficiency considerations.

Finally, because airports present a rather unique mix of various occupancy types, posing a multitude of fire and life safety considerations, the following information regarding established interpretations, policies, and procedures are provided to assist designers with guidance in making certain that all fire related requirements are being met in the project design. This list, while as complete as possible, is not intended to be an all-encompassing checklist. Where questions may arise, please contact the OFM for additional clarification.

15.4.2.1 Project Submittals and Reviews

1. For all projects other than Tenant Space fitouts: 30%, 60%, and 100% design drawings are required to be submitted to the OFM (exception: other schedules are acceptable, as defined by the Office of Design & Construction).
2. For Tenant Spaces: 60% and 100% submittals are required to be submitted to the OFM.
3. Shop drawings must be submitted to the OFM for all fire alarm installations, fire detection systems, and fire extinguishing systems, and modifications, prior to installation.
4. "As-Built" drawings are required to be submitted to the OFM for all fire protection system installations (alarm, detection, extinguishing).

15.4.2.2 Fire Alarm Systems

1. All conductors are to be a minimum of 16 gauge and with solid conductors.
2. Class "A" wiring is required.
3. Honeywell is the sole-source provider of fire alarm equipment.
4. "Plenum rated" cables in cable trays are permitted in areas where existing cable trays are present. All other new fire alarm wiring must be in conduit. Fire alarm conduit must be painted red.
5. Shop drawings are required to be submitted to the OFM for all fire alarm installations and modifications, prior to installation.
6. "As-Built" drawings are required to be submitted to the OFM for all fire alarm installations.
7. See Voice Communication Systems regarding speakers and notification appliances.

15.4.2.3 Voice Communication Systems

1. As Tenant Spaces are renovated or added, voice communications system speakers are to be added to the Terminal voice communication system.

2. The locations of all speakers must be shown on the plans. Clearly identify voice communications speakers vs. other speakers on the plans.
3. Take ambient noise conditions into account when designing the voice communications system. All installations are subject to field approval upon testing.
4. Voice communications speakers are not to be placed in the immediate vicinity of cash registers.
5. Audible fire alarm devices are to be set at 90" above the finished floor (AFF).
6. Visual fire alarm devices (flashing, with no audible signal) are to be set at 80" AFF.
7. Combination audible/visual devices are to be set at 90" AFF.

15.4.2.4 *Sprinkler Systems*

1. All public areas of the Airport are classified as Ordinary Hazard, Group I.
2. All baggage areas are classified as Ordinary Hazard, Group II.
3. "C" Concourse renovations and expansions must be upgraded to Ordinary Hazard Group I as a portion of any new work. The current classification is unverified.
4. Cargo Buildings are classified as Extra Hazard, Group I.
5. Sprinkler piping that is subject to outdoor environmental conditions must be galvanized pipe (open-air parking garages are considered outdoor).
6. Schedule 40 piping is required in all sprinkler systems (wet or dry) for all piping of 6", or less, in diameter. Piping over 6" can be schedule 30.

15.4.2.5 *Cooking Hoods*

1. Type I Hoods, as defined by NFPA 96, are regulated by the requirements of NFPA 96.
2. Type II Hoods, as defined by NFPA 96, are not required to have watertight welded seams, or automatic fire extinguishing systems. Type II hoods are typically used for cooking or heating processes that do not produce grease laden vapors.

3. An Air Balance report is required for all Hoods, Type I and Type II.
4. Consideration of adjacent tenant space exhausts and other impacting features must be made in the exhaust design capacity so that Type I hoods in the immediate tenant space will provide the required exhaust capacity. Also the exhaust capacity shall not negatively affect adjacent existing exhaust systems.

15.4.2.6 *Egress and Occupant Loads*

1. Stairs from the Concourses that egress to the aprons (airside) shall accommodate 100% of the total Concourse occupant load.
2. 50% of all egress from the Concourse (Gate Areas) must be accommodated through the throat of all Concourses into the Terminal.
3. Full credit of egress capacity is granted to the stair capacities that egress to the aprons (airside).
4. Consult with the Office of the Fire Marshal for special provisions concerning calculating Hold Room occupant loads.
5. Refer to Section 15.4.9 for special provisions concerning calculating egress requirements from Concourses.
6. Some portions of the airport are “A-3” Use, while others areas are built under “Covered Mall” provisions.
7. “C” and “D” Concourses have special existing egress capacity issues that must be addressed and evaluated with the OFM during any renovations, additions, or demolitions.
8. An emergency egress plan from tenant spaces is required. The plan must show actual and allowable “travel distances”, “dead-end distances”, and “common path of travel” limits, as defined within NFPA 101.
9. All travel distances from the Concourses must be taken to the non-secure side of the Security Checkpoint or to the nearest stairwell.
10. The occupancy load for each tenant space must be calculated and shown on the plans.
11. A performance based “Life Safety Evaluation”, developed in accordance with NFPA 101, is required for all projects serving an occupant load of more than 6,000 persons. Significant alterations or additions to existing spaces may be required to comply. Check with the OFM regarding your

project. A Professional Engineer who is licensed to practice in Maryland, and who is a Fire Protection Engineer, must prepare the Life Safety Evaluation.

15.4.2.7 *Smoke Control and HVAC*

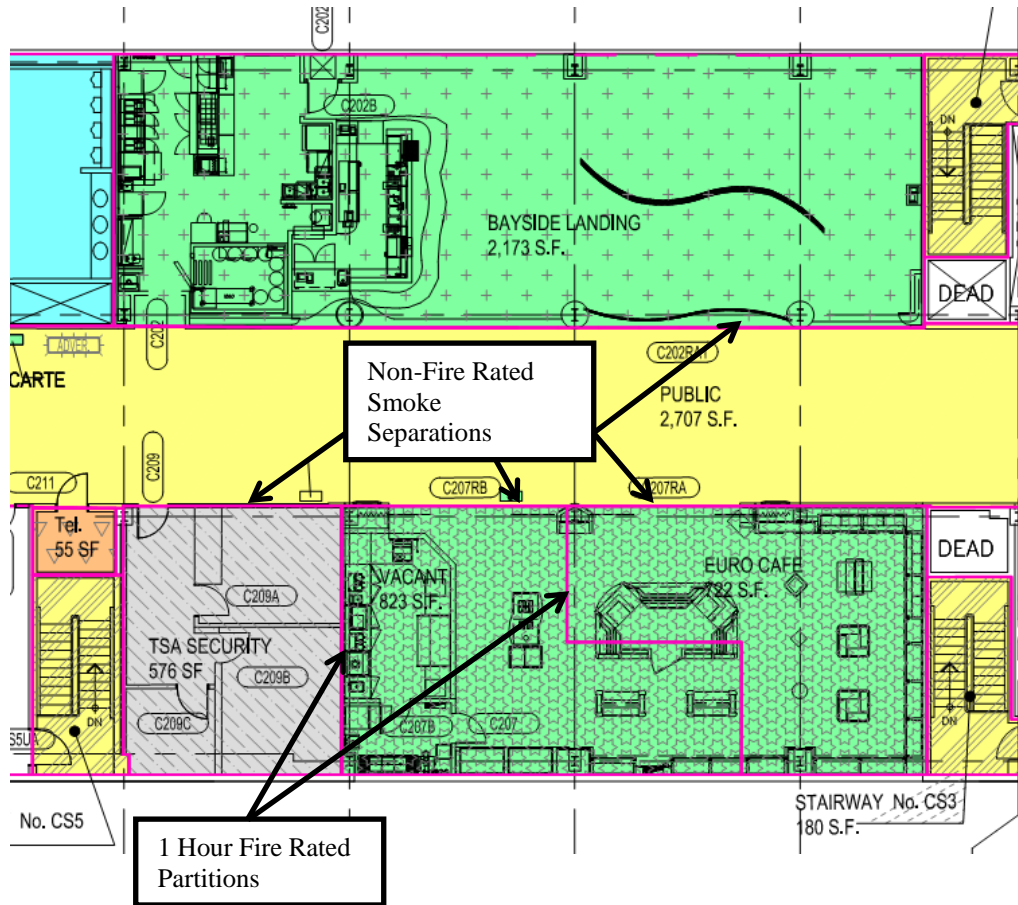
1. A “Modified Smoke Control” system is present in most public areas of the airport. These systems have the ability to pressurize areas to control smoke movement, or to remove smoke, using manual switch controls. Designers are cautioned to discuss planned smoke control features of their projects with the OFM in advance of plan submittals.
2. Smoke Dampers: There are “pockets” of manually re-settable dampers (fusible link type) in older portions of the airport. Fusible link activated dampers are no longer permitted. All new fire dampers must be tied into the smoke control system and must be capable of automatic resetting or remote resetting at the smoke control panel. All renovations of existing spaces containing fusible link dampers must include the removal and replacement with suitable fire dampers meeting these requirements. An installation detail of typical fire damper installation and mounting details must be shown on the design drawings. The detail must include the access panel, with all dimensions shown. A schedule of fire dampers is required on the drawings.
3. Automatic smoke barriers (“Won-Doors”) exist between the International Terminal and the Domestic Terminal to provide smoke separation of the buildings. These barriers exist on the Upper and Lower levels. Designers of additions or major renovations at the Domestic Terminal building are cautioned to check with the OFM for similar requirements for automatic smoke barriers that may apply to new projects.
4. Field verify if ducted returns, or plenum returns, are present in existing spaces and show that information on the plans. Schedule a conference with OFM to review additional provisions that may be required based on the field survey information.
5. Air balance reports are required on all new HVAC work affecting smoke control systems and must be submitted to the OFM.
6. If additional items affecting HVAC and smoke control design arise during demolition work, notify the OFM in writing of the changes required and obtain design revisions and approval prior to deviations from approved plans.
7. In Concourses C, D, DX, DY, the Commuter Concourse, the North Terminal Extension, the North Terminal, the South Terminal, the Central

Terminal, the B-C Connector and future Concourses and Connectors, the requirements of (a.) and (b.) below shall apply:

a. Concourse Upper Level Tenant Separation Requirements

Smoke separations are required on the Concourse departure level in retail storefront areas and other tenant spaces (except Hold Rooms) that directly front on Concourse public circulation areas and public corridors. Concourse smoke separations are not required to be fire endurance rated, but must be of non-combustible construction and must extend tight to the underside of the roof or floor deck above and be constructed to resist smoke from entering the public circulation space from the tenant space. All duct penetrations of smoke separations shall be provided with UL listed, self-resetting, electrically actuated, smoke dampers. ASTM 685 compliant plastics are required to be applied to storefront grilles when comprising a portion of a smoke separation. Sliding doors are not considered compliant as smoke separation doors unless provisions are made for gap coverage to prevent smoke migration. Solid faced rolling doors are permitted to be used as smoke doors. All gaps must be sealed to resist migration of smoke.

Exception – Kiosk vendors, mobile vendor carts, and other small tenant spaces may be exempted from smoke separation requirements, subject to determination of the Office of the Fire Marshal.

**Example 1: Concourse Level**

b. Lower Level Tenant Separation Requirements

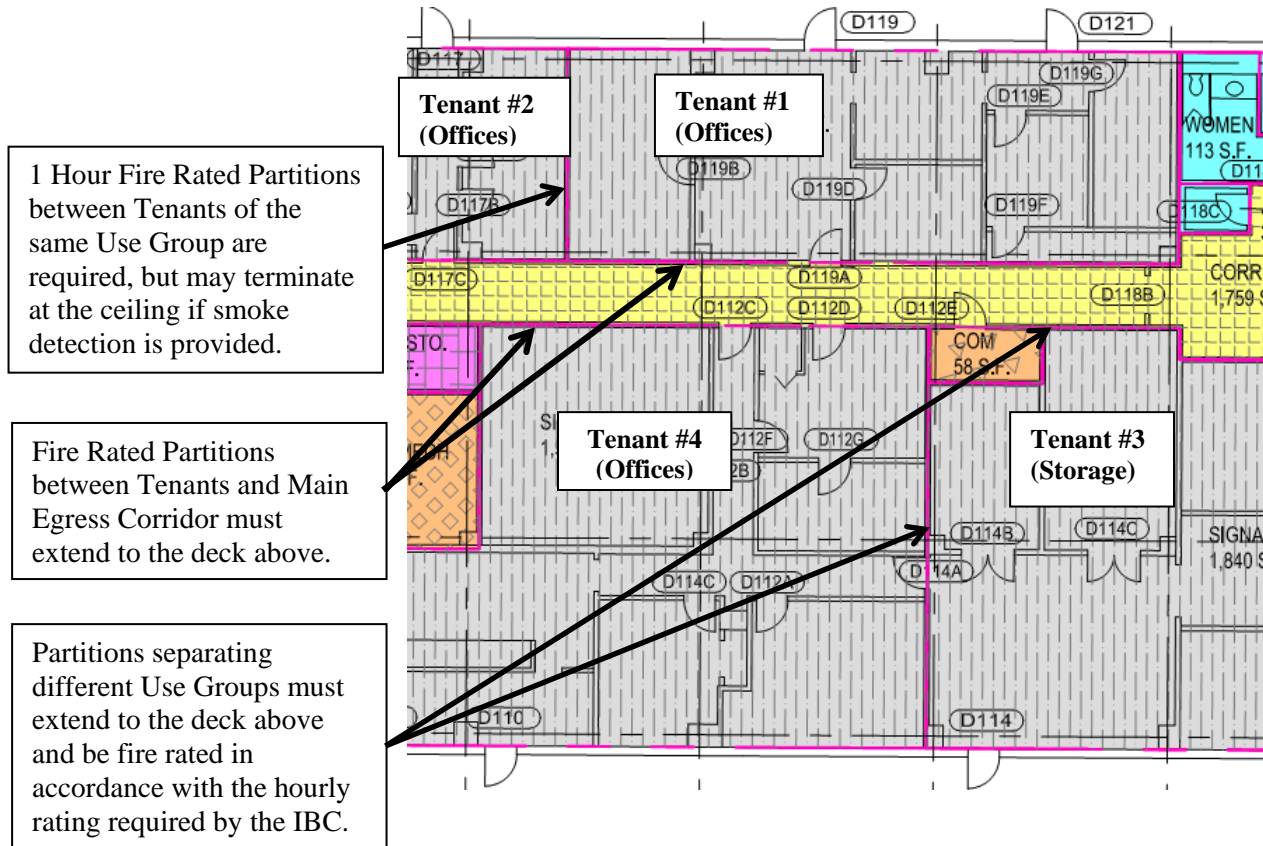
Use Group Separations:

Fire rated fire separation walls are required between adjoining tenant spaces and also between tenant spaces and service corridors serving multiple tenants. If separating Use Groups, the fire rated walls are required to extend tightly to the underside of the floor or roof deck above with all ductwork penetrations provided with U.L. listed, self-resetting, electrically actuated fire dampers shall be installed and all wiring penetrations protected in accordance with a U.L. listed penetration protection design. Fire rated separation walls between Use Groups shall comply with the fire rating requirements of the IBC and shall be constructed of non-combustible materials.

Tenant Separations, Same Use Group:

Fire rated fire separation walls are required between adjoining tenant spaces and also between tenant spaces and service corridors serving multiple tenants. If ceiling-mounted area smoke detection is provided

within the tenant spaces, the fire separation wall may terminate at the underside of a UL listed fire rated floor-ceiling Assembly. Fire rated separation walls separating tenants shall be one (1) hour fire rated and constructed of non-combustible materials.



Example 2: Lower Level – Fire Rated Partitions

Note: Where a one (1) hour fire rated tenant separation is required for a new tenant that could potentially disturb an existing adjacent tenant space, the new tenant space may be separated in accordance with Figure 1 or Figure 2 below, an alternate U.L. listed one (1) hour rated assembly. In such case, the fire separation partition shall extend on either the ceiling or to the deck above, as appropriate per Paragraph 7 above.

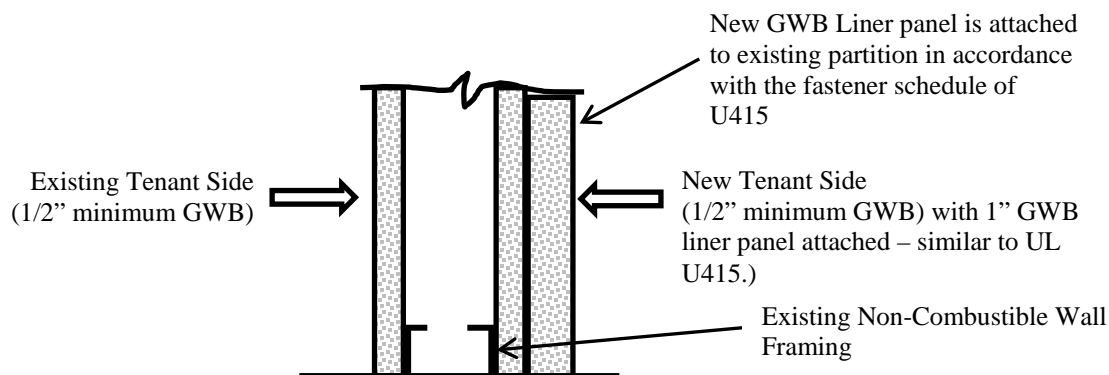


Figure 1 – Condition where 1/2" drywall is on one, or both, sides of an existing tenant separation partition and does not currently provide a 1 hour rating without additional GWB liner panel being installed.

1-Hour Fire-rated Construction		Non-loadbearing		Acoustical Performance		Reference	
Construction Detail	Description	Test Number	STC	Test Number	ARL	Index	
	<ul style="list-style-type: none"> 5/8" SHEETROCK FIRECODE Core gypsum panels, joints finished 2-1/2" USG C-H Studs 25 gauge 24" o.c. 1" SHEETROCK gypsum liner panels 	UL Des U415, System A or U469	39	USG-040901 Based on 4" C-H studs 25 gauge	SA926	1	

Figure 2 – Condition where 5/8" "Fire Code" drywall existing on only one side of the tenant separation partition and a gypsum liner panel is installed to completed the required separation.

15.4.2.8 Interior Finishes

All interior finishes must be Class "A".

15.4.2.9 Non-Combustible Casework

All casework is to be constructed of non-combustible materials (fire retardant treated wood is permitted).

15.4.2.10 Elevator and Moving Walks - Fire Detection and Suppression Requirements

1. The requirements of the State Elevator Code apply. See ANSI A17.1, as amended by the Division of Labor and Industry, State of Maryland (Article 89, Section 49B and 64, Annotated code of Maryland) for elevator and moving walk requirements.
2. Sprinklers are not required in the shaft of non-combustible traction (cable type) elevator shafts if the shaft is vented to the outside.

3. Venting is required on all elevators that serve four or more floors (stops), regardless of whether it is traction or hydraulic.
4. NFPA 13 requires a sprinkler head to be installed at no more than 24 inches above the pit floor for a hydraulic elevator. NFPA 72 requires a heat detector if used to disconnect power to the elevator to be placed within 2 feet of the sprinkler head, also a smoke detector for elevator recall shall be installed adjacent to the heat detector per NFPA 72.
5. The heat and smoke detector must be located no lower than 48 inches above the pit floor, otherwise they shall be rated as NEMA 4 (weatherproof) per ANSI 17.1. Presently, a NEMA 4 rating for smoke detectors does not exist. It is important to note that the sprinkler head must be installed exactly 24 inches above the pit floor to comply with both ANSI and NFPA codes.
6. Both heat detectors for power shut down, thru shunt trip circuit breakers, and smoke detectors for recall and sprinklers are required in the machine room and hydraulic elevator pit.
7. There is no requirement for smoke or heat detectors in moving walk or escalator pits. If they are installed, they are required to shut down the escalator or moving walk within 15 seconds and sound a warning buzzer on the escalator or moving walk.

15.4.3 Emergency Power Systems Table

EMERGENCY POWER FOR FIRE PROTECTION FEATURES

Locations	Emergency Power
A Concourse	Existing Emergency Power (Generator)
B Concourse	Existing Emergency Power (Generator)
A/B Terminal	Existing Emergency Power (Generator)
C Concourse	Existing Emergency Power (Generator) – BWI Dispatch and MAA Communications Room Only
C Concourse Tunnel	MER-2 Fire Pump, 3rd Floor OPS area, and TSA Security Checkpoint C
D DX DY Concourses	No Independent Power Generator – Redundant Utility Company (BGE) feeds and redundant MAA-Owned distribution system
North Terminal Extension, Between D/E	Existing Emergency Power (900kW Generator) Serves Ticket Lobby and Upper Level Commercial Corridor Emergency Lighting (2Q '09) and D/E Baggage Claim/Baggage Screening Operation (2Q '10)
Central Terminal	Existing Emergency Power for Lighting served by South Terminal's generator. – Redundant Utility Company (BGE) feeds and redundant MAA-Owned distribution system
E Concourse	Existing Emergency Power (Generator)
South Terminal	Existing Emergency Power for Lighting (250kW Generator) serves Ticket Lobby and Upper Level Commercial Corridor Emergency Lighting (2Q '09).

15.4.4 Existing Construction Types and Use Classifications

EXISTING CONSTRUCTION TYPES AND USE CLASSIFICATION TABLE

Locations	Use Group Separations (and Smoke Separations)	Construction Type	Code Built Under
A Concourse	Mixed Use (Smoke Separation Required Between Tenants & Mall)	IBC Type IB	IBC 2000 NFPA 101-2000
B Concourse	Mixed Use (Smoke Separation Required Between Tenants & Mall)	IBC Type IB	IBC 2000 NFPA 101-2000
A/B Terminal	Mixed Use (Smoke Separation Required Between Tenants & Mall)	IBC Type IB	IBC 2000 NFPA 101-2000
B-C Connector	Mixed Use (Smoke Separation Required Between Tenants & Mall)	IBC Type IB	IBC 2009 NFPA 101-2009
C Concourse	Mixed Use (Smoke Separation Required Between Tenants & Mall)	Undocumented Construction Type	Unknown
D Concourse	Mixed Use (Smoke Separation Required Between Tenants & Mall)	Undocumented Construction Type	Unknown
E Concourse	Covered Mall (No Smoke Separations Required Between Tenants and Mall)	Type IIB, Protected Column, Unprotected Roof	BOCA 1993
North Terminal Extension (Between D and E)	Separated Uses (Smoke Separations Required Between Tenants and Mall)	Undocumented Construction Type	Unknown
Center Terminal	Separated Uses (Smoke Separations Required Between Tenants and Mall)	Undocumented Construction Type	Unknown
North Terminal	Separated Uses (Smoke Separations Required Between Tenants and Mall)	IBC Type IB	Unknown
South Terminal	Separated Uses (Smoke Separations Required Between Tenants and Mall)	IBC Type IB	Unknown

LEGEND



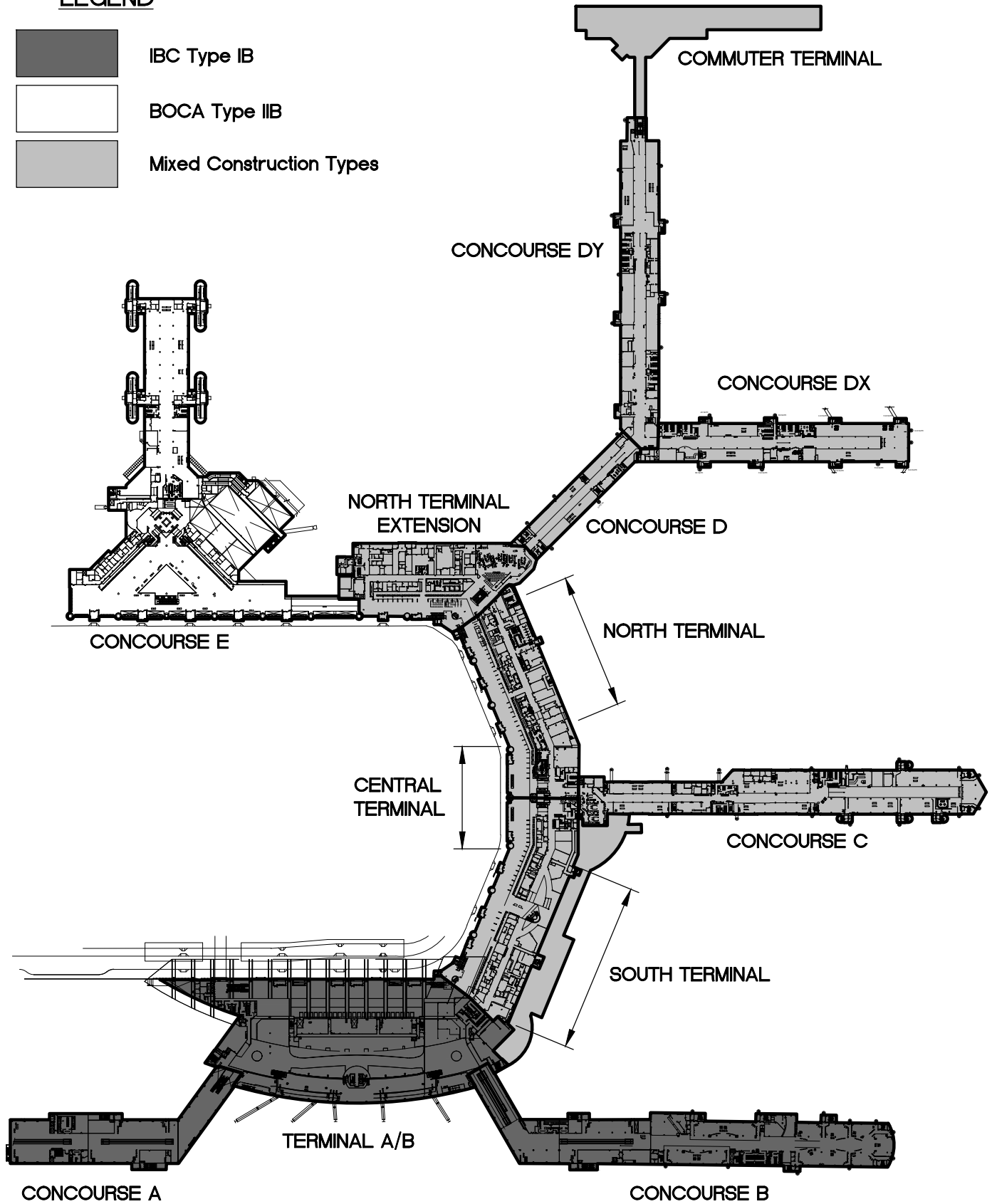
IBC Type IB



BOCA Type IIB



Mixed Construction Types



15.4.5 Fire Suppression Systems Table

AUTOMATIC FIRE SUPPRESSION SYSTEMS REQUIRED

Areas Protected	FM200 Clean Agent Systems	NFPA 17A Type, Wet, Hood Systems	Fire Cycle Automatic Sprinklers	Wet Automatic Sprinklers	Deluge Automatic Sprinklers (Pre-Action)	Dry Automatic Sprinklers (Non Pre- Action)	Dry Automatic Sprinklers (Pre- Action)
Terminals, Concourses, Concourses, and Public Areas				X			
General Office areas				X			
Storage Rooms and Baggage Handling Rooms				X			
Tenant Spaces				X			
Mechanical Rooms				X			
Critical Communications Rooms	X (Notes 1, 2)						
Skywalks				X			
Electrical Sub-stations, Interior, (13.8 KVA Incoming)			X				
Main Electrical Rooms							X (Note 4)
Cooler and Freezer Boxes				X (Note 3)			
Unconditioned Spaces				X (Note 3)			
Exterior Trash Chutes				X			

Areas Protected	FM200 Clean Agent Systems	NFPA 17A Type, Wet, Hood Systems	Fire Cycle Automatic Sprinklers	Wet Automatic Sprinklers	Deluge Automatic Sprinklers (Pre-Action)	Dry Automatic Sprinklers (Non Pre- Action)	Dry Automatic Sprinklers (Pre- Action)
Cooking Hoods, Class I, (UL 300 Type)		X					
Elevator Machine Rooms							X
Generator Rooms							X
Exterior Overhangs of Terminal Buildings						X	
Drive-Thru Tunnels						X	
Auto Shops, with open doors (subject to freezing)						X	
Cornice and Exterior Glazing Protection, as required by NFPA 415					X		

SPECIFIC NOTES TO TABLE OF “AUTOMATIC FIRE SUPPRESSION SYSTEMS REQUIRED”

Note 1: Water mist systems may be acceptable in lieu of FM200 systems. Contact the OFM for further information.

Note 2: Examples of critical communications rooms are those related to:

- Airfield Lighting
- Emergency Paging Systems
- Emergency Communications for consolidated Police and Fire (BWI Dispatch)
- Computer Servers
- Main Telephone Rooms
- Critical Computer Systems
- Fire Alarm Servers
- “IDF” Emergency Paging Rooms (fiber optics in/out and data routers for networks)
- Other rooms, or spaces, as may be designated critical to operations or life safety by OFM or MAA or FAA

- “Non-critical” telephone closets of 24 square feet, or less, do not receive automatic fire suppression systems. They are to be provided with automatic fire detection only. Refer to the detection requirements for further information.

Note 3: Cooler and Freezer Boxes and similar unconditioned spaces are to be provided with dry-barrel sprinkler heads, off of wet sprinkler systems. They are to be provided with separate control valve(s) with tamper switches.

Note 4: Main Electrical Rooms are to be provided with a sprinkler system activated shunt trip to deactivate electrical switchgear.

GENERAL NOTES TO TABLE OF “AUTOMATIC FIRE SUPPRESSION SYSTEMS REQUIRED”

- For rooms or spaces not specifically listed above, consult the OFM for guidance on required suppression systems.
- Hangars exceeding 12,000 square feet are required to be equipped with automatic foam fire suppression systems in accordance with NFPA 409. Consult with the OFM for specific guidance.
- Fire sprinkler systems are to be designed to meet the requirements of NFPA 13 Hazard Classifications, as follows:
 - ✓ Passenger areas, Public Areas, Tenant Spaces, and Offices are “Ordinary Hazard, Group I”. Water density of 0.2 GPM/SF. The maximum coverage per sprinkler head shall be 130 SF of the area.
 - ✓ Baggage Rooms, Mechanical Rooms, and Storage Rooms are “Ordinary Hazard, Group II”. Water density of 0.2 GPM/SF. The maximum coverage per sprinkler head shall be 130 SF of the area.
 - ✓ Cargo Buildings and Freight Terminals are to be designed for “Extra Hazard”
 - ✓ No areas are to be designed as “Light Hazard”
- “Fuel Farms” are to be protected with sub-surface automatic foam fire suppression systems.
- Although there are existing CO2 and Halon 1301 systems in some protected areas, they are not to be used in new construction without the approval of the OFM. When performing work in such an existing area, consult with the OFM for guidance.

15.4.6 Fire Detection Systems Table

AUTOMATIC FIRE AND SMOKE DETECTION SYSTEMS REQUIRED

Areas Protected	Combined Rate-of-Rise and Fixed Temperature Heat Detectors	Heat Detection Only	Smoke Detection
General Office Spaces			X (Note 6)
Storage Rooms			X
Kitchens		X (Note 2)	
Elevator Lobbies			X (Note 4)
Elevator Pits	X (Note 3)		
Elevator Machine Rooms		X (Note 9)	X (Note 8)
Escalator Pits			X
Communication Rooms	X		X (Note 1)
Non-Critical Telephone Rooms	X		
Non-Critical Electrical Rooms (480v to 120v "House Power")			X
Electrical Sub-Station Rooms	X		X
Tenant Space Transformer Rooms			X
Hazardous Materials Storage Rooms			X
Mechanical Rooms			X
Break Rooms (without kitchenette)			X
Break Rooms (with kitchenette)		X	
Sleeping Rooms			X
Bag Belts at fire rated walls			X (Note 5)

Areas Protected	Combined Rate-of-Rise and Fixed Temperature Heat Detectors	Heat Detection Only	Smoke Detection
Warehouses			X
Airfield Light Vaults			X
Automatic Smoke Doors at Pedestrian Tunnels			X (Note 7)
Automatic Smoke Doors at Skywalks			X (Note 7)

SPECIFIC NOTES TO TABLE OF “AUTOMATIC FIRE AND SMOKE DETECTION SYSTEMS REQUIRED”

Note 1: Ceiling mounted room smoke detection in Communications Rooms is not to activate Pre-Action Dry Sprinkler Systems or FM200 Clean Agent systems.

Note 2: A ceiling mounted heat detector is required within 6 feet of each non-commercial kitchenette hood. General area heat detection is not required in kitchens.

Note 3: A heat detector is required within 2 feet of the automatic sprinkler head in the elevator pit. The heat detector is to be a probe type, rate-of-rise, detector that meets NEMA Standards for wet or damp locations.

Note 4: Smoke detectors in elevator lobbies are for local elevator recall only, as required by NFPA 101, ANSI A17.1, and the Maryland State Elevator Code. They are not to initiate general fire alarm activation.

Note 5: Smoke detectors are required on both sides of fire rated walls where bag belt penetrations occur. They are to activate the fire shutters at each opening.

Note 6: General office spaces require ceiling mounted, area, smoke detection. Where separate corridors are established with floor to ceiling partitions, additional smoke detection is required in the office corridors. For additional guidance concerning office groupings contact the OFM.

Note 7: Smoke detectors are required on both sides of smoke doors at Skywalks and Pedestrian Tunnels. They are to activate the smoke doors or fire doors at each opening.

Note 8: Elevator Machine Room smoke detection is for elevator recall.

Note 9: Elevator Machine Room heat detection is for shunt trip activation.

GENERAL NOTES TO TABLE OF “AUTOMATIC FIRE AND SMOKE DETECTION SYSTEMS REQUIRED”

- Duct Smoke detectors are required in HVAC systems where required by NFPA 90A and 90B criteria.
- Water Flow detectors are required for all automatic sprinkler system control valves.
- Wherever “Heat Detection” is required above, combination Rate-of-Rise and Fixed Temperature (ROR-FT) detectors may be used except where specifically “Heat Detection Only” is listed (e.g. – Break rooms with kitchenette, Elevator shunt trip, Kitchens). In “Heat Detection Only” locations, combination ROR-FT detectors may not be used, however it is permissible to install ROR-FT detectors in those locations if only the FT portion of the combination detector is wired to be functional for detection notification.
- Fire Alarm Control Panels (FACP) are not to be set to provide automatic building evacuation signaling in public areas upon receipt of a water flow, smoke, heat detection signal, or manual pull station activation, but are to provide automatic evacuation signaling in tenant areas. They are to transmit a fire alarm signal to the Emergency Communications Center (BWI Dispatch). All FACP are to be non self-resetting.

15.4.7 Manual Fire Alarm Pull Station Table

MANUAL FIRE ALARM PULL STATIONS REQUIRED

Areas Protected	Manual Pull Station
Exit doors and Egress Stairwells	X (Note 1)
Parking Garages	X (Note 1)
Fire Doors at Skywalks	X (Note 2)
Cooking Hoods, 17A systems, local activation only	X (Note 3)
FM200 systems, local activation only	X (Note 3)
Fire Cycle Systems, local activation only	X (Note 3)
CO2 System at Generator Room (Existing)	X (Note 3)

SPECIFIC NOTES TO TABLE “MANUAL FIRE ALARM PULL STATIONS REQUIRED”

Note 1: Fire alarm pull stations are required at each Main Exit door, each egress stair, and at each vestibule leading to the outside. They are not required at tenant space public entrances (such as at security grill entrances). Manual pull stations are also required at not more than 200 feet of travel distance apart.

Note 2: Fire alarm pull stations are required on the terminal side of skywalk doors and on the parking garage side of skywalk doors.

Note 3: These are local pull stations to manually activate local extinguishing systems. They are a component of the specific fire suppression system.

15.4.8 Special Fire Protection Code Requirements For Martin State (MTN) Airport

All DST and other fire protection requirements in these Fire Protection Design Guidelines apply to Martin State Airport, unless otherwise provided for herein.

The AHJ for fire protection matters at MTN is the MAA OFM.

15.4.8.1 Fire Protection Water Supply at Martin State Airport

For all new work (additions, new buildings, major building renovations, water supply lines) that may affect water based fire suppression systems or fire hydrants, contact the OFM for specific requirements and information that may apply. Recently completed, or programmed, water supply improvements may affect design considerations.

15.4.8.2 Aircraft Fueling

As per NFPA 407 requirements, no aircraft fueling is permitted within aircraft hangars. Fueling of aircraft within hangars is a violation of the Title 29 06.01, State Fire Prevention Code and offenders are subject to the penalties prescribed therein.

15.4.8.3 Fire Alarm Systems

MTN has various manufacturers' fire alarm systems (Honeywell, Tyco Integrated Security, Simplex). Contact the OFM in advance to coordinate any work involving replacement, modifications, or extensions to any existing fire alarm equipment.

15.4.9 Procedures for Determining Occupant Loads and Minimum Required Egress Capacities for Concourses

15.4.9.1 Overview

This Policy is to be used in the planning and construction of all new Concourses, and in modifications or expansion of existing Concourses at BWI Marshall that affect egress capacity or occupant loads. It also applies to all future terminal development involving Concourse egress. It is intended to provide consistent and documented methods established by the Fire Marshal as the Authority Having Jurisdiction (AHJ) for fire code enforcement at BWI Marshall Airport.

15.4.9.2. Purpose

These criteria are intended to result in avoiding unsafe egress conditions that could otherwise result from unanticipated events (e.g. -air traffic delays, inclement weather, security related events, et cetera). They are intended to provide safe and effective means of prompt evacuation and adequate emergency egress.

Additionally, this Policy serves as an authoritative reference for use by Architects, Engineers, and Airport Planners in the preparation of plans and specifications for additions, alterations, and/or renovations of the terminal buildings at BWI Marshall Airport.

15.4.9.3 Definitions

The following terms are defined for use in the application of this Policy. Any terms not specifically defined in these procedures shall be as defined within the latest adopted Edition of the Life Safety Code, NFPA 101.

- a. "Maryland Aviation Administration" (MAA) is the Owner and operator of BWI Marshall Airport.
- b. "Approved" shall mean acceptable to the Authority Having Jurisdiction (AHJ).

- c. “Authority Having Jurisdiction (AHJ)” is the organization, office, or individual responsible for approving equipment, materials, an installation, or a procedure. For purposes of the implementation, enforcement, and interpretation of these procedures, the Fire Marshal for BWI Marshall Airport is the Authority Having Jurisdiction.
- d. “Office of the Fire Marshal” (OFM) shall mean the Fire Marshal for BWI Marshall Airport, who is the Authority Having Jurisdiction for fire code enforcement.
- e. “Existing” shall mean that which is already in existence on the date this Policy goes into effect.
- f. “Life Safety Code” and “NFPA 101” refers to the Life Safety Code, NFPA 101, of the current Edition adopted by the State of Maryland.
- g. “IBC” and “International Building Code” refers to the International Building Code, published by the International Code Council, of the current Edition adopted by the State of Maryland.
- h. “Occupant Load” is the number of occupants within the Concourse, determined in accordance with the requirements herein, for which sufficient emergency egress and controlled evacuation accommodations must be provided.
- i. “Controlled Evacuation” shall mean a condition under which there is an evacuation of Concourse occupants through the Concourse front egress facilities only, either directly to the Terminal Building or via an adjacent secure corridor connector between Concourses that egresses to the Terminal Building or to an approved horizontal exit constructed in accordance with NFPA 101, under controlled evacuation procedures, via public address system announcement, or as otherwise directed by authorized MAA personnel. Controlled evacuation procedures are not intended for imminent life safety threatening emergency egress conditions (e.g. – fires and similar emergencies, see “Emergency Evacuation”).
- j. “Emergency Evacuation” shall mean emergency egress from the Concourse(s) in response to a fire or other similar life threatening emergency condition. Emergency egress may be via a combination of the front exit, an adjacent secure corridor connector between Concourses that egresses to the Terminal Building or to an approved horizontal exit constructed in accordance with NFPA 101, or to emergency egress stairs leading to the airside apron, or any other approved means of egress from the Concourse. An emergency evacuation condition is an event under which all required means of egress (including Concourse egress stairs)

are intended to be available to safely and promptly evacuate the building in accordance with adopted fire codes and emergency egress procedures.

- k. “Passengers” or “Passenger Load” shall be as described within the portions herein that apply to specific Concourses. Note that the methods for establishing passengers or passenger loads for Concourses A and B are different than those for other Concourses due to unique operational characteristics for those Concourses.
- l. “Meeter/Greeters” – Currently, non-ticketed meeter/greeters are barred from all Concourses. Therefore, non-ticketed meeter/greeters are not considered a portion of the Concourse occupancy load calculation methods for all existing Concourses. If, in the future, non-ticketed passengers are admitted to the Concourses, a meeter/greeter multiplier of 1.2 (or another alternate multiplier if approved in advance by MAA and OFM) would be applied to the base occupant load.

NOTE: For new Concourses, the Designer shall calculate egress requirements with and without using the Meeter/Greeters multiplier applied to the occupant load calculation method. The Designer shall provide a cost comparison (based on a 1.2 meeter-greeter multiplier) for the Concourse with and without Meeter/Greeters for MAA’s consideration. (See 15.4.9.5.1, c.)

- m. “Employees and Staff” (Concourses A and B only) – Staff load is defined by the maximum staff required to operate the building. This includes gate agents, airline crews, concession employees, custodial staff, and miscellaneous Airport and security staff. Consult with the OFM in advance regarding appropriate employee and staff levels to include in occupant load calculation for Concourses A and B. This applies to Concourses A and B only.
- n. The “MAA Aircraft Parking Plan” is an exhibit that indicates the largest mix of aircraft that can be simultaneously parked at each gate position supported by a holdroom as set forth by the MAA and is subject to periodic revision by the MAA. An updated aircraft-parking plan is to be provided to the OFM by MAA for reference each time that subsequent revisions by MAA occur. An example of an MAA Aircraft Parking Plan is included in Section 15.4.10.3. The example is a sample only; in all cases refer to the current official MAA Aircraft Parking Plan.

15.4.9.4 Concourses A, B and Terminal AB Occupant Load Determination

In addition to the methods contained in NFPA 101 for occupant loads and egress determination, Concourses A, B and Terminal AB are also required to

comply with the special methods described herein and with Formula 1 in Section 15.4.9.4.

The Concourse occupant load is required to include the sum of the passenger loads from each aircraft, airline employees and crews and concession employees, custodial and general staff, accumulated from two departing flights (herein referred to as “first-flight” and “second-flight”).

A passenger load is obtained for the first flight by using a 95% load factor of the available seating capacity of the largest aircraft that can park at each gate simultaneously, as designated in the most current MAA Aircraft Parking Plan.

A second flight passenger load is added to the first-flight passenger load to simulate a two-hour flight delay. The second-flight passenger load is calculated based on a factor of 61% of the 95% first-flight load. The second-flight factor is derived from historical data showing approximately 39% of passengers are transfers within the same Concourse or remain on board. The passengers of the second flight are assumed to simultaneously populate the Concourse with those of the first flight in the event of delays. The combined 95% of the first-flight, plus an additional 61% of that 95%, can be represented by a simplified factor of 153% of the total aircraft passenger seat count. First and second-flight factors may be updated periodically, based upon significant changes in historical data.

In the calculation methods herein, values of passenger shall be rounded up where fractional numbers occur, as in the following example.

Example of Passenger Count Method:

First-Flight (based on 137 passenger seat aircraft on 15 Gates)
 $137 \text{ passengers/plane} \times 95\% = 130.15$ (131) passengers per Gate
 $131 \text{ passengers/Gate} \times 15 \text{ Gates} = 1,965$ passengers, First-Flight

Second-Flight
 $131 \text{ passengers per Gate} \times 61\% \text{ delay factor} = 79.91$ (80) passengers per Gate
 $80 \text{ passengers/Gate} \times 15 \text{ Gates} = 1,200$ passengers, Second-Flight

Total Passenger Occupant Load = $1,965 + 1,200 = 3,165$ passengers

Or, the following simplified formula is considered sufficiently accurate and is presented as Formula 1:

[Formula 1] $153\% \times 137 \text{ total seats} \times 15 \text{ Gates} = (3,144.15), 3,145 \text{ passengers}$

Where there are aircraft of varying maximum seating capacities shown on the MAA Aircraft Parking Plan at Concourse Gates, the maximum seating counts of

each aircraft type shall be used to determine the total passenger occupant load of an entire Concourse.

To the computed passenger occupant load, the airline crews, staffs, employees and other occupant loads shall be added as follows. Deviations from these values must be approved by the Fire Marshal in advance and must be based on substantiated and reliable other values.

5 crew persons per Gate

2 airline staff per Gate

1 employee per small shop

1 employee per small bar

8 employees per fast food restaurant or deli

Large restaurants and other spaces shall be as determined by the OFM

2 Security staff and 1 Airport maintenance staff shall be included in the overall Concourse population

A Fire Protection Engineer, who is a licensed Professional Engineer in the State of Maryland, shall prepare any such calculations and supporting justification for review of the OFM and shall sign and seal them accordingly.

Formula 1- Concourse Occupant Load Determination (Passenger Seating Method)

Occupant Load = (1.53 x Total Aircraft Seating Capacity) + (Concessions Employees, Crews, Airport staff and Airline Employees)

15.4.9.4.1 Emergency Egress Capacity Requirements

Emergency egress capacity requirements for Concourses A and B are based on the Model Codes (NFPA 101, IBC), except as modified herein. A Fire Protection Engineer, who is a licensed Professional Engineer in the State of Maryland, shall prepare any such required egress capacity and occupant load calculations, with supporting justification, for review of the OFM for any modifications or expansions of a Concourse that affect egress or occupant loads.

- a. Egress components from Concourses must be sized to provide at least 50% of the Concourse occupant load through the front/main exit. The main/front exit of the Concourse is considered the egress route into the Terminal Building. Egress via an adjacent secure corridor that connects Concourses may also be considered contributing to the front/main exit egress capacity provided that the secure corridor leads to egress to the Terminal building or to a space designed to meet the requirements of NFPA 101, most recent adopted Edition, for "Horizontal Exits".

- b. Egress components from Concourses must be sized to provide at least 100% of the Concourse occupant load through the Concourse egress stairs to the airfield-side apron to accommodate an incident that could block the front/main exit. The Fire Marshal has determined that a potential exists for an incident rendering the front Concourse exits possibly inaccessible or no longer well defined during the incident.

Exception 1: In existing Concourses, where 100% occupant load egress stair capacity is not currently provided, upgrading the stair capacity to achieve 100% capacity is not required unless the Concourse footprint is being increased in area.

Exception 2: In existing Concourses, where 100% occupant load egress stair capacity is not currently provided, upgrading the stair capacity to achieve 100% capacity is not required if the Concourse area is being increased in order to improve existing deficient egress via the required front exit (as per paragraph a., above).

- c. If there are more stringent egress requirements of the IBC, they shall apply.

15.4.9.4.2 Alternative Time Based Egress Analysis

In lieu of the above method (15.4.9.4.1), a Maryland licensed Professional Engineer, who is also a Fire Protection Engineer, may provide a performance based life safety egress analysis, subject to AHJ approval, for Concourses A and B. This alternative method of evaluating egress capacity is a performance-based approach, using approved time-based dynamic linear egress analysis, which considers the travel distance and passenger flow rates through the egress components leading to the front/main exit. This method takes into account elements of crowd behavior, walking speed, physical elements of construction (ramps, stairs, level walking surfaces, etc.) and population density to forecast the required minimum egress capacity widths to ensure the orderly evacuation of the airside space. A Fire Protection Engineer, who is a Professional Engineer licensed in the State of Maryland, shall prepare any such calculations and supporting justification, and those documents shall be signed and sealed accordingly. The OFM shall be consulted in advance regarding acceptable parameters to be applied concerning assumed physical mobility of the occupants, average walking speeds, notification delay time to occupants, accessible routes of egress, and other criteria upon which the egress model is to be based.

15.4.9.5 Concourses C, D, E and Future Concourses Occupant Load Determination

Occupant load determination for Concourses C, D, E, and all future Concourses, must comply with 15.4.9.5. These requirements are based on the NFPA Life Safety Code, with certain modifications as listed herein.

A Fire Protection Engineer, who is a licensed Professional Engineer in the State of Maryland, shall prepare any required egress capacity and occupant load calculations or evacuation modeling, with supporting justification, for review of the OFM and shall sign and seal them accordingly for any modifications or expansions of a Concourse that affect egress or result in increased occupant loads.

- a. NFPA 101 Compliance - Emergency Evacuation Conditions
Calculate the Concourse occupant load based on square footage tables and occupant load factors of the NFPA Life Safety Code (NFPA 101). Exclude toilets, under the simultaneous occupancy provisions, per code.
- b. IBC Compliance – Currently, the NFPA 101 occupant load and egress requirements are more stringent than those of the IBC. Therefore, compliance with NFPA 101 is deemed as meeting the requirements of the IBC. In the event that the IBC becomes more stringent than NFPA 101 in matters regarding occupant loads and egress capacity requirements, the most stringent egress requirements of either the IBC or the NFPA 101 shall apply.

15.4.9.5.1 Emergency Egress Capacity Requirements

The emergency egress analysis assumes the availability of all designated emergency egress components, in accordance with model code provisions. Emergency egress requirements for Concourses C, D, E, and future Concourses are based on NFPA 101, except as modified herein. A Fire Protection Engineer, who is a licensed Professional Engineer in the State of Maryland, shall prepare any such required egress capacity and occupant load calculations, with supporting justification, for review of the OFM for any modifications or expansions of a Concourse that affect egress or occupant loads.

- a. Egress components must be sized to provide at least 50% of the Concourse occupant load through the front/main exit. The main/front exit of the Concourse is considered the egress route into the Terminal Building. Egress via an adjacent secure corridor that connects Concourses may also be considered contributing to the front/main exit egress capacity provided that the secure corridor leads to egress to the Terminal building or to a space designed to meet the requirements of NFPA 101 for Horizontal Exits.

- b. Egress components must be sized to provide at least 100% of the Concourse occupant load through the Concourse egress stairs to the airfield-side apron to accommodate an incident that could block the front/main exit. The Fire Marshal has determined that a potential exists for an incident rendering the front Concourse exits possibly inaccessible or no longer well defined during the event.

Exception: In existing Concourses, where 100% occupant load egress stair capacity is not currently provided, upgrading the stair capacity to achieve 100% capacity is not required unless the Concourse footprint is increased in area.

- c. Currently, non-ticketed meeter/greeters are barred from all Concourses. Therefore, non-ticketed meeter/greeters are not considered a portion of the Concourse occupancy load calculation methods for all existing Concourses. If, in the future, non-ticketed passengers are admitted to the Concourses, a meeter/greeter multiplier of 1.2 (or another alternate multiplier if approved in advance by MAA and OFM) would be applied to the base occupant load.

NOTE: For new Concourses, the Designer shall calculate egress requirements with and without using the Meeter/Greeters multiplier applied to the occupant load calculation method. The Designer shall provide a cost comparison (based on a 1.2 meeter-greeter multiplier) for the Concourse with and without Meeter/Greeters for MAA's consideration.

15.4.9.5.2 Special Criteria for Controlled Evacuation Conditions.

In addition to meeting the requirements of the Model Code criteria above, a time-based analysis must be provided that ensures that Concourse C, D, E, or Future Concourses can be evacuated under a controlled evacuation condition. (Note: Concourses A and B were evaluated for compliance with this condition at the time of design and are considered compliant as long as Concourses A or B are not increased in area or passenger seating count.) The controlled evacuation analysis is to assume that the egress stairs to the airfield apron are not available and that all egress is to be through only the front/main exit through the Terminal Building. No airfield apron stair availability is to be used for this evaluation.

- a. The controlled evacuation analysis is to be performed using a time-based egress modeling method, acceptable to the OFM.
- b. 100% of the above occupant load is required to egress via the front of the Concourse, through the Terminal Building for the analysis. Egress

via a secure corridor adjacent to the front exit to the Terminal Building, connecting to another Concourse through a horizontal barrier which complies with NFPA 101, is also considered as being egress via the front of the Concourse.

- c. It must be demonstrated by the evacuation analysis that the entire Concourse population is capable of being evacuated within 20 minutes via the front exit(s), unless alternate evacuation time criteria are approved by the OFM in advance.
- d. A Fire Protection Engineer, who is a licensed Professional Engineer in the State of Maryland, shall prepare any such calculations and supporting justification for review of the OFM and shall sign and seal them accordingly.

**DETERMINING OCCUPANT LOADS AND MINIMUM EGRESS
CAPACITIES FOR CONCOURSES A AND B**

FOR CONCOURSES A AND B, EITHER METHOD 1 OR 2 BELOW MUST BE SATISFIED

OR

**Method 1,
Aircraft Based Occupant Loads**

- The Concourse population is based on the sum of passengers, airline and concession employees, custodial and general staff accumulated from two departing flights in accordance with 15.4.9.4.

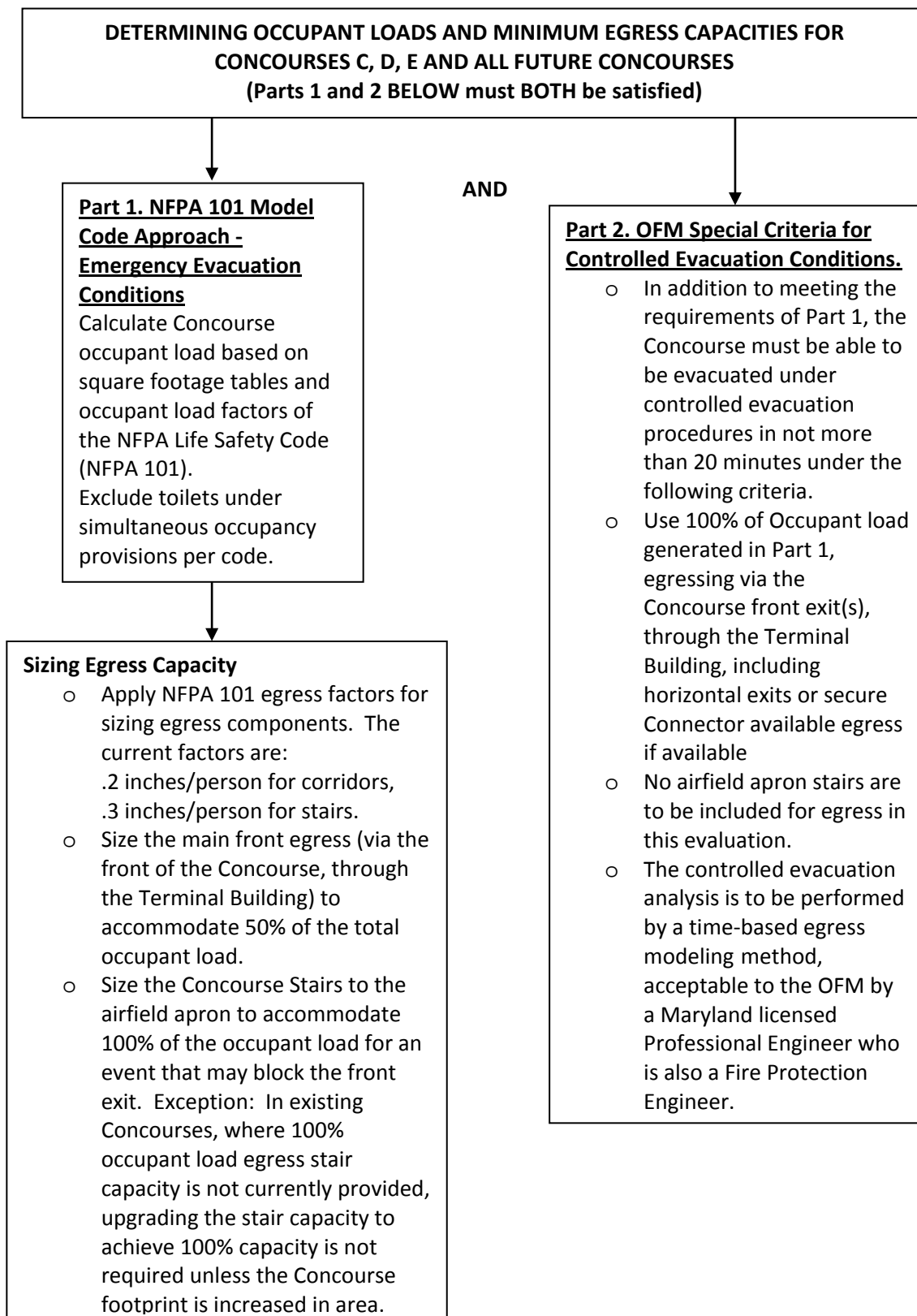
Sizing Egress Capacities

- Apply NFPA 101 egress factors for sizing egress components. The current factors are:
 - .2 inches/person for corridors,
 - .3 inches/person for stairs.
- Size the main front egress (via the front of the Concourse, through the Terminal Building) to accommodate 50% of the total occupant load.
- The stairs to the airfield side apron must be sized to accommodate not less than 100% of the Aircraft Based Occupant Load, as calculated above. Exception: In existing Concourses, where 100% occupant load egress stair capacity is not currently provided, upgrading the stair capacity to achieve 100% capacity is not required unless the Concourse footprint is increased in area.

**Method 2,
Life Safety Engineering
Analysis**

In lieu of Method 1, A Fire Protection Engineer, who is a Professional Engineer licensed in Maryland, may provide a performance based life safety egress analysis, subject to AHJ prior approval of the use of this method.

DETERMINING OCCUPANT LOADS AND MINIMUM EGRESS CAPACITIES FOR CONCOURSES C, D, E AND FUTURE CONCOURSES



15.4.10 Procedures for Holdroom Sizing

15.4.10.1 Overview

This method is to be used in the planning and construction of aircraft boarding holdrooms in all new Concourses, and in modifications or expansion of existing holdrooms within existing Concourses A, B, C, D and E at BWI Marshall Airport. It applies to all future terminal development involving concourse holdroom sizing. It is intended to provide consistent and documented methods in that regard, as established by the Office of the Fire Marshal as the Authority Having Jurisdiction (AHJ) for fire code enforcement at BWI Marshall Airport.

15.4.10.2 Purpose

These criteria are intended to result in avoiding unsafe conditions and overcrowding, which could otherwise result from unanticipated events (e.g. -air traffic delays, inclement weather, et cetera). Experience shows that such delays can lead to the unplanned accumulation of passengers awaiting departing flights, which can present an unsafe condition if not properly designed for in advance.

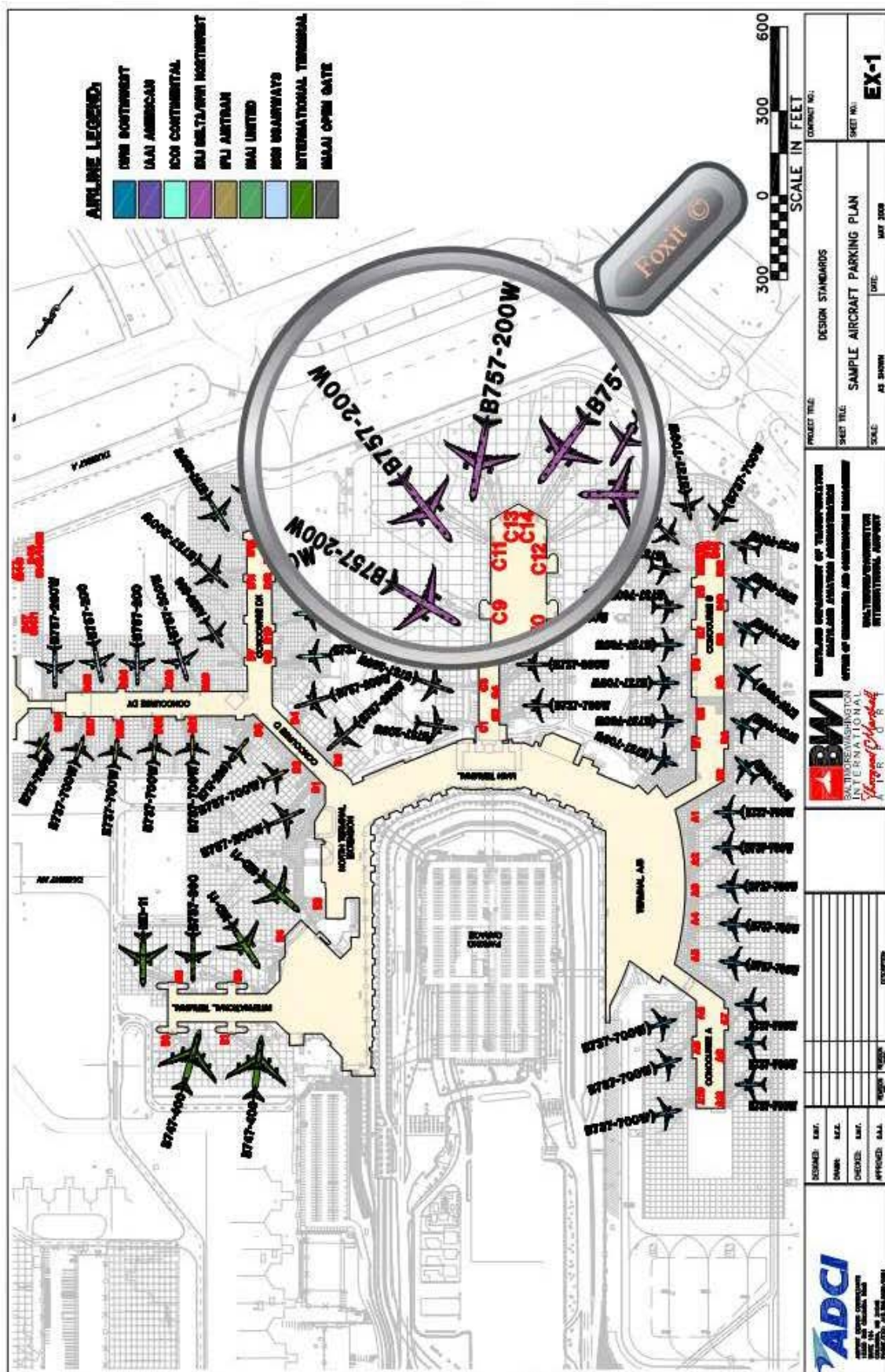
Additionally, this Policy serves as an authoritative reference for use by Architects, Engineers, and Airport Planners in the preparation of plans and specifications for additions, alterations, and renovations at BWI Marshall Airport.

15.4.10.3 Definitions

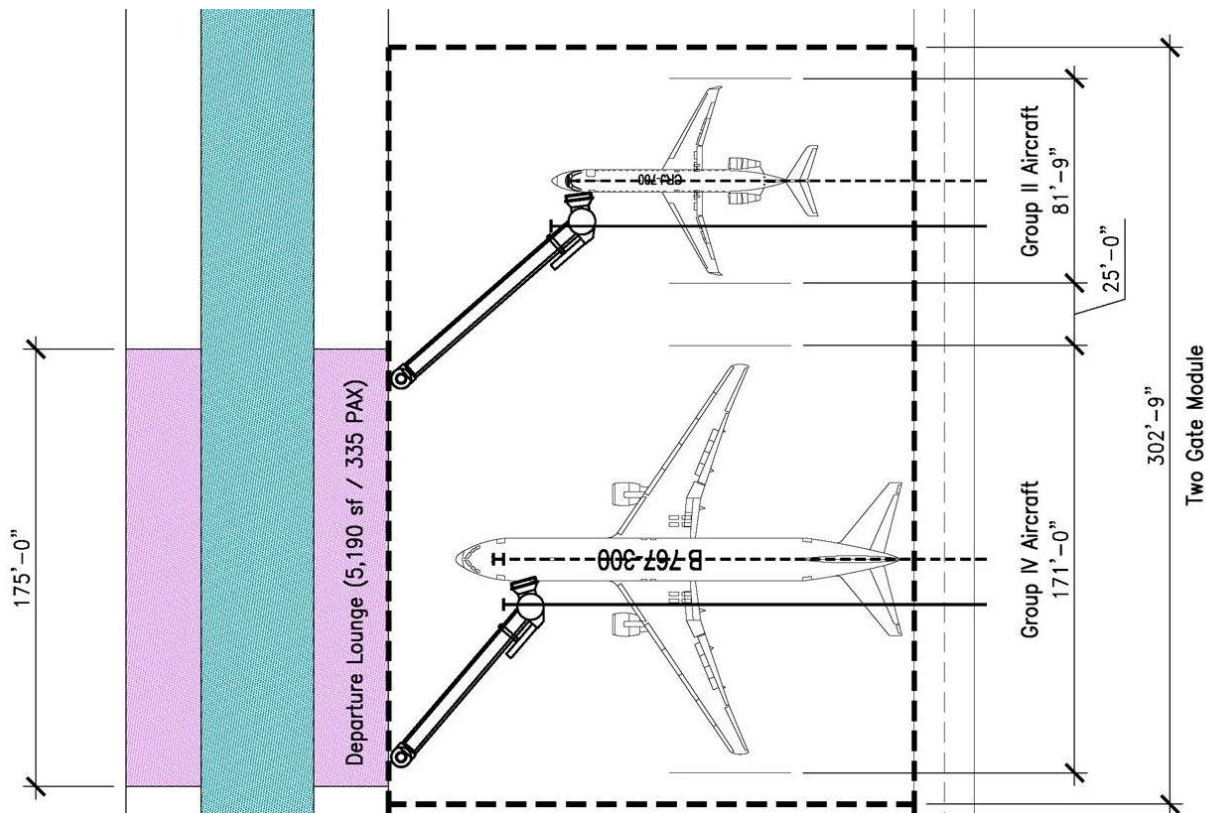
The following terms are defined for use in the application of this Policy.

- a. “Maryland Aviation Administration” (MAA) is the Owner and operator of BWI Marshall Airport.
- b. “Approved” shall mean acceptable to the Authority Having Jurisdiction (AHJ).
- c. “Authority Having Jurisdiction (AHJ)” is the organization, office, or individual responsible for approving equipment, materials, an installation, or a procedure. For purposes of the implementation, enforcement, and interpretation of this Policy, the Fire Marshal for BWI Marshall Airport is the AHJ.
- d. “Office of the Fire Marshal” (OFM) shall mean the Fire Marshal for BWI Marshall Airport, who is the Authority Having Jurisdiction for fire code enforcement.

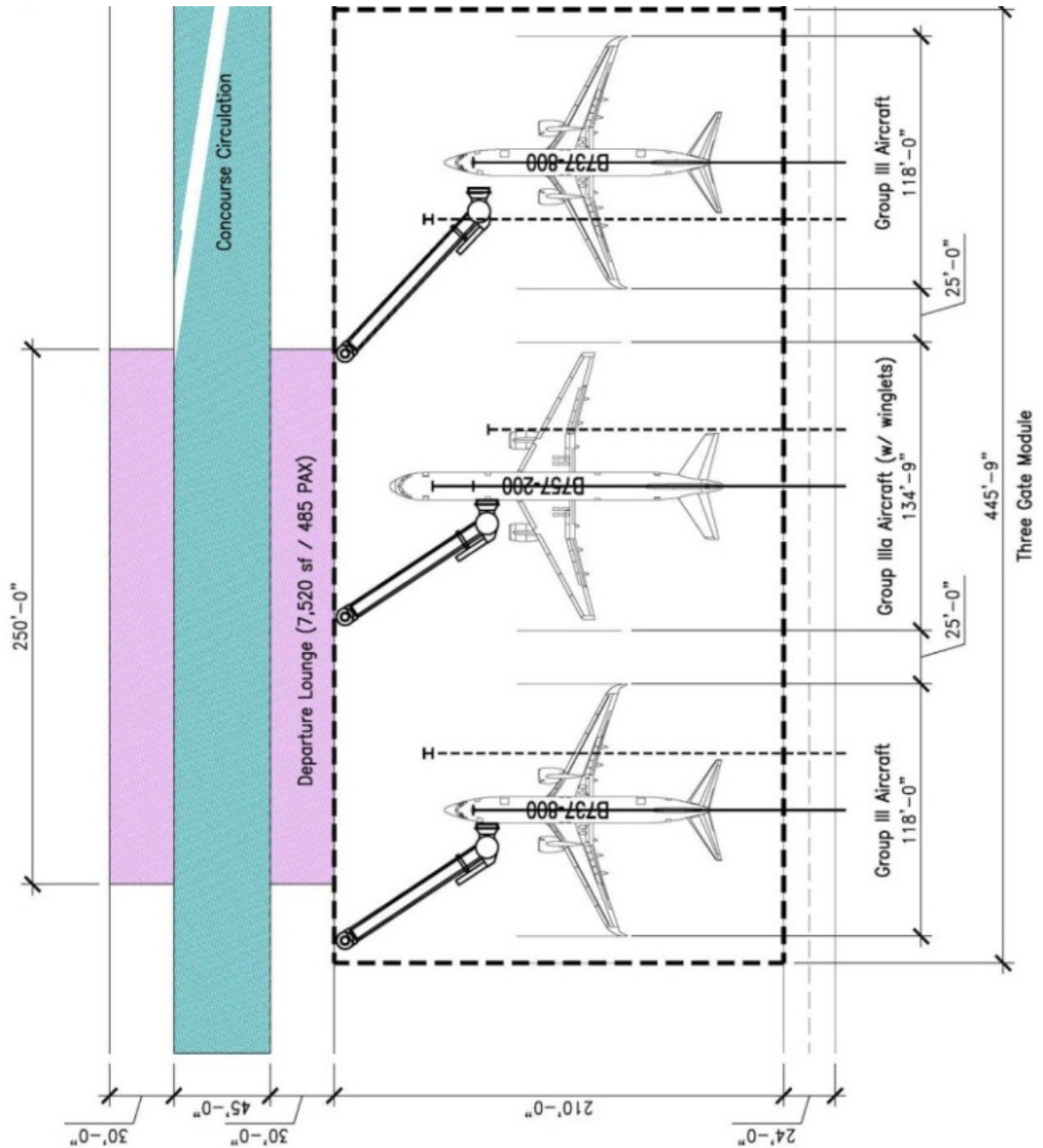
- e. “Existing” shall mean that which is already in existence on the date this Policy goes into effect.
- f. “Minimum Holdroom Area” (MHA) shall mean the total required gross square footage of space to be provided for passenger waiting purposes serving a Gate(s), based upon Formula 2. The MHA may include columns, seats, queuing lines and check-in desk areas, as well as general passenger seating and standing areas, and other waiting areas within the holding room or area. However, required egress aisles, or egress corridors, leading to required exits may not be credited toward the total required MHA space due to code requirements that they be kept free and clear at all times for emergency egress use.
- g. The abbreviation “sf” refers to square feet.
- h. “Design Population (DP)” is the number of passengers to be used in Formula 2 in 15.4.10.4 for determining minimum required holdroom area for single or shared holdrooms. The aircraft type shall be based on the MAA Aircraft Parking Plan for the holdroom(s) being evaluated. Shared holdrooms are those that are either contiguous or which meet the adjacency criteria of this Section, supporting more than one aircraft. The DP shall be developed based on the following criteria.
 - 1. Single Holdrooms: The design population for single holdrooms shall be equal to 100% of the maximum seating capacity of the largest aircraft served by the holdroom, based on the MAA Aircraft Parking Plan.
 - 2. Shared Holdrooms” are contiguous holdroom areas that support more than one aircraft gate. The design population for shared holdrooms shall equal 100% of the seating capacity of the largest mix of aircraft that can be simultaneously parked at the gates being supported by the shared holdroom area, based on the MAA Aircraft Parking Plan.
- i. The “MAA Aircraft Parking Plan” is an exhibit that indicates the largest mix of aircraft that can be simultaneously parked at each gate position supported by a holdroom as set forth by the MAA and is subject to periodic revision by the MAA. An updated aircraft-parking plan is to be provided to the OFM by MAA for reference each time that subsequent revisions by MAA occur. An example of an MAA Aircraft Parking Plan is included. This plan is a sample only; in all cases refer to the current official MAA Aircraft Parking Plan.



- j. “Adjacency” is defined as a condition under which holdrooms can be designed to serve two or more gates by providing credit for proven “surplus” unoccupied area in one holdroom to enhance one or more other holdroom’s required area. Adjacent holdrooms may be immediately adjacent areas, and may also include those areas on opposite sides of a common public circulation area. For a hold room to be considered for adjacency credit, the travel path from said hold room to the Gate served must be unimpeded by moving walks, or other similar obstructions, and must be reasonably expected to provide usable passenger accommodation for the intended Gate.
- k. “Gate Module” refers to a concept that is based on any aircraft ranging from ADG-II up to ADG V aircraft, to park at any gate, depending on airline fleet mix and simultaneous parking capability. The Gate Module aligns gate and holdroom capacity to the current and projected pattern of gate utilization by an airline. An MAA issued modular gate and holdroom plan (MAA Aircraft Parking Plan) is intended to provide an observable means to monitor for compliance and mitigate the need for code review whenever an airline changes equipment gauge. Some examples of Gate Modules are as follows.



Example of a 2-Gate Module based on simultaneous parking of two aircraft at shared or contiguous hold room(s).



Example of a 3-Gate Module based on simultaneous parking of two Boeing 737-800 (176 seats) and a single Boeing 757-200 (185 seats) using shared or contiguous holdrooms.

*15.4.10.4 Holdroom Sizing Criteria**15.4.10.4.1 New Construction*

- a. The required minimum holdroom area (MHA) for a holdroom serving a single gate for new construction is determined per Formula 2, below. Adjacency credits established in 15.4.10.5 may be used to compensate for meeting this area requirement.

[Formula 2] **MHA (sf) = 15.5 (square feet per passenger) X DP (passengers)**

- b. The minimum holdroom area for a “Gate Module” is based on a gate fleet mix of up to a three aircraft module established by an airline and MAA. Aggregate holdroom area, based on the associated fleet mix shall be in accordance with this Policy. Adjacency credits established in 15.4.10.5 may be used to compensate for meeting this area requirement.

15.4.10.4.2 Existing Conditions, Not New Construction

- a. No code related improvements are required concerning existing holdroom size and egress if existing holdrooms are expanded within current exterior wall limitations of the concourse, and the Concourse building footprint is not increased, subject to paragraph b., below.
- b. If existing egress conditions are not in compliance with the NFPA 101 Life Safety Code (current adopted Edition) for “Existing Buildings”, those conditions must be corrected to the extent specified by the AHJ.
- c. No decreases in existing egress capacity, or width of main circulation corridor serving the concourses, will be permitted unless supporting calculations are provided to the AHJ, which justify the reduction based on current applicable code requirements and conformance with policies established by the AHJ. A Fire Protection Engineer, who is a licensed Professional Engineer in the State of Maryland, shall prepare any such calculations and supporting justification.
- d. No decrease in existing undersized holdroom area(s) will be permitted unless there is a corresponding reduction in aircraft size (i.e. - passenger seat counts) in the aircraft serviced at the subject gate, and the resulting holdroom area(s) satisfies this holdroom sizing Policy.
- e. In the event that the MAA Aircraft Parking Plan is modified such that an aircraft of larger seating capacity is designated for an existing Gate served by an existing holdroom (or a combination of Gates served by an existing

shared holdrooms), the existing holdroom(s) may remain at its existing size so long as the holdroom does not thereby become undersized by more than 20% of the required area. Adjacency credits may be applied in determining the adequacy. If the holdroom becomes undersized by more than 20%, even with adjacency credits applied, a reconfiguration of the holding area or room shall be required to bring it into compliance with Formula 2, if deemed necessary by the OFM for life safety reasons. **Note: In no case, shall a hold room be permitted to be reduced below its 100% compliant size (as determined by this Standard) in order to increase leased space as a result. The 20% accommodation is intended solely to address extremely difficult circumstances in bringing existing conditions up to compliance with required hold room areas generated by the introduction of aircraft of larger seating capacity to existing Gates.**

The determination of whether an individual hold room is undersized by more than 20% shall be in accordance with the following method.

Example of Hold Room Deficiency Calculation

Assume in this example, an existing hold room area of 2,300 square feet, serving a Gate utilizing a 737-700 aircraft (137 seats). If a 737-800 aircraft is intended to replace the 737-700 aircraft, with a new seating of 176 seats, the new hold room area percent deficiency is calculated as follows:

$$\frac{(\text{New Required Hold Room Area}) - (\text{Existing Hold Room})}{(\text{New Required Hold Room Area})} = \% \text{ (deficiency)}$$

$$\text{New Required Hold Room Area} = 176 \text{ pax} \times 15.5 \text{ sf/pax} = 2,728 \text{ sf.}$$

$$\frac{(2,728 \text{ sf}) - (2,300 \text{ sf})}{(2,728 \text{ sf})} = 15.76\% \text{ (deficiency)}$$

15.4.10.5 Adjacency Credits

Adjacency is a condition in which, surplus space of adjacent, or nearby, holdrooms may be credited to other holdroom area(s) for passenger seating purposes, subject to the following conditions. It is not required that areas be contiguous in order to qualify for adjacency credits so long as the following criteria is met.

- a. Holdrooms being considered for adjacency area credits must have surplus capacity for such purposes, after an analysis has been made in accordance with Formula 2. (Exception - If Gates are unleased, those areas may be automatically credited toward adjacency credit so long as they meet the criteria of 15.4.10.5, paragraphs b. and c., as follows).

- b. In order to qualify for adjacency credit, the spaces must not be separated by other uses or by significant obstructions which would hinder the ability of passengers to migrate easily between the two areas while awaiting boarding at their assigned gate. Holding spaces on the opposite side of a Concourse are eligible for consideration of adjacency credits.
- c. In order to qualify for adjacency credit, passengers in adjacent areas must be able to have a generally unobstructed line of sight to the holdroom of their boarding gate and the ability to hear public address boarding announcements and flight updates for their flight.

15.4.10.6 Hold Room Distribution and Balance For New Construction

- a. The holding space required by this Policy is intended to represent an aggregate amount of space distributed throughout the Concourse to best serve the aircraft-parking plan. The apportionment of holding areas is expected to be of reasonable balance and distribution throughout the Concourse so as to minimize potential overcrowding of any specific holding room or area.
- b. The aggregate holding area shall be capable of adequately meeting the requirements of this Policy, based on the MAA Aircraft Parking Plan.
- c. In the event that a new (constructed after the date of adoption of this Policy) individual hold room experiences a negative balance of available passenger holding area square footage of 20% or more on a regular basis (based on a comparison of required area per Formula 2 versus available area, and after taking into account all available adjacency credits), a reconfiguration of the holding area or room shall be required to bring it into conformance with Formula 2, if deemed necessary by the OFM for life safety reasons.

Note: In no case, shall a hold room be permitted to be reduced below its 100% compliant size (as determined by this Standard) in order to increase leased space as a result. The 20% accommodation is intended solely to address extremely difficult circumstances in bringing existing conditions up to compliance with required hold room areas generated by the introduction of aircraft of larger seating capacity to existing Gates. The method of calculation shall be in accordance with 15.4.10.4.2, e.

DETERMINING HOLDING AREA (HOLDROOM) SIZE REQUIREMENTS FOR ALL CONCOURSES, EXISTING AND FUTURE

Is this considered New Construction for Holding Area Requirements?

It is considered new construction if any of the following is involved.

- Change in existing space distribution, or
- Expansion of Concourse building footprint, or
- Change in occupancy type, or
- Increased aircraft passenger counts for an existing gate which causes more than a 20% deficiency in holdroom area for an existing holdroom?

If the answer is "Yes" to any of the above, New Construction Requirements Apply. If not, Existing Conditions apply.

Yes

New Construction Requirements

Establish the Passenger Load

Determine the passenger load that must be accommodated by the holding room or area, for the Gate(s) served, based on the following criteria.

- Assume that 100% of the Aircraft seats are being occupied
- Use the largest aircraft mix the Gate(s) can accommodate based on the MAA Aircraft Parking Plan.

Establish the Holding Space Required for the Gate

Provide 15.5 square feet of holding area per passenger.

- Holding area must not impinge into required Concourse corridor circulation area.
- No credit is given for the Concourse circulation area as hold space.
- No credit is given for required egress aisles and egress corridors as hold space

Adjacency as a Portion of Providing Required Holding Space

Adjacent areas and spaces are permitted to comprise a portion of the required holding area for a Gate, so long as the criteria of the Adjacency requirements herein are met.

No

Existing Construction Requirements

Existing Conditions Requirements

- No Code Related Improvements are required for holdroom size and egress if existing holdrooms are expanded within current exterior wall limitations of the Concourse.
- If egress conditions do not comply with NFPA 101 for "Existing Buildings", those conditions must be corrected to the extent specified by the OFM.
- No decreases in existing egress capacity or width of main circulation corridor serving the Concourses will be permitted unless supporting calculations are provided to the OFM that justify the reduction.
- No decrease in existing undersized holdroom area will be permitted unless the aircraft size served at the subject gate is reduced and the resulting area requirement satisfies the sizing policy.

15.4.11 Pre-Occupancy Fire Inspection Checklist

The Pre-Occupancy Fire Inspection checklist (a form provided by the Fire Department) is included in Appendix B. This form should be used for self-checking readiness for inspection.

CHAPTER 16 SECURITY

16.1 SECURITY SYSTEM DRAWINGS

Security System design shall be produced as separate and unique sections in the contract plans and specifications. Security Systems shall be defined as the Controlled Access Security System (CASS), the Flex response system, the Closed Circuit Television (CCTV) systems, and the supporting communication and/or Fiber-optic backbone delivery systems. All information pertaining to these systems must be clearly tagged and separated in all submitted drawings and documents. These sheets must also carry the following statement:

“WARNING: This record contains Sensitive Security Information that is controlled under 49 CFR parts 15 and 1520. No part of this record may be disclosed to persons without a “need to know”, as defined in 49 CFR parts 15 and 1520, except with the written permission of the Administrator of the Transportation Security Administration or the Secretary of Transportation. Unauthorized release may result in civil penalty or other action. For U.S. government agencies, public disclosure is governed by 5 U.S.C. 552 and 49 CFP parts 15 and 1520.”

CHAPTER 17 AIRPORT INFORMATION TECHNOLOGY (IT) SYSTEMS

Designers shall obtain the latest IT standards from the MAA Office of Technology's website at the following link: <http://www.marylandaviation.com/OTstandards/index.html>.

Standard specifications can also be obtained/viewed from OT's website. In order to edit the specifications with the MAA standard headers/footers for a specific project, Designers must request the latest specifications from the OT Manager of Telecommunications.

CHAPTER 18 ELECTRICAL

The electrical systems for all facilities shall be based on proven design principles and the NFPA 70 Electrical Code. The final configuration, selection and sizing of the electrical system shall be determined by the designer during detailed design phase. The design shall utilize state of the art technology in available equipment and components. The electrical system shall be flexible to accommodate changes, additions and modifications as necessary. Straight forward designs shall be safe, reliable and cost effective.

Accessibility, ease of erection and dismantling of all the components of the system shall be a priority.

18.1. GENERAL ELECTRICAL REQUIREMENTS

18.1.1 UPS Protection

All contract documents for retrofitting, modifying, or new building construction, which involve data jacks, cabling, etc., shall be designed to include, at a minimum, one duplex outlet on a UPS circuit adjacent to each data jack location. This requirement is in addition to any convenience outlet requirements, and is to provide UPS protection for each PC-CPU and future telephone system which is deployed.

18.1.2 Total Harmonic Distortion

1. In order to minimize potential effects of harmonics from: Frequency Converters (including 400 hertz ground power units for aircraft), and Uninterruptible Power Supplies (UPS) of 30,000 volt-ampere capacity or greater, the technical specifications for each piece of such equipment must include the following requirements:
 - a. Harmonics Content: total harmonic distortion (THD) of the input current waveform, as measured at the input terminals where the equipment is connected to the premises electrical system, shall be 30% or lower whenever the load on the equipment is 50% of its rated output or higher, independent of external filters.
 - b. Power Factor: the input power factor measured at the input terminals, where the equipment is connected to the premises electrical system, shall be 90% or higher whenever the load on the equipment is 50% of its rated output or higher.
2. For Adjustable Frequency Drives (AFDs) for motors 25 horsepower or larger, the technical specifications for each piece of such equipment must include the following requirements:
 - a. Harmonics Content: total harmonic distortion (THD) of the input current waveform, as measured at the input terminals where the equipment is

connected to the premises electrical system, shall be 15% or lower, and the THD of the voltage waveform shall be 3% lower whenever the load on the equipment is 50% of its rated output or higher, independent of external filters.

- b. Power Factor: the input power factor measured at the input terminals where the equipment is connected to the premises electrical system, shall be 90% or higher whenever the load on the equipment is 50% of its rated output or higher.

3. Branch Circuits: All circuits shall have a dedicated neutral conductor.

- a. The ungrounded and grounded conductors of each branch circuit shall be grouped by wire ties or similar means in at least one location within the panelboard or other point of origin, splice or terminations point.

In addition, for Adjustable Frequency Drivers of 300 horsepower or more or a group of Drives with horsepower adding to the 500 horsepower or more, a system study shall be performed by the designer to demonstrate compliance with IEEE Std 519-1992 Tables 10.2 and 10.3. The point of common coupling for the study shall be the immediately upstream medium voltage to low voltage substation in the Airport distribution system. If the study indicates that the IEEE standard cannot be met with above THD limits, then the designer shall specify lower limits so that the IEEE Standard requirements are met.

18.1.3 Approved Testing Laboratories

All equipment and materials shall be tested and labeled by a nationally recognized testing laboratory. A current list of recognized laboratories should always be available on the following website, and should be regularly referred to for updates:

www.firemarshal.state.md.us/Testinglabs.htm

Background:

Electrical Testing Laboratories are qualified private organizations that meet the requirements in 29 CFR 1910.7 to perform independent (i.e., third-party) safety testing and product certification, and thereby receive OSHA recognition. To be recognized by OSHA, an organization must: (1) Have the appropriate capability to test and evaluate products for workplace safety purposes; (2) be completely independent of the manufacturers, vendors, and users of the products for which OSHA requires certification; (3) have internal programs that ensure proper control of the testing and certification process; and (4) establish effective reporting and complaint handling procedures (29 CFR 1910.7(b)).

Any testing laboratory that is listed or otherwise recognized by the U.S. Department of Labor, Occupational Safety and Health Administration, National Voluntary Laboratories Accreditation Program (NVLAP), International Accreditation Service,

Inc., or the International Code Council, is automatically accepted by the Office of the Maryland State Fire Marshall and Maryland Aviation Administration.

18.1.4 Aluminum Electrical Wire

No aluminum electrical wire shall be permitted at BWI Marshall and MTN Airports.

18.1.5 Final Cleaning of Electrical/Communication/IT Closets

All projects involving modifications to or in electrical, communication, and/or IT closets/rooms shall provide language within the specification requiring the entire area be cleaned by the contractor prior to demobilization, including removal of all debris, surface dust, etc.

18.1.6 Medium Voltage Cable Terminations

Components used for medium voltage cable terminations at equipment connections and splices, such as tubing used for sealing cable jackets shall bear a manufacturer's name and product series identifier.

Wherever practicable, cold shrinkable tubing shall be specified in preference to heat shrinkable tubing, to minimize potential damage from overheating and need for high levels of workmanship on the part of the installer.

18.1.7 Transformers

18.1.7.1 Transformer Safety Markings

- A. Transformers shall be marked around visible edges with a 2-inch red reflective tape. The tape shall be installed so that 1 inch of material is on either side of the edge.
- B. Existing transformers shall meet the Transformer Safety Marking requirements (Paragraph 18.1.7.1.A) when an existing transformer is in a location where there is a proposed change of use and/or alteration being made either to the area around the transformer or to the space the transformer is serving.

18.1.7.2 Transformer Sizing

- A. Transformers for tenant improvement projects shall be sized on the basis of calculated/demand load plus 25% or the connected load, whichever is higher. The designer shall submit complete set of calculations and demand factors for both calculated/demand load and connected load as part of permit drawing submission for the approval of MAA.

18.1.7.1.3 *Transformer location*

No transformer above 10KVA shall be permitted above ceilings.

Exceptions:

1. Specialty transformers for low voltage lighting, neon lighting, or other similar systems shall be reviewed on a case-by-case basis.
2. When an existing transformer is in a location where there is no change of use, change of occupancy, or significant alteration either to the space being served or the area around the transformer, subject to the discretion of the Authority Having Jurisdiction (AHJ).
3. Transformers permitted in writing by the AHJ.

18.2 GROUNDING AND LIGHTNING PROTECTION

18.2.1 Grounding

Whenever grounding electrode conductors are bonded to ground rods or other grounding electrodes, bonds shall be exothermic welds. Exothermic welds shall be coated against corrosion where direct buried.

1. Ground Rods: Ground Rods shall be $\frac{3}{4}$ " in diameter, 10' long as a minimum. Materials of construction shall be copper-coated steel as a minimum. Ground rods shall be designed and installed per the National Electric Code.

18.2.2 Surge Suppression, Bonding and Grounding for Outdoor Systems

Surge Suppression, Bonding and Grounding, shall be included in the specifications and plans for the following outdoor installations:

- Parking and Revenue Control Systems
- Closed Circuit Television System (CCTV) Installations
- Access Control
- Any unprotected system that may be struck by lightning that would conduct the lightning energy to the inside of the facilities.

Note: Equipment product catalog numbers included in this design standard are for equipment manufactured and provided by Emerson Network Power, EDCO, Transient Voltage Surge Suppression, or by General Electric but these are not meant to be sole source or proprietary specifications. Products by other manufacturers, which meet or exceed the specifications of the named products and include salient features matching those named may be specified, and used.

18.2.2.1 Protection for Parking and Revenue Control Systems

Surge suppression devices shall be installed on all electrical conductors connected to lane toll equipment (revenue plaza equipment, ticket dispensers (spitters) and gates). Typical installations include data cabling (RS-422 for example) and electrical power circuits that feed the lane equipment, and booths.

Protection for Data Cabling

The RS 485/RS-422 circuits shall be protected with an EDCO PC-642-008LC signal line protection device. This device provides two stages of protection with an 8-volt clamp which coordinates well with the 6-volt normal operating voltages on RS-422/485 circuits. The LC suffix indicates low capacitance which allows the suppressor to operate at higher data rates. The EDCO PC series suppressor modules shall be ordered with a model PC-BIB base assembly. The first stage (odd numbered) terminals shall be connected to the field-side wiring and that the second stage (even numbered) terminals shall be connected to the equipment-side cabling to the protected equipment.

Many locations run RS-422 cables from lane-to-lane in a daisy-chain fashion (parallel connections). In these locations the inter-lane cabling shall be bridged in and then out to the next lane on the field-side wiring of the suppressor. This requires separate inbound and outbound inter-lane cables connected to the field-side of the suppressor with a short pigtail data cable between the suppressor equipment-side and the lane equipment. A suppressor shall be installed on the end of the inter-lane cabling where it attaches to an isolator or protocol converter. **Figure 1** below shows the inter-lane cabling configuration graphically.

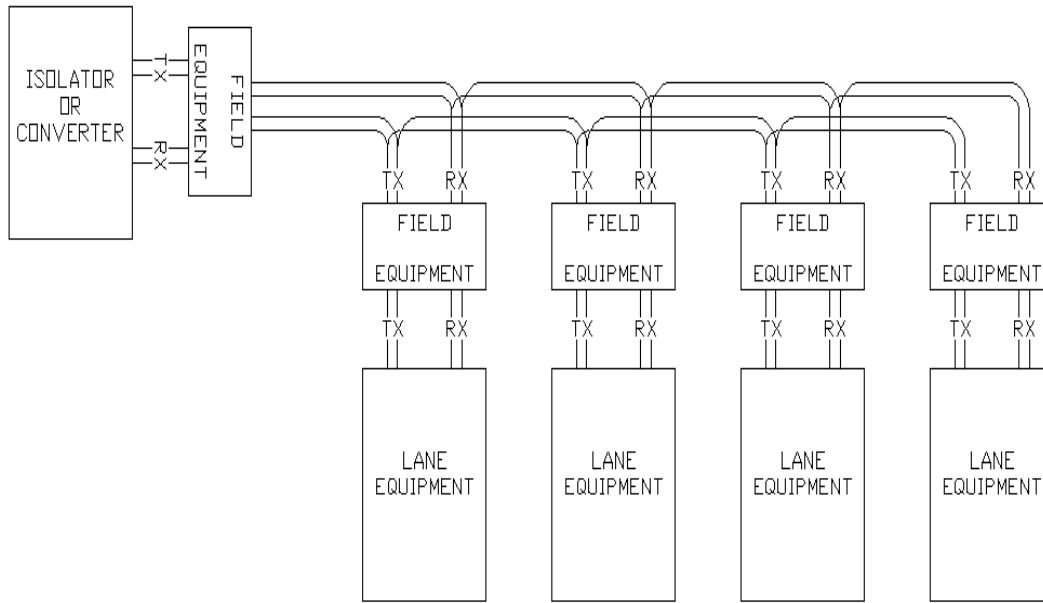


Figure 1 – Inter-Lane Cabling Configuration

Power ground wires and signal suppressor ground wires shall be as short as possible and be bonded to the equipment chassis as physically close to the suppressor as possible. This will minimize the effects of inductive voltage drop across these conductors and help control the voltage excursions that occur during a surge between the protected conductors and the equipment chassis. **Figure 2** below from the EDCO suppressor's application notes depicts these details.

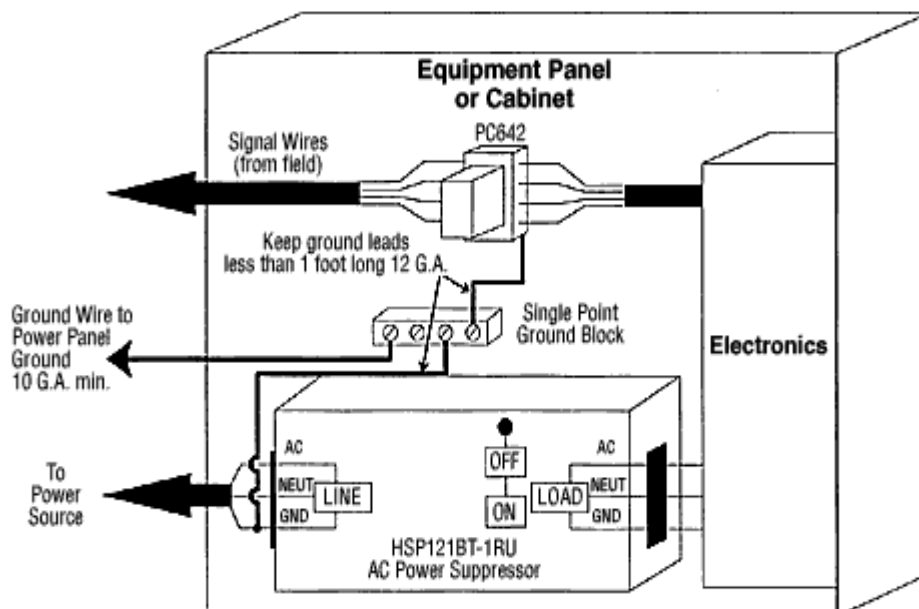


Figure 2 – Chassis Bonds for Suppressor Grounds

Protection for 120 Volt AC Powered Equipment

The 120 Vac powered cashier interface terminals, ticket spitters and gates shall be protected with either an EDCO model HSP121BT or a model HSP121A surge suppressor.

The EDCO HSP121BT has an external barrier strip which is suitable for installation inside ticket spitters, and gate operator housings that are not normally accessible to the cashier or others.

The EDCO HSP121A is mounted in a NEMA enclosure and has an internal terminal strip and knockouts that will accept conduit fittings or cord strain relief fittings. The EDCO HSP121A shall be used inside the cashier booths for protection of the cashiers' interface terminals. Using a cord strain relief fitting, the device shall be hard wired in series with the power input to the UPS at the booths. This will help ensure that the cashiers do not plug heaters into an unused receptacle protected by the surge suppression device as these devices are only rated for 15 amperes.

At the gates, these units shall be used to protect the 120 Vac feed to the controllers with the 120 Vac for the motors taken off upstream of the device. Motor loads shall not be fed through the surge suppressors.

The central equipment is typically located at the equipment cabinet in the Toll Plaza Administration building. The power equipment in the closet cabinet is usually supported by one or two plug-strips. An EDCO TS-1200G suppressor which will plug into one of the receptacles located in the cabinet shall be used.

The plug-strip(s) can then be plugged directly into the EDCO TS-1200G. The “G” in the part number is an external binding post ground terminal. It connects to the internal grounds in the suppressor and provides a good point to attach the ground leads from the data line suppressors.

18.2.2.2 Protection for Closed Circuit Television Systems

Remote Closed Circuit Television (CCTV) cameras located at gates and parking areas are particularly susceptible to damage from lightning, largely due to the high level of exposure to direct lightning strikes or strikes in near proximity.

Protection for CCTV Cameras

The CCTV cameras typically include pan tilt assemblies, and are integrated units requiring 24 Vac power, RS-485 4-wire pan-tilt-zoom control and a coaxial video connection. A NEMA 4X rated equipment enclosure is typically installed at the base of each tower. This enclosure contains a quad electrical receptacle, a fiber-optic transceiver for video and control, a power transformer for camera power and a separate power transformer for the fiber-optic transceiver. Adequate space must be provided in the enclosure for the required surge suppression devices.

Figure 3 below depicts several measures that shall be taken at typical tower locations. An air terminal, fashioned from a galvanized ground rod shall be installed to protect the camera housing from direct lightning strike currents. A ground rod and bonding conductor to the tower shall be added to improve the ground resistance of the tower foundation. Continuous steel conduit shall be installed from the camera housing to the equipment enclosure to help shield the camera cabling from induced voltage if the tower is struck by lightning.

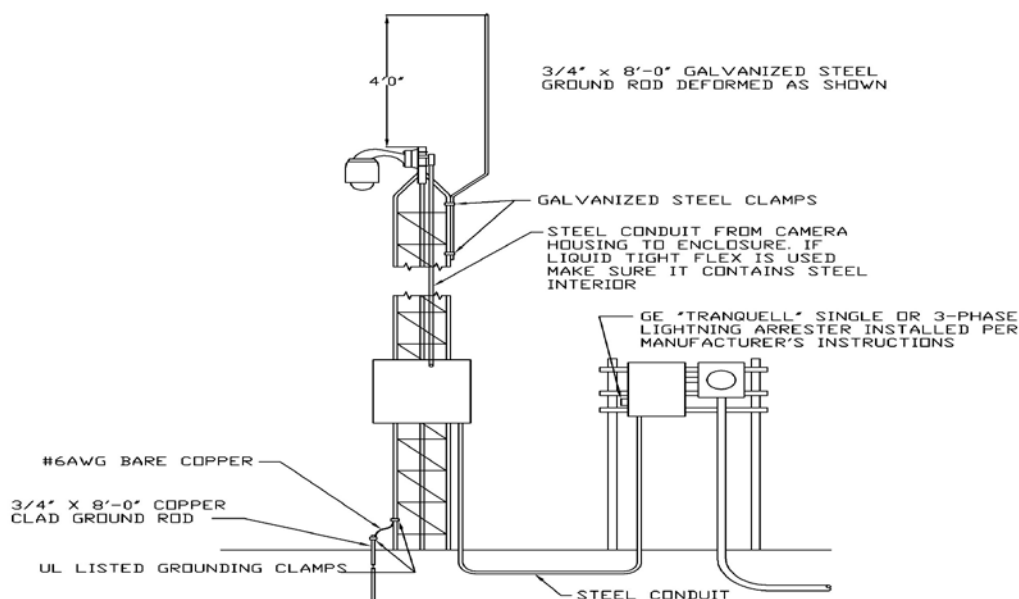


Figure 3 – CCTV Camera Tower Recommendations

Because of the relatively high exposure of these sites a high energy Metal Oxide Varistor (MOV) arrester shall be installed at the electrical panel serving each camera tower. The product recommended is a General Electric Tranquell device in either a 120/240 Vac single phase or 120/208 Vac three phase configuration. These units install in a knockout in the panel and either is directly connected to the buses or connected through a 30-ampere breaker. These units are rated for 10,000 ampere Category C exposure conditions and they will provide a first stage clamp down to a level between 2 kV and 3 kV. This provides an additional level of protection that will help extend the lifespan of suppressors installed inside the camera cabinet.

Figure 4 below shows the recommended configuration for the CCTV power, video and RS-422 pan-tilt-zoom control circuits at the base of the tower. These enclosures are typically equipped with quad 120 Vac receptacles to plug-in the camera power transformer and the plug-in DC supply for the fiber transceiver. Protect these receptacles with an EDCO HSP-121A, NEMA 4X, 120 Vac, suppressor. This suppressor (shown as A on Figure 4) is shown interconnecting these receptacles with the incoming power conductors. This suppressor will control voltage excursions from line-to-neutral and from line-to-ground to about 300-400 volts during 10 kiloampere Category C surge conditions. These suppressors are required in these locations due to the high exposure levels to direct lightning.

NOTES

- A EDCO HSP-121A 120VAC NEMA 4X
- B EDCO FAS-1-043HC 24VAC
- C EDCO CX-06-BNC-Y-I GND ISOLATED VIDEO
- D EDCO PC-642-008LC/PCB1B RS-485
- E #12AWG COPPER & RING LUGS - KEEP SHORT
- F NEW 4'SQ BOX WITH RECEPTS & COVER
- G 1' X 1/8" COPPER BUS BONDED TO SIDE OF CABINET
- H BOND HSP INPUT GROUND TERMINAL TO INCOMING GROUND CONDUCTOR. EXTEND BONDING JUMPER FROM INPUT GROUND THROUGH DRILLED HOLE TO BAR

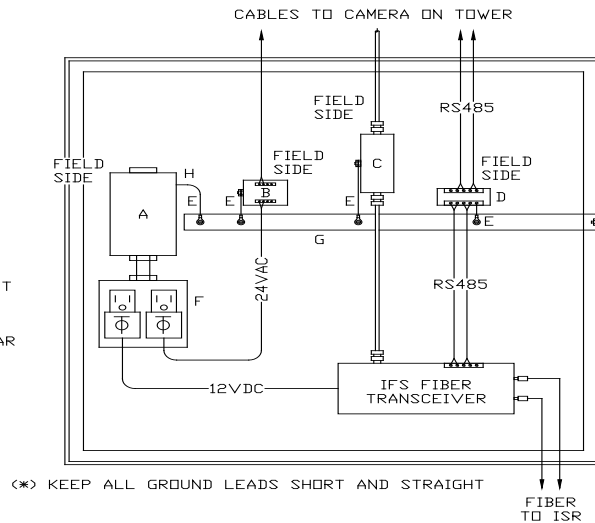


Figure 4 – CCTV Equipment Enclosure Recommended Configuration

An EDCO FAS-1-043HC, two-stage, suppression shall be installed to protect the 24 Vac power conductors to the camera assembly. This suppressor uses series inductors between the first and second stage rather than resistors, allowing it to pass several amperes of current.

An EDCO CX-06-BNC-Y-I, coaxial suppressor (shown as B on Figure 4) shall be installed to protect the camera video cable. This suppressor uses a female BNC connector on both the field-side and equipment-side. A clamp voltage of 6-volts is recommended as the peak-to-peak video levels should be around one volt.

An EDCO PC-642-008LC/PCB1B, two-pair low capacitance suppressor (shown as D on Figure 4) shall be installed to protect the RS-485 circuits with a clamping voltage of eight volts. This is consistent with the 6-volt operating range for the suppressor. This suppressor is polarity insensitive. The part number for this unit also includes a plug-in screw terminal base.

A copper ground bus (shown as G on Figure 4) shall be installed to terminate the ground leads for the suppressors. A flat conductor provides a significantly lower inductance than a round conductor, which is a major factor in having the suppressors track each other during high levels of lightning current. The bus bar is shown bonding to the side of the cabinet with stainless steel hardware and star washers to ensure that potentials inside the enclosure remain consistent with each other.

The power suppressor has a terminal strip for line, neutral and ground on both the unprotected and protected side. Line, neutral and ground conductors shall terminate on these strips. In addition, a #12 AWG copper conductor is shown

between the unprotected ground terminal and the copper bus for the cabinet. This will help to ensure that the ground reference for the power suppressor and ground leads for the other suppressors track each other during surge handling.

Properly connect the suppressors with their unprotected or field-side wiring terminals to the cabling leaving the enclosure. If connected backwards, the more sensitive (but faster acting) second stage will be exposed to excessive current and the suppressors may be damaged by the first lightning event.

Separation of cabling is required to minimize coupling between protected and unprotected cabling. If it is necessary to cross these cables over each other, make the crossover using right angles. This will help to minimize the inductive and capacitive coupling of energy between protected and unprotected circuits.

Protection is not provided for the 12 Vdc power supply to the IFS transceiver as this power circuit does not leave the enclosure.

18.2.2.3 Protection for Access Control System Gates

Due to the exposed location of access control components located at vehicular gates, there is likely to be damage by direct or nearby lightning strikes and the metallic fencing's ability to conduct nearby strikes to the gate locations.

Figure 5 shows the recommended method for protecting the access control equipment at the gates. Install an EDCO HSP-121A, two-stage hybrid, NEMA 4X, suppressor (See A on Figure 5) on the exterior of the access control enclosure to protect the power conductors. This approach is recommended as access control enclosures typically have insufficient space to place the suppressor in the housing. The incoming 120 Vac power entering the enclosure is looped out, through the suppressor and back into the enclosure where it is hard-wired to the 27 Vdc regulated switching power supply.

NOTES

- A EDCO HSP-121A 120VAC NEMA 4X
- B EDCO FAS-1-043HC 24VAC
- C EDCO PC-642-008LC/PCB1B RS-485
- D #12AWG COPPER & RING LUGS - KEEP SHORT
- E 1' X 1/8" COPPER BUS BONDED TO SIDE OF CABINET
- F EDCO FAS-1-043HC 24VAC OR DC

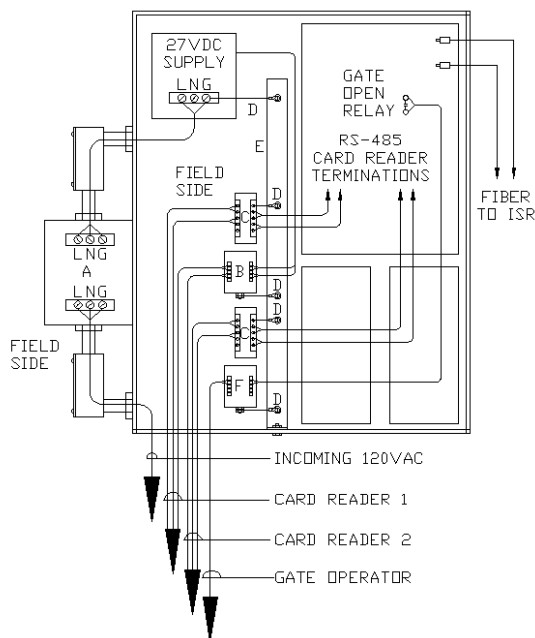


Figure 5 – Gate Access Control Recommended Configuration

An EDCO FAS-1-043HC, two-circuit, 24 Vac, suppressor shall be installed at each gate to protect the wiring to the two card readers. This EDCO AC suppressor was chosen for this application as the 27 Vdc used to power the remote readers is on the upper limit of what a 24 Vdc suppressor will tolerate. Since peak voltage on an AC circuit is 1.41 times the RMS value, the clamping threshold for the AC suppressor is actually set at 43-Volts. The suppressors for card reader power utilize a series inter-stage inductor rather than resistors making them suitable for this type of powering application.

Use EDCO PC-642-008LC/PCB1B, low capacitance, 8-volt, RS-485, suppressors for protection of the card reader data circuits. These suppressors shall include a plug-in screw terminal base that can be secured to the back or side panels in an enclosure.

In the event that Wiegand readers are ever required, the same manufacturer makes a 5-conductor Wiegand protector in the same package.

In lower exposure areas, there would not be concern about circuits that leave the enclosure isolated by a dry relay contact. Cases of welded relay contacts, contacts burned open and even miniature relays which were completely disintegrated have occurred in high exposure level situations. When this occurs there is often collateral damage to other components on the circuit board.

A 24 Vac suppressor shall be specified for in high exposure level situations. This is usable with AC or DC control voltages of up to about 30 volts as the clamping threshold is set at 43 volts. If higher voltages are required, a different

suppressor may be utilized with a clamp setting that is workable with the voltage being switched.

All of the rules and guidelines recommended for the CCTV enclosure apply to the card access installation. This includes separation of protected and unprotected conductors and keeping ground leads short.

No detail was produced for the remote card readers themselves. These readers shall be equipped with one of the reader power suppressors (also available in a single pair configuration) and an RS-485 suppressor installed in the junction box behind the reader. Bond suppressor grounds to the metallic housing for the reader and reader pedestal.

18.3 POWER DISTRIBUTION SYSTEM AND EQUIPMENT

18.3.1 Substations

Below outlines the requirements for 13,800-480 volt electrical substations.

1. All equipment and installations shall be in accordance with the National Electrical Code (NEC) per edition approved and specified in the Maryland Model Performance Code.
2. All equipment locations shall be coordinated with the MAA Office of Design & Construction.
3. Substations shall be 13,800-480 volt, secondary selective configuration consisting of two primary (13,800 volt) feeders, two primary fused load interrupter switches, two power transformers, two secondary (480 volt) main circuit breakers, one tie breaker, and feeder breakers. All current carrying parts of the substation and related components shall be copper. Each substation shall be supplied by one North feeder and one South feeder originating from switchgear supplied from the BWI Marshall North and South substation respectively. Refer to Substation one-line diagram and the substation sequence of operation details for additional information. The current BWI Marshall medium voltage one-line diagram is included on the following pages.

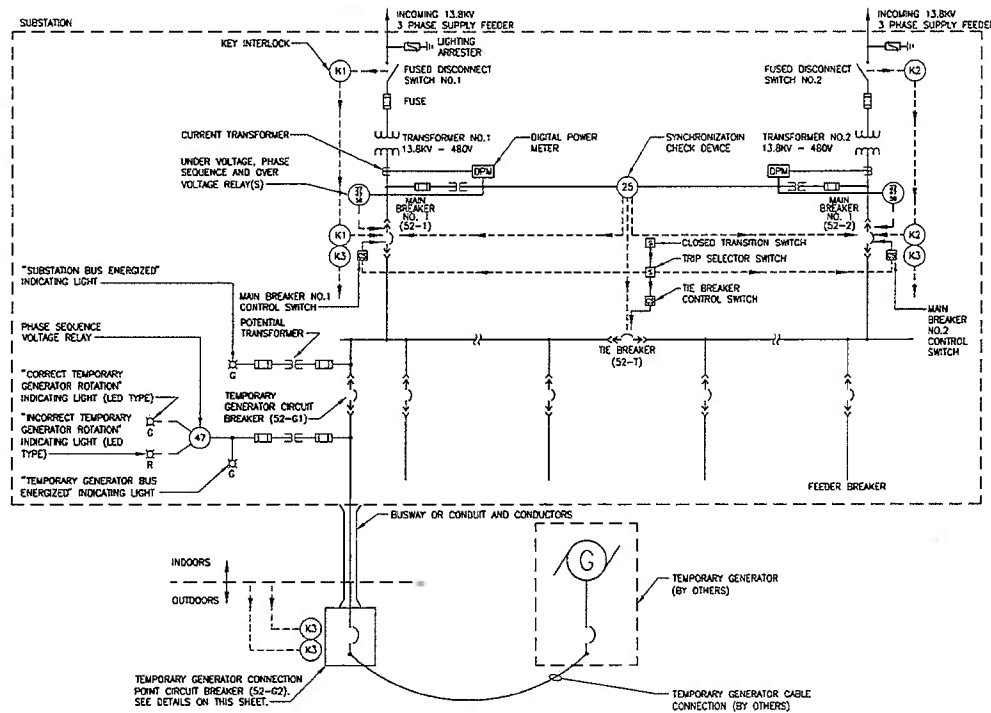
The secondary main and tie circuit breakers shall be electrically operated draw-out type low voltage power circuit breakers or insulated case circuit breakers.

The feeder circuit breakers shall be manually operated draw-out type low voltage power circuit breakers, insulated case circuit breakers or molded case circuit breakers mounted in continuous metal enclosed switchgear or switchboard enclosure(s).

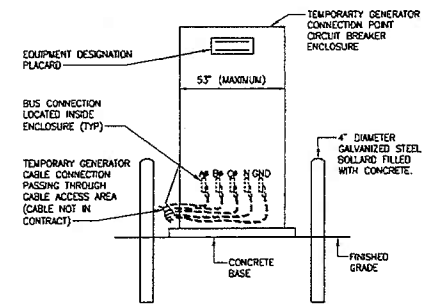
4. All substation short-circuit ratings shall be adequate for the combined available fault current contribution due to secondary closed transition switching. The available fault current shall be calculated for the moment that both secondary main breakers and the tie breaker are simultaneously closed and both transformers are energized from their primary source.
5. Ground fault protection shall be provided for all substation 480 volt circuit breakers including secondary main circuit breakers, tie breaker and all feeder breakers. Ground fault protection for 3 phase, 4 wire, solidly ground systems shall utilize current transformer (CT) sensing for all phase and neutral conductors. Three (3) phase underground systems shall include a ground fault sensing and indication system.
6. Substations shall include a semi-automatic secondary closed transition switching scheme that allows for momentary simultaneous closing of both secondary main circuit breakers and tie circuit breaker for maintenance switching purposes. The closed transition scheme and associated components shall be designed and manufactured by the substation equipment manufacturer and designed specifically for this application. All components shall be integral to the substation. Refer to Substation one-line diagram and the substation sequence of operation details for additional information.

The designer shall contact MAA maintenance personnel to see if any operating problems have occurred recently with closed transition operation at existing substations. If so, the designer shall request that BGE perform a circulating study. The designer shall make recommendations based on the results of the study.

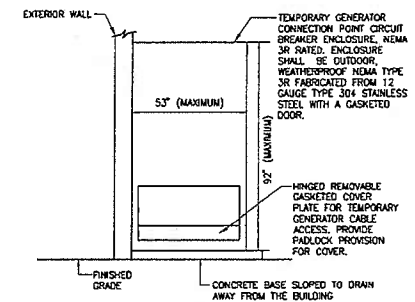
The designer shall contact BGE to see if any changes have been made that could affect the synchronization of incoming feeders and closed transition operation. If so, the designer shall request that BGE perform a circulating study. The designer shall make recommendations based on the results of the study.



SUBSTATION ONE-LINE DIAGRAM
NOT TO SCALE



**TEMPORARY GENERATOR CONNECTION POINT
CIRCUIT BREAKER (52-G2) - FRONT VIEW**
NOT TO SCALE



**TEMPORARY GENERATOR CONNECTION POINT
CIRCUIT BREAKER (52-G2) - SIDE VIEW**
NOT TO SCALE

URS

CONSULTING ENGINEERING AND PLANNING
1000 Wisconsin Road
Landover, MD 21110
Phone 410-855-4100 Fax 410-855-4101

DESIGNED D.M.W.
DRAWN M.R.F.
CHECKED D.L.B.
APPROVED D.L.B.

REVISION NO.	REVISION DATE	DESCRIPTION



MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING
BALTIMORE/WASHINGTON
INTERNATIONAL AIRPORT

PROJECT TITLE

SHEET TITLE

SUBSTATION ONE-LINE DIAGRAM

SCALE

NONE

DATE

AUGUST, 2003

SHEET NO.

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1. KEY INTERLOCKS K1 AND K2 INTERLOCK PRIMARY FUSED DISCONNECT SWITCH AND SECONDARY MAIN BREAKER. SECONDARY MAIN BREAKER CAN BE CLOSED ONLY AFTER PRIMARY SWITCH IS CLOSED. PRIMARY SWITCH CAN BE OPENED ONLY AFTER SECONDARY MAIN BREAKER IS OPENED. KEY IS CAPTIVE. PRIMARY SWITCH WITH SWITCH IN OPEN POSITION. KEY IS CAPTIVE IN SECONDARY MAIN BREAKER WITH BREAKER IN CLOSED POSITION.
 2. BREAKER CONTROL SWITCH ELECTRICALLY OPEN AND CLOSE BREAKER UNLESS OVERRIDDEN BY INTERLOCK FUNCTIONS.
 3. CLOSED TRANSITION SWITCH ACTIVATES SUBSTATION CLOSED TRANSITION SWITCHING SCHEME ALLOWING FOR MOMENTARY SIMULTANEOUS CLOSING OF BOTH SECONDARY MAIN CIRCUIT BREAKERS AND THE CIRCUIT BREAKER.
 - CLOSED TRANSITION SWITCH TO 'OFF' POSITION PERFORMS THE FOLLOWING FUNCTIONS:
 - (1) PREVENTS SIMULTANEOUS CLOSING OF MAIN BREAKER NO. 1, MAIN BREAKER NO. 2, AND THE BREAKER WITH ELECTRICAL INTERLOCK.
 - (2) DISABLES TRIP SELECTOR SWITCH FUNCTIONS.
 - CLOSED TRANSITION SWITCH TO 'ON' POSITION PERMITS SECONDARY CLOSED TRANSITION SWITCHING WITH SELECTIVE TIME-OUT FUNCTION.
 4. TRIP SELECTOR SWITCH SELECTS SECONDARY BREAKER (MAIN BREAKER NO.1, MAIN BREAKER NO.2, OR THE BREAKER) THAT WILL AUTOMATICALLY OPEN AFTER SECONDARY CLOSED TRANSITION SWITCH OPERATION HAS BEEN INITIATED. SELECTED BREAKER WILL OPEN AFTER TIME-OUT PERIOD WHICH STARTS AT THE INSTANT WHEN ALL SECONDARY BREAKERS ARE SIMULTANEOUSLY CLOSED (MAIN BREAKER NO. 1, MAIN BREAKER NO. 2, AND THE BREAKER). FEEDER CIRCUIT BREAKERS WILL NOT EXPERIENCE ANY TYPE OF OUTAGE DUE TO THIS SWITCHING OPERATION.
 5. SYNCHRONISM CHECK DEVICE PREVENTS SECONDARY CLOSED TRANSITION SWITCHING OPERATION IF VOLTAGE PHASE SHIFT OR MAGNITUDE ACROSS OPEN SECONDARY BREAKER (MAIN BREAKER NO. 1, MAIN BREAKER NO. 2 OR THE BREAKER) EXCEEDS A PRESET VALUE. THE SYNCHRONISM CHECK DEVICE SETTINGS SHALL BE PROVIDED BY THE SWITCHGEAR EQUIPMENT MANUFACTURER.
 6. SECONDARY BREAKER TRIP DEVICE BELL ALARM INTERLOCK (NOT SHOWN ON ONE - LINE DIAGRAM) PREVENTS SECONDARY CLOSED TRANSITION SWITCHING OPERATION IF BELL ALARM INDICATED ON ANY SECONDARY BREAKER (BREAKER NO. 1, BREAKER NO. 2 OR THE BELL ALARM IS ACTIVATION OF BREAKER TRIP DUE TO FAULT AND REQUIRES MANUAL RESET AT BREAKER.
 7. KEY INTERLOCK K3 INTERLOCKS THE TEMPORARY GENERATOR CONNECTION POINT CIRCUIT BREAKER (52-G2) WITH BOTH SECONDARY MAIN BREAKERS. THE TEMPORARY GENERATOR CONNECTION POINT CIRCUIT BREAKER (52-G2) CAN ONLY BE CLOSED AFTER BOTH SECONDARY MAIN BREAKERS ARE OPENED. KEY K3 IS CAPTIVE IN SECONDARY MAIN BREAKER NO. 1 BREAKER IS IN CLOSED POSITION. BOTH K3 KEYS ARE CAPTIVE IN THE TEMPORARY GENERATOR CONNECTION POINT CIRCUIT BREAKER (52-G2) WHEN BREAKER IS IN CLOSED POSITION.
 8. TEMPORARY GENERATOR CIRCUIT BREAKER (52-G1) IS NOT KEY INTERLOCKED.
 9. TEMPORARY GENERATOR CIRCUIT BREAKER (52-G1) INDICATING DEVICE FUNCTIONS ARE AS FOLLOWS:
 - "SUBSTATION BUS ENERGIZED" INDICATING LIGHT:
 - (1) ON WHEN TEMPORARY GENERATOR CIRCUIT BREAKER (52-G1) LINE SIDE BUS IS ENERGIZED.
 - (2) OFF WHEN TEMPORARY GENERATOR CIRCUIT BREAKER (52-G1) LINE SIDE BUS IS DE-ENERGIZED.
 - "CORRECT TEMPORARY GENERATOR ROTATION" GREEN INDICATING LIGHT:
 - (1) ON WHEN TEMPORARY GENERATOR CIRCUIT BREAKER (52-G1) LOAD SIDE BUS IS ENERGIZED AND VOLTAGE ROTATION IS CORRECT.
 - (2) OFF WHEN TEMPORARY GENERATOR CIRCUIT BREAKER (52-G1) LOAD SIDE BUS IS DE-ENERGIZED. OFF WHEN TEMPORARY GENERATOR CIRCUIT BREAKER (52-G1) LOAD SIDE BUS IS ENERGIZED AND VOLTAGE ROTATION IS INCORRECT.
 - "INCORRECT TEMPORARY GENERATOR ROTATION" RED INDICATING LIGHT:
 - (1) ON WHEN TEMPORARY GENERATOR CIRCUIT BREAKER (52-G1) LOAD SIDE BUS IS ENERGIZED AND VOLTAGE ROTATION IS INCORRECT.
 - (2) OFF WHEN TEMPORARY GENERATOR CIRCUIT BREAKER (52-G1) LOAD SIDE BUS IS DE-ENERGIZED. OFF WHEN TEMPORARY GENERATOR CIRCUIT BREAKER (52-G1) LOAD SIDE BUS IS ENERGIZED AND VOLTAGE ROTATION IS CORRECT.
 - "TEMPORARY GENERATOR BUS ENERGIZED" INDICATING LIGHT:
 - (1) ON WHEN TEMPORARY GENERATOR CIRCUIT BREAKER (52-G1) LOAD SIDE BUS IS ENERGIZED.
 - (2) OFF WHEN TEMPORARY GENERATOR CIRCUIT BREAKER (52-G1) LOAD SIDE BUS IS DE-ENERGIZED.
 - PHASE SEQUENCE VOLTAGE RELAY:
- MONITORS TEMPORARY TEMPORARY GENERATOR CIRCUIT BREAKER (52-G1) LOAD SIDE VOLTAGE AND PROVIDES ELECTRICAL CONTACTS REQUIRED TO TRIP, ROTATION INDICATING LIGHT FUNCTION.

OPERATION 1: PERFORM CLOSED TRANSITION SECONDARY SWITCHING FROM NORMAL TO ALTERNATE CONFIGURATION.

<u>CIRCUIT BREAKER</u>	<u>INITIAL STATUS</u>	<u>STATUS AFTER SWITCHING</u>
MAIN NO. 1 (52-1)	CLOSED	CLOSED
THE (52-1)	OPEN	CLOSED
MAIN NO. 2 (52-2)	CLOSED	OPEN

1. CLOSED TRANSITION SWITCH TO "ON" POSITION.
2. TRIP SELECTOR SWITCH TO "MAIN 2" POSITION.
3. CLOSE THE BREAKER VIA CONTROL SWITCH.
4. AFTER TIME-OUT PERIOD MAIN BREAKER NO. 2 AUTOMATICALLY OPENS.

OPERATION 2: PERFORM CLOSED TRANSITION SECONDARY SWITCHING FROM OPERATION 1 ALTERNATE BACK TO NORMAL CONFIGURATION.

<u>CIRCUIT BREAKER</u>	<u>INITIAL STATUS</u>	<u>STATUS AFTER SWITCHING</u>
MAIN NO. 1 (52-1)	CLOSED	CLOSED
THE (52-1)	CLOSED	OPEN
MAIN NO. 2 (52-2)	OPEN	CLOSED

1. CLOSED TRANSITION SWITCH TO "ON" POSITION.
2. TRIP SELECTOR SWITCH TO "THE" POSITION.
3. CLOSE MAIN NO. 2 BREAKER VIA CONTROL SWITCH.
4. AFTER TIME-OUT PERIOD THE BREAKER AUTOMATICALLY OPENS.

OPERATION 3: PERFORM CLOSED TRANSITION SECONDARY SWITCHING FROM NORMAL TO ALTERNATE CONFIGURATION.

<u>CIRCUIT BREAKER</u>	<u>INITIAL STATUS</u>	<u>STATUS AFTER SWITCHING</u>
MAIN NO. 1 (52-1)	CLOSED	OPEN
THE (52-1)	OPEN	CLOSED
MAIN NO. 2 (52-2)	CLOSED	CLOSED

1. CLOSED TRANSITION SWITCH TO "ON" POSITION.
2. TRIP SELECTOR SWITCH TO "MAIN NO. 1" POSITION.
3. CLOSE THE BREAKER VIA CONTROL SWITCH.
4. AFTER TIME-OUT PERIOD MAIN BREAKER NO. 1 AUTOMATICALLY OPENS.

OPERATION 4: PERFORM CLOSED TRANSITION SECONDARY SWITCHING FROM OPERATION 3 ALTERNATE BACK TO NORMAL CONFIGURATION.

<u>CIRCUIT BREAKER</u>	<u>INITIAL STATUS</u>	<u>STATUS AFTER SWITCHING</u>
MAIN NO. 1 (52-1)	OPEN	CLOSED
THE (52-1)	CLOSED	OPEN
MAIN NO. 2 (52-2)	CLOSED	CLOSED

1. CLOSED TRANSITION SWITCH TO "ON" POSITION.
2. TRIP SELECTOR SWITCH TO "THE" POSITION.
3. CLOSE MAIN NO. 1 BREAKER VIA CONTROL SWITCH.
4. AFTER TIME-OUT PERIOD THE BREAKER AUTOMATICALLY OPENS.

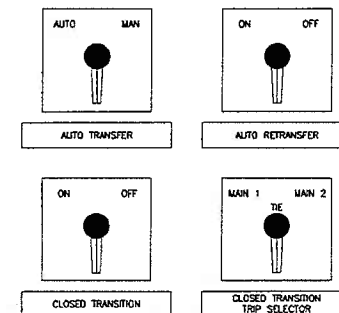
OPEN TRANSITION: OPEN TRANSITION SECONDARY SWITCHING CAN BE PERFORMED WHEN CLOSED TRANSITION SWITCH IS IN "OFF" POSITION.

1. AUTOMATIC/MANUAL CONTROL SWITCH - ENABLES/DISABLES AUTOMATIC TRANSFER SCHEME.
2. RETRANSFER CONTROL SWITCH - ENABLE/DISABLE AUTOMATIC TRANSFER SCHEME AUTOMATIC RETRANSFER OPERATION.
3. NORMAL CONDITION - SECONDARY MAIN CIRCUIT BREAKERS (52-1 AND 52-2) ARE CLOSED, AND THE TIE BREAKER (52-3) IS OPEN.
4. LOSS OF EITHER ONE OF THE INCOMING UTILITY SOURCES RESULTS IN AUTOMATIC OPENING OF AFFECTED SECONDARY MAIN CIRCUIT BREAKER (52-1) OR (52-2) AND CLOSING OF SECONDARY TIE BREAKER (52-3) IN ORDER TO AUTOMATICALLY SUPPLY ENTIRE SUBSTATION LOAD.
5. WHEN INCOMING UTILITY SOURCE IS RE-ENERGIZED, 52-1, 52-2, AND 52-3 RETRANSFER TO NORMAL CONDITION IF RETRANSFER CONTROL SWITCH IS IN "ON" POSITION. SUBSTATION SECONDARY BREAKERS WILL NOT RETRANSFER IF RETRANSFER SWITCH IS IN "OFF" POSITION.
6. ATS SCHEME SHALL BE COORDINATED WITH OTHER SUBSTATION FUNCTIONS.

OPERATION DEVICE	SUBSTATION DEVICE STATUS (NORMAL, SYSTEM BREAKER)	SUBSTATION DEVICE STATUS (TEMPORARY GENERATOR, OPERATION)
FUSED DISCONNECT SWITCH NO. 1	CLOSED	OPEN
FUSED DISCONNECT SWITCH NO. 2	CLOSED	OPEN
SECONDARY MAIN BREAKER NO. 1 (52-1)	CLOSED	OPEN
SECONDARY MAIN BREAKER NO. 2 (52-2)	CLOSED	OPEN
THE BREAKER (52-1)	OPEN	CLOSED
TEMPORARY GENERATOR CIRCUIT BREAKER (52-G1)	OPEN	CLOSED
TEMPORARY GENERATOR CONNECTION POINT CIRCUIT BREAKER (52-G2)	OPEN	CLOSED

SWITCHING OPERATION: FROM NORMAL SYSTEM OPERATION TO TEMPORARY GENERATOR OPERATION SHALL BE AS FOLLOWS:

1. OPEN 480V FEEDER CIRCUIT BREAKERS.
2. OPEN TEMPORARY GENERATOR CIRCUIT BREAKER (52-G1).
3. OPEN SECONDARY MAIN CIRCUIT BREAKER NO. 1 (52-1) AND NO. 2. (52-2)
4. REMOVE KEYS K1 AND K2 FROM SECONDARY MAIN CIRCUIT BREAKERS.
INSERT KEYS K1 AND K2 INTO FUSED DISCONNECT SWITCH NO. 1 AND NO. 2.
5. OPEN FUSED DISCONNECT SWITCH NO. 1 AND NO. 2.
6. CLOSE THE CIRCUIT BREAKER (52-F).
7. REMOVE KEY K3 FROM BOTH SECONDARY MAIN CIRCUIT BREAKERS. INSERT BOTH K3 KEYS INTO TEMPORARY GENERATOR CONNECTION POINT CIRCUIT BREAKER (52-G2).
8. CONNECT TEMPORARY GENERATOR CABLE CONNECTION FROM GENERATOR TO TEMPORARY CONNECTION POINT CIRCUIT BREAKER (52-G2).
9. START GENERATOR.
10. CLOSE TEMPORARY GENERATOR CONNECTION POINT CIRCUIT BREAKER (52-G2).
11. CHECK TEMPORARY GENERATOR ROTATION INDICATING LIGHTS AT TEMPORARY GENERATOR CIRCUIT BREAKER (52-G1). IF GENERATOR ROTATION IS CORRECT, CLOSE THE TEMPORARY GENERATOR CIRCUIT BREAKER (52-G1). THE SUBSTATION MAIN 480V BUS IS ENERGIZED AT THIS TIME.
12. CLOSE 480V FEEDER BREAKERS AS NEEDED.



NOTE:
1. PROVIDE CONTROL SWITCH LAYOUT AT SWITCHGEAR TRANSFER CONTROLS SECTION.

[illegible]

7. Substations shall include a secondary automatic transfer scheme that will automatically open one secondary main breaker and close the tie breaker in order to transfer all load to one primary feeder if abnormal voltage is detected on one of the two incoming substation primary feeders. Since there is an automatic transfer on the primary feeders to the substations, the automatic secondary transfer should incorporate time delays of sufficient length to allow the primary transfer to occur prior the secondary transfer. Refer to Substation one-line diagram and the substation sequence of operation details for additional information.
8. Substations shall include an emergency power quick connect system which includes a permanent connection point for a temporary electric generator in order to supply temporary power to the entire substation in the event of a complete substation power outage. The quick connect system shall include a temporary generator circuit breaker (52-G1) (located within the substation), temporary generator connection point circuit breaker (52-G2) (located outdoors, remote from the substation at an area easily accessible to the temporary generator), feeder from 52-G1 to 52-G2, and control system. The location of the temporary generator connection point enclosure shall be approved by the BWI Marshall Office of Airfield Operations and Security, as well as the Office of Maintenance and Utilities. Refer to Substation one-line diagram and the substation sequence of operation details for additional information.

Circuit breaker 52-G1 and 52-G2 shall be manually operated. Circuit breaker 52-G1 and 52-G2 and the feeder shall have a rated ampacity equal to the substation main circuit breakers.

The temporary generator connection point circuit (52-G2) shall be installed in a pad-mounted enclosure of sufficient size and configuration to allow for temporary generator cable connections. The enclosure shall have the following options: NEMA 3R 12-gauge type 304 stainless steel construction, gasketed door, front accessible only, padlock provision, key interlock, internal heater (with thermostat and internal control power transformer), internal hinged dead front door (that allows breaker to be operated with no possible access to energized parts), temporary generator cable access area, and number of cables. The entire enclosure shall be rated NEMA 3R while-in-use when temporary generator cables are connected and operational. All components of the temporary generator connection point circuit breaker shall be specifically designed for this purpose and manufactured by the circuit breaker manufacturer or by the circuit breaker manufacturer factory authorized field service organization. An 8-1/2" x 11" aluminum sign attached to outside of the enclosure shall be installed with

the following wording: "Substation _____ Generator Connection." The name of the substation shall be filled in the blank space.

Attach a 10" x 4" self-adhesive engraved, laminated acrylic sign 1/8" thick to the exterior of the quick connect enclosure stating the phase rotation for connecting a portable generator. This sign shall include the wording in white text (size 3/8") with a red background stating,

SUBSTATION _____ (Blank to be filled in with substation number)
QUICK CONNECT CABINET
CONNECT GENERATOR AS FOLLOWS:
CABINET LEAD COLORS: B O Y
GENERATOR LEAD COLORS: B O Y

Quick connects that have a phase rotation of C-B-A shall have the leads swapped so the generator temporary connection will follow an A-B-C phase rotation and shall include a sign inside the quick connect enclosure with the same specifications as the exterior sign and with the wording,

SUBSTATION _____ (Blank to be filled in with substation number)
QUICK CONNECT CABINET
PHASE A AND C HAVE BEEN SWITCHED
TO MATCH THE PHASE ROTATION
OF SUBSTATION _____ (Blank to be filled in with substation number)

Placards shall not overlap or cover existing signage on the equipment required by code. Samples of the exterior and interior quick connect placards have been included at the end of this DST.

9. Contract documents shall require performance of a short-circuit and coordination study during construction to establish settings for all new adjustable system protection devices. All new devices shall be selectively coordinated with existing devices and operating schemes including but not limited to, overload/short-circuit protection and automatic transfer schemes.
10. Contract documents shall require furnishing and installation of permanently attached engraved instruction placards including substation one-line diagram and all substation sequence of operations. Locate on placard at substation interior wall with an emergency lighting fixture with integral battery back-up in close proximity. Locate one placard on the inside of the temporary generator connection point circuit breaker enclosure.
11. Contract documents shall require furnishing and installation of a framed wall-mounted one-line diagram for the substation and the entire downstream distribution system. Locate with substation room.

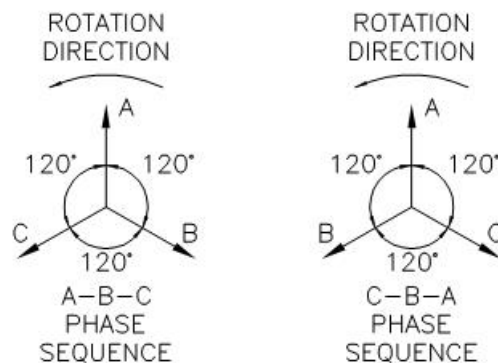
18.3.2 Medium Voltage Electrical Phasing and Rotation (BWI Marshall only)

This section details the electrical phasing and rotation conditions for the BWI Marshall medium voltage electrical distribution system.

18.3.2.1 Background

The BWI Marshall Airport medium voltage distribution system is a three-phase system. The phases are labeled A, B and C in accordance with industry standard practices. System phase rotation must be consistent where multiple power sources are available for the following reasons: (1) for system identification and safety purposes, (2) to provide correct system rotation, and (3) to allow for the use of alternate distribution system configurations made possible by using Airport tie circuit breakers.

The term rotation refers to the order that the phases reach their maximum instantaneous line-to-neutral voltage value. There are two possible system rotations, ABC (positive sequence) or CBA (negative sequence). The rotation of the system determines the direction that a three-phase motor will spin when connected to the system. A three-phase motor connected to an ABC system will rotate in the opposite direction as compared to a CBA system. This is particularly important for HVAC and other three-phase motor equipment, since the rotation of the equipment is based on the electrical connection. The figure below shows the vector diagram for each of the two system phase rotations.



The existing medium voltage distribution system at BWI Marshall is shown in the following Airport Wide Phase Rotation Drawing with the Sheet Title "Single Line Diagram with Phase Rotation". The single line diagram shows the power distribution from the primary of each power transformer located in the BWI Marshall North and South substations through the three 13.8 kV switchgears and to 480 V substations. The phase rotation at each switchgear and substation is shown on the Single Line Diagram.

The Table titled “Switchgear, Substation and Quick Connect Switches-Phase Rotation” summarizes the phase rotation for each switchgear, substation and quick connect cabinet at BWI Marshall Airport. The actual phase rotation shown for the electrical equipment in this Table was measured and verified in 2014.

The BWI Marshall system has adopted labeling and color coding for all 480 VAC conductors as an ABC rotation, where at 480 VAC, 3-phase equipment, phase A is color coded Brown, Phase B is color coded Orange and Phase C is color coded Yellow, following the B-O-Y conventional nomenclature. As an example of how the color coding is implemented at BWI the color coding of the power conductors for substations ST-TU and A1 are as follows:

Substation ST-TU has a phase rotation ABC, and the color coding of the substation feeder conductors on the load side of the substation breaker looking into the front of the breaker is left terminal lug, Brown, center terminal lug, Orange and right terminal lug, Yellow. The motors connected from this substation will follow the connections Phase A to Phase A, Phase B to Phase B and Phase C to Phase C. The color coding of the connection of these feeder conductors at the motor will be the same as at the substation.

In the case of Substation A1, which has a CBA rotation, this requires that in order for a three phase motor to turn in the correct rotation, the power wiring connection at the motor will have the A and C phase conductors switched. The color coding for the feeder conductors on the load side of the substation breaker looking into the front of the breaker will be left terminal lug, Brown, center terminal lug, Orange and right terminal lug, Yellow. The color coding of the connection of these feeder conductors at the motor will be the same as at the substation. The correct motor rotation will be accomplished by switching the A and C phase motor leads, where motor lead phase A will be connected to feeder conductor phase C and motor lead phase C will be connected to feeder conductor phase A.

18.3.2.2 Design

The Designers and Contractors shall consider the phase rotation differences that exist within the BWI Marshall Airport electrical power distribution system, particularly for Projects where equipment is powered from substations that do not have matching phase rotations.

The electrical power system designs that are performed at the BWI Airport North and South substations will require that the phase rotation remain consistent with that already established. The existing phase labeling shall remain and the designer shall contact BGE at 410-291-3156 to coordinate all work at the North and South substations.

18.3.2.3 Generator Connections

AC Generator electrical phase sequence must match plant and utility electrical phase sequence. When three-phase temporary generators are used on the BWI Marshall Airport distribution system, the generator will be connected to the quick connect breaker conductors in an ABC rotation. The following Table, “Switchgear, Substation and Quick Connect switches – Phase Rotation” shows that the quick connects for substations A1, B1, B2 and ST-BC have a rotation CBA. In order to keep the temporary generator connections consistent for all of the quick connects at BWI Marshall Airport, the A and C phase leads from the quick connect breaker for the A1, B1, B2 and ST-BC quick connect breakers have been switched. Temporary generator rotation shall be electrically tested by the Contractor prior to connecting to the BWI Marshall system. Generators connected to BWI Marshall 13.8 kV – 480 VAC unit substation emergency power quick connect systems shall be tested for proper rotation using the voltage phase sequence relay and associated generator rotation indicating light that is permanently installed on the quick connect breaker in most substations. A substation quick connect sequence of operation placard is required by the MAA Substation Design Standard (Section 18.3.1) to be located at the substation and on the temporary generator connection point circuit breaker. This placard explains the use of the quick connect scheme including the generator rotation indicating light.

18.3.2.4 Identification Placards

Placards with phase rotation information are installed at all switchgears, substations and quick connect switches at BWI Airport. The Designer shall include phase rotation placards as required by these Standards for new switchgears, substations, and quick connect switches as described below. Placards shall not overlap or cover any existing signage or labeling on the electrical equipment as required by code.

Switchgears

The Designer shall include phase rotation placards as required by these Standards for new switchgear at BWI Marshall Airport. The Designer shall note in the Contract Documents to: “Attach a 6” x 3” self-adhesive engraved, laminated acrylic sign 1/8” thick to the exterior of switchgear stating the phase rotation. This sign shall include the wording in white text (size 3/8”) with a red background stating,

SWITCHGEAR ____ (Blank to be filled in with Switchgear number)
PHASE ROTATION
A-B-C (OR C-B-A AS VERIFIED)

Substations

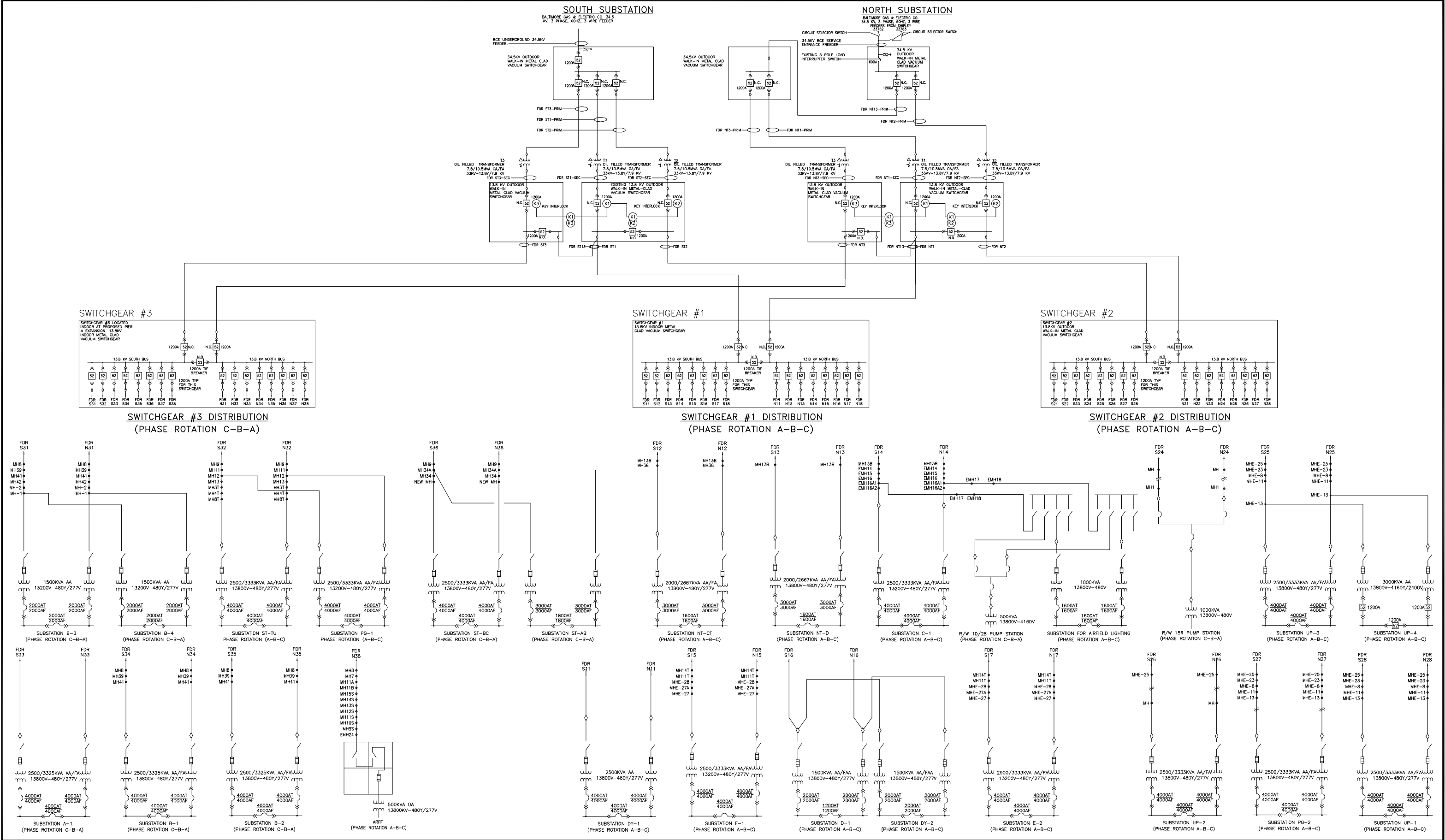
The Designer shall include phase rotation placards as required by these Standards for new Substations at BWI Marshall Airport. The Designer shall note in the Contract Documents to: "Attach a 6" x 3" self-adhesive engraved, laminated acrylic sign 1/8" thick to the exterior of the substation stating the phase rotation. This sign shall include the wording in white text (size 3/8") with a red background stating,

SUBSTATION ____ (Blank to be filled in with Switchgear number)
PHASE ROTATION
A-B-C (OR C-B-A AS VERIFIED)

Quick Connect Switches

The details for the quick connect placards both exterior and interior (where required) are as described in Section 18.3.1, Item 8.

Sample templates for each of the placards described above are included in the following pages.



CONSULTANT: <div> JOHNSON, MIRMIRAN & THOMPSON Engineering & Design, Inc.</div> JOHNSON, MIRMIRAN & THOMPSON 72 Loveton Circle BALTIMORE, MD 21152	SEAL: PROFESSIONAL CERTIFICATION: "I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND." LICENSE NO. _____ EXPIRATION DATE: _____	DESIGNED:	REVISION NO.	REVISION DATE	DESCRIPTION	<div><div><div> BALTIMORE/WASHINGTON INTERNATIONAL <i>Thurgood Marshall</i> AIRPORT</div><div>MARYLAND DEPARTMENT OF TRANSPORTATION MARYLAND AVIATION ADMINISTRATION OFFICE OF DESIGN AND CONSTRUCTION</div></div></div>	PROJECT TITLE: PHASE ROTATION		CONTRACT NO.:	
		DRAWN:					SHEET TITLE: SINGLE LINE DIAGRAM WITH PHASE ROTATION		SHEET NO.:	of
		CHECKED:							IDENTIFIER:	
		APPROVED:								
		SCALE:		DATE:						

SWITCHGEAR, SUBSTATION AND QUICK CONNECT SWITCHES

PHASE ROTATION

SUBSTATION	FED FROM SWITCHGEAR/ AS INDICATED	MEDIUM VOLTAGE FEEDER NUMBER	PHASE ROTATION	QUICK CONNECT PHASE ROTATION
A1-NORTH	3	N33	CBA	CBA*
A1-SOUTH	3	S33	CBA	CBA*
B1-NORTH	3	N34	CBA	CBA*
B1-SOUTH	3	S34	CBA	CBA*
B2-NORTH	3	N35	CBA	CBA*
B2-SOUTH	3	S35	CBA	CBA*
PG-1-NORTH	3	N32	ABC	NO QUICK CONNECT
PG-1-SOUTH	3	S32	ABC	NO QUICK CONNECT
ST-TU-NORTH	3	N32	ABC	ABC
ST-TU-SOUTH	3	S32	ABC	ABC
ARFF	3	N38	ABC	NO QUICK CONNECT
UP-1-NORTH	2	N28	ABC	ABC
UP-1-SOUTH	2	S28	ABC	ABC
UP-2-NORTH	2	N26	ABC	ABC
UP-2-SOUTH	2	S26	ABC	ABC
UP-3-NORTH	2	N25	ABC	ABC
UP-3-SOUTH	2	S25	ABC	ABC
UP-4-NORTH	2	N25	ABC	NO QUICK CONNECT
UP-4-SOUTH	2	S25	ABC	NO QUICK CONNECT
PG-2-NORTH	2	N27	ABC	ABC
PG-2-SOUTH	2	S27	ABC	ABC
ST-AB-NORTH	3	N36	CBA	NO QUICK CONNECT
ST-AB-SOUTH	3	S36	CBA	NO QUICK CONNECT
ST-BC-NORTH	3	N36	CBA	CBA*
ST-BC-SOUTH	3	S36	CBA	CBA*
DY-1-NORTH	1	N11	ABC	ABC
DY-1-SOUTH	1	S11	ABC	ABC
DY-2-NORTH	1	N16	ABC	ABC
DY-2-SOUTH	1	S16	ABC	ABC
D-1-NORHT	1	N16	ABC	ABC
D-1-SOUTH	1	S16	ABC	ABC
NT-D-NORTH	1	N13	ABC	ABC
NT-D-SOUTH	1	S13	ABC	ABC
RW 15R PUMP STA.	2	N24/S24	CBA	NO QUICK CONNECT
E-1-NORTH	1	N15	ABC	ABC
E-1-SOUTH	1	S15	ABC	ABC
E-2-NORTH	1	N17	ABC	ABC
E-2-SOUTH	1	S17	ABC	ABC

SWITCHGEAR, SUBSTATION AND QUICK CONNECT SWITCHES

PHASE ROTATION

SUBSTATION	FED FROM SWITCHGEAR/ AS INDIATED	MEDIUM VOLTAGE FEEDER NUMBER	PHASE ROTATION	QUICK CONNECT PHASE ROTATION
NT-CT-NORTH	1	N12	ABC	ABC
NT-CT-SOUTH	1	/S12	ABC	ABC
B-3-NORTH	3	N31	CBA	NO QUICK CONNECT
B-3-SOUTH	3	S31	CBA	NO QUICK CONNECT
B-4-NORTH	3	N31	CBA	NO QUICK CONNECT
B-4-SOUTH	3	S31	CBA	NO QUICK CONNECT
C-1-NORTH	1	N14	ABC	ABC
C-1-SOUTH	1	S14	ABC	ABC
AIRFIELD LIGHTING- NORTH	1	N14	ABC	ABC
AIRFILED LIGHTING- SOUTH	1	S14	ABC	ABC
SWITCHGEAR 1	34.5 KV NORTH SUBSTATION	NT1	ABC	NOT APPLICABLE
SWITCHGEAR 1	34.5 KV SOUTH SUBSTATION	ST1	ABC	NOT APPLICABLE
SWITCHGEAR 2	34.5 KV NORTH SUBSTATION	NT2	ABC	NOT APPLICABLE
SWITCHGEAR 2	34.5 KV SOUTH SUBSTATION	ST2	ABC	NOT APPLICABLE
SWITCHGEAR 3	34.5 KV NORTH SUBSTATION	NT3	CBA	NOT APPLICABLE
SWITCHGEAR 3	34.5 KV SOUTH SUBSTATION	ST3	CBA	NOT APPLICABLE

* The quick connect breaker feeder conductors are labeled and color coded with A-phase breaker connection as C-phase and C-phase breaker connection as A-phase.

SUBSTATION X
QUICK CONNECT CABINET
CONNECT GENERATOR AS FOLLOWS:
CABINET LEAD COLORS: B O Y
GENERATOR LEAD COLORS: B O Y

LOCATE SIGN ON EXTERIOR OF QUICK CONNECT CABINET

NOTE:

"X" IN THE SAMPLE PLACARD SHALL BE REPLACED WITH SUBSTATION NAME

SAMPLE PLACARD FOR EXTERIOR OF QUICK CONNECT CABINET

**SUBSTATION X
QUICK CONNECT CABINET
PHASE A AND C HAVE BEEN SWITCHED
TO MATCH THE PHASE ROTATION
OF SUBSTATION X**

LOCATE SIGN INSIDE OF QUICK CONNECT CABINET ENCLOSURE

NOTES:

1. "X" IN THE SAMPLE PLACARD SHALL BE REPLACED WITH SUBSTATION NAME.
2. THESE PLACARDS SHALL ONLY BE PLACED ON THE INTERIOR OF QUICK CONNECT CABINETS FOR SUBSTATIONS THAT HAVE A PHASE ROTATION OF C-B-A.

SAMPLE PLACARD FOR INTERIOR OF QUICK CONNECT CABINET

**SWITCHGEAR #X
PHASE ROTATION
X-X-X**

SAMPLE SWITCHGEAR PLACARD

**SUBSTATION X
PHASE ROTATION
X-X-X**

SAMPLE SUBSTATION PLACARD

NOTE:

"X" IN THE SAMPLE PLACARD SHALL BE REPLACED WITH SWITCHGEAR OR SUBSTATION NAME AND RESPECTIVE PHASE ROTATION

18.4 EQUIPMENT

18.4.1 Panelboards (Power and Lighting)

BWI Marshall and MTN Airport projects shall only specify Square-D 120/208 circuit breaker panelboards. Accordingly, “No substitutions will be accepted” shall be used when specifying Square-D circuit breaker panelboards.

18.4.2 Raceways

18.4.2.1 Raceways – Within Buildings

Indoor wiring methods:

1. Exposed where subject to physical damage: Rigid galvanized steel (RGS) conduit from slab up to 10 feet above finished floor. Electrical metallic tubing (EMT) above 10 feet above finished floor.
2. Exposed where not subject to physical damage: EMT.
3. Concealed: EMT
4. Concealed where installing/fishing new wiring in existing wall or partition: Flexible metal conduit (FMC) or metal clad cable (MC). FMC and MC shall be directly connected to junction box located directly above existing wall or partition.
5. Connection to vibrating equipment (Including transformers and hydraulic, pneumatic, electric solenoid, or motor-driven equipment): Liquid tight flexible metal conduit (LFMC) or FMC. Use maximum of 6 foot length. Connections in wet or damp environments shall use LFMC.
6. Final connection to recessed and semi-recessed lighting fixtures: FMC or MC. Use maximum of 6 foot length from fixture to junction box only.
7. Minimum raceway size: Minimum Electrical raceway shall be $\frac{3}{4}$ inch and Minimum Communications raceway shall be 1 inch.
8. The use of any type flexible raceway or flexible cable other than those specifically mentioned above will not be accepted unless approved in advance.
9. In approved tenant spaces, MC Cable shall be permitted to be used for branch circuit wiring drops and lighting. Daisy-chained wiring is

permitted. All home runs shall be installed in conduit from the panel to the main installation area, sleeved and fireproofed through walls and terminated with a junction box. All conduit, junctions, boxes, and device plates shall be properly labeled.

10. All spare and electrical conduits 1" and larger must have a bushing installed.
11. All fittings (couplings, connectors, etc.) for metal conduit shall be steel, set screw or compression type. No malleable or aluminum fittings will be considered.
12. Fittings for all flexible metallic conduits shall be steel T&B Tite-Bite style or equivalent. No malleable or aluminum fittings will be considered.
13. All Conduit Outlet Bodies (LB's, T's, etc.) not subject to physical damage must be of Iron construction Crouse-Hinds Form 5, 7, 8, or equivalent. No Aluminum will be considered.
14. All Conduit Outlet Bodies and Device Boxes (LB's, T's, FS, FD, etc.) installed where subject to physical damage must be of Malleable Iron construction Crouse-Hinds Form 5 or equivalent. No aluminum will be considered.

Cable tray shall be permitted for low voltage communication wiring/cable only. All fire alarm and security related wiring/cable shall be installed in a raceway system as detailed in indoor wiring methods 1 through 8 shown above. Public Address System wiring if used to convey voice messages for public space evacuation, as required by the OFM, shall be considered fire alarm wiring and shall be installed in a raceway system and protected in accordance with NFPA 72.

All raceways and cables shall be properly installed and supported in accordance with the National Electrical Code (NEC) and the Code of Maryland Regulations (COMAR). All new construction materials shall be fire retardant. All new wiring/cable shall be plenum-rated. Cable and raceways shall be permanently labeled at a minimum of every 50 feet, at all junction boxes and at all terminations. Label information shall include equipment type/usage, supply panelboard/equipment and circuit number. Wherever old raceways, wiring and/or cables are to be abandoned, they shall be removed.

Metal Conduit Fittings: All fittings, coupling, etc. for metal conduit shall be steel, set screw or compression type. No malleable fittings will be considered.

Grounding: A ground wire properly sized to the largest phased conductor shall supplement all metallic conduits. Ground wire shall be identified by either green insulation coating or by the use of green tape.

18.4.2.2 Raceways – Underground

Marking tape indicating “Electrical Cable Buried Below” shall be installed. The tape should be 3” wide and positioned 8”-12” deep below top of ground, or 4” wide and positioned at a maximum 3”-6” deep below the bottom of pavements.

18.4.2.3 Raceways – Labeling

- a. All labels shall be mechanical; no handwritten labels unless otherwise approved.
- b. Cable and raceways shall be permanently labeled at a minimum of every 50 feet, every 25 feet when view is obstructed, and within 5 feet of any wall or floor/ceiling penetration at all junction boxes, terminations, and within 12 inches of electrical panel.
- c. The area to be labeled shall be cleaned prior to labeling.
- d. Labeling shall include: Type/Usage, Panelboard/Equipment, Circuit Number
- e. For labeling requirements of installations consisting of multiple systems occupying the same space, see Section **18.4.2.4 Exception #2**
- f. Wall switches, receptacles, occupancy sensors, wall dimmers, device plates and box covers, poke-through fittings, access floor boxes, photocells, time clocks, and other similar outlets shall be identified externally with circuit numbers and source. In areas exposed to the public, identifications should be made on the back side of device covers. Use machine-generated labels or neatly, handwritten permanent marker.
- g. All Panelboard circuit directories shall be updated and mechanically generated. No handwritten updates or changes shall be made.

18.4.2.4 Raceways – Voltages

- a. Wiring derived from different system voltages of 50V-600V shall be installed in separate conduits. Cables and conductors shall not occupy the same installation space (i.e. cable tray, metal wireways, compartment, enclosure, manhole, outlet box, device box, raceway, or similar fitting)

unless critical to the operation of installed equipment (motor starters, relays, contactors, etc.).

Exception #1: Wiring of different voltages may be permitted to be installed in the same junction box provided that a barrier is installed to separate the voltages.

Exception #2: Wiring of different voltages may be installed in cable tray and metal wireways (troughs) provided that the raceway is labeled "Multiple Voltages Present" at no more than 6' intervals when installed above a suspended ceiling, under a raised floor, or similar location and no more than 15' where installed elsewhere. Labeling shall be sized to ensure visibility from any access point.

- b. Class 2 and 3 cables shall be permitted to share the same raceway as 50V-600V wiring when in compliance with NEC 725.55.
- c. No wiring other than the primary voltage indicated shall be installed in electrical panels.
- d. Wiring color code shall be standardized as follows:

120/208, 120/240	Black, Red, Blue and White
277/480 and higher	Brown, Orange, Yellow, and Gray

18.4.2.5 Raceways – Workmanship

- a. Neat and Workmanlike Manner: Executed and/or installed in a skilled manner; e.g., plumb, level, square, in line, undamaged and without marring adjacent work. Conduits shall be run parallel to and/or perpendicular to the building structure.

In addition, Electrical work should be installed in accordance with ANSI/NECA 1-2006: Standard for Good Workmanship in Electrical Construction.

- b. Conduits shall be supported within 2 feet of the beginning of a 90° bend or offset.
- c. Performance of Work - All electrical work performed shall be under the direction of a master electrician licensed in the State of Maryland or in the county where the work is performed. In addition, all electrical work shall be performed by or under the direct supervision of a Journeyman electrician.

18.4.3 Receptacles

18.4.3.1 Electrical Receptacles in offices, other spaces and non-public corridors

Duplex receptacles shall be rated at 20 amperes, 125 volts, and be polarized, parallel blade type with ground and National Electrical Manufacturer's Association (NEMA) 5-20R configuration. Receptacles equivalent in quality to Pass & Seymour (P&S) Catalog number 5362, heavy duty specification grade, should be specified. The receptacles shall be side wired.

18.4.3.2 Electrical Receptacles in Airport Terminal public corridors, Ticketing Areas, and Baggage Claim Areas

Receptacles for these, and other areas subject to heavy use by housekeeping and cleaning machinery, should be equivalent in quality to Pass & Seymour (P&S) Catalog number 5362A, extra heavy duty. Receptacles shall be side wired, and spaced no more than 100 feet apart. These receptacles shall be placed on dedicated circuits, that is, they shall be isolated from receptacles in other types of spaces. In addition, no more than two receptacles shall be placed on the same circuit.

18.4.3.3 Cover plates for receptacles shall be brushed stainless steel.

18.4.3.4 Receptacles shall be identified by color-coding the face and body according to type of circuit they are connected to, per the following:

Regular Power	Brown or Ivory
Uninterruptible Power Supply (UPS)	Red
Isolated Ground	Orange/or Ivory with Orange Triangle

18.4.4 Charging Stations

18.4.4.1 Charging Stations - General

The purpose of this section is to define parameters for the installation of charging stations for personal electronic devices in common use hold rooms and public spaces within the airport terminal. The intent of the standard is to provide adequate and convenient charging stations for use by the traveling public. Ultimate layouts for charging stations will be on an installation by installation basis but must provide the charging station types and density prescribed.

18.4.4.2 Charging Station – Types

A mixture of duplex receptacles and 5v USB receptacle will be provided. Duplex receptacles for charging stations will meet the requirements of 18.4.3.1

Electrical Receptacles in offices, other spaces, and Nonpublic Corridors. Induction type charging stations can be utilized for one third (1/3) of the positions required in paragraph 18.4.4.3.

Stations can be for either standing or seating in a chair or stool. They should discourage sitting on the floor.

a. Standing stations

Each standing/wall mounted station will include both receptacle types and a shelf or counter surface suitable for writing or supporting a lap top computer. Standing stations shall be located so as not to impede general pedestrian circulation, restrict egress pathways, and be ADA compliant.

b. Sitting Stations

Sitting stations will include both receptacle types and will be either mounted directly on the furniture or on a wall receptacle at a height that provides convenient access from the associated seating. Furniture mounted units will be in 'InFlex' system by Acronas or an approved equal. Receptacles mounted on seating that is not located against a wall will be powered by recessed floor mounted receptacles. Cords from these receptacles will be managed and will not be readily accessible or pose a tripping hazard. Wall outlets providing power for adjacent seating stations should be positioned below the back of the seating to discourage disconnecting the power cords.

18.4.4.3 Charging Station – Density

a. Hold Rooms

Charging Stations will be installed with a duplex receptacle for every two hundred (200) square feet and one USB outlet per every five hundred (500) square feet of hold room as defined in the Space Allocation Plan. New installations requiring freestanding seating with floor mounted outlets will require seating plans to be reviewed and approved by the MAA Office of Design and Construction and the Fire and Rescue Division.

b. Public Areas

Charging Stations in corridor areas will be installed with two (2) duplex receptacles and four (4) USB receptacles per three hundred (300) linear feet of corridor. Charging Stations in public lounge areas will be installed at the same density as hold rooms.

Charging Stations in other public areas will be installed on an installation by installation basis.

18.4.4.4 *New Construction*

All new terminal construction shall be designed to include charging stations. Designs shall meet the charging station density requirements and provide all required infrastructure including adequate power supply. Charging station types and locations shall be approved by the MAA.

18.5 EMERGENCY AND STANDBY POWER SYSTEMS

18.5.1 Diesel Powered Engine – Generator Load Bank

Permanent diesel powered engine-generator sets provided to power: emergency (Level 1 per National Fire Protection Association (NFPA) Standard 110, “Emergency and Standby Power Systems”); legally required standby (Level 2 per NFPA 110); or optional standby circuits shall be designed to include a permanent load bank to provide electrical loading for testing and exercising the generator-set. Load banks shall be sized to provide at least 50 percent of the engine-generator set nameplate kilowatt rating. Load banks shall, if practical, be mounted next to the engine radiator and be connected to outside air duct for the radiator.

Include in requirements for the Automatic Transfer Switch associated with each engine-generator set an engine exerciser and requirements for setting it for at least 30 minutes exercise loading at least once a week.

Load banks shall be equipped with automatic controls so that the test or exercise load is automatically replaced with the emergency loads in the event of failure of the normal power source during the test.

18.5.2 Permitting and Review Requirements

Provision of fuel-powered generators shall be subject to review and permitting requirements of Design Standard Section 4.8.3, Fuel Burning Equipment Permitting Process.

18.6 METERING OF POWER

Each substation shall be provided with secondary watt-hour demand meters. All watt-hour demand meters shall have digital readout and pulse output for future remote monitoring.

Watt-hour meters shall be provided for tenant spaces by the tenant. Each food and beverage tenant shall provide watt-hour demand meter in the MAA electrical closet. All other tenants shall include provisions for future metering. These meters shall be “E-Mon” brand and shall be located in the MAA electrical closet. A spare 2” conduit shall be installed from each metering location to the nearest telephone closet. Provisions shall consist of routing the tenant feeder through a current transformer cabinet located adjacent to the MAA electrical

panelboard. Watt-hour meters shall be socket type with a by-pass type meter base and they shall be ANSI approved.

Metering at substation shall be Square-D Powerlogic system.

For double ended substations, a meter shall be provided in each side of the double ended switchgear. Meter shall measure all of the following: voltage, current, power, power factor, frequency, kilowatt-hours, and demand. Unit shall have the following additional features: 4 optically isolated status inputs, 2 optically isolated RS485 communications ports, Modbus and DNP communications protocol. In addition, one meter in any group shall have an internal modem. An auxiliary contact on each main and tie circuit breaker shall be wired to the status inputs on one power meter. The transformer over-temperature alarm on each transformer shall be wired to a status input on the associated power meter. The RS485 ports on all meters shall be daisy-chained together. A category 5 telecom cable shall be extended from the meter with the internal modem to the nearest telecom closet.

18.7 TEMPORARY ELECTRIC POWER SERVICE

For temporary electric power service during construction, designers shall include the following requirements in the specifications. These requirements are usually found in:

Technical Specifications
Temporary Facilities and Control
Section 01500

Part 2 – Products
2.2 Equipment

H. Power Distribution System: Service entrance drop cable to the first disconnect may be aluminum, subject to conditions specified in Part 3 of this specification. Circuit wiring conductors, inward from the first disconnect, shall be copper.

I. Power Distribution System Circuits: Circuits for temporary power distribution and lighting, not exceeding 125 volts AC, 20 ampere rating, may be permitted to use nonmetallic sheathed cable, provided that:

- a. The installation meets requirements of the NEC, and
- b. The cables are installed overhead and left exposed for surveillance.

Add the following new language to:

“Part 3 – Execution”, under Section “3.2 Temporary Utility Installation”

If, as allowed under Part 2 – Products above, aluminum conductors are used for service drops, they shall be inspected monthly for the duration of their use. A written report on the cable condition shall be submitted to the MAA’s authorized inspection firm.

18.7.1 Back-up Generator Requirements for Electrical Work (BWI Marshall Only)

This standard includes requirements for temporary emergency electrical generators for use during construction activities at Baltimore/Washington International Thurgood Marshall Airport (BWI Marshall). This standard addresses temporary generator requirements resulting from outages on the BWI Marshall distribution system from the utility service entrance locations down to and including the BWI Marshall customer utilization voltage equipment. During the planning and design phase, a study by the Engineer shall be conducted to determine the requirements of backup generator(s). Based on cost and the Engineer's recommendation, the MAA Project Manager shall determine if a backup generator is necessary.

The BWI Marshall medium voltage distribution system consists of the following major components:

1. Two utility service entrance substations designated North Substation and South Substation. These substations are located approximately on opposite sides of the Airport and are each supplied from a separate utility company feeder.
2. Multiple switchgear locations designated Switchgear #1, Switchgear #2 and Switchgear #3 (future, anticipated on-line May, 2004). Each switchgear is supplied by two feeders, one feeder from the North Substation and the other from the South Substation.
3. Multiple customer utilization voltage equipment (13,800 volt primary voltage, 480 volt or 4,160 volt secondary voltage) consisting of a double-ended unit substation, single ended unit substation or separate entrance transformer. All customer utilization voltage equipment is supplied from Switchgear #1, Switchgear #2 or Switchgear #3. Most of the customer utilization voltage equipment consists of double ended unit substations supplied by both a north and south switchgear feeder. The remaining customer utilization voltage equipment locations are supplied by a single switchgear feeder.

The designer shall perform the following activities during the design phase of the project:

1. Contact the Maryland Aviation Administration (MAA) to obtain a current BWI Marshall medium voltage distribution system diagram that shows all electrical equipment from the North and South Substations down to and including all customer utilization voltage equipment at the secondary voltage level.
2. Develop and submit for approval a project specific electrical equipment outage and equipment switching schedule including, but not limited to, the location, number, duration and time of day for all anticipated electrical outages and associated equipment switching activities for all BWI Marshall distribution system electrical equipment from the North and South Substations down to and

including all customer utilization voltage equipment at the secondary voltage level. An outage is defined as the electrical de-energization of any electrical equipment within the scope of this standard for any length of time. All outages shall be included regardless of duration. Whenever equipment is supplied by both a north and south feeder, the de-energization of one of the two feeders shall be considered an equipment outage. All switching activities shall be included regardless of outage impact.

3. Develop and submit for review a project specific temporary emergency electrical generator plan including proposed temporary emergency generator set size(s) as required for the electrical outages and/or switching operations. MAA shall be contacted for specific generator requirements.
4. Include all temporary generator requirements in the bid documents for the project.
5. All temporary emergency electrical generator requirements shall be coordinated with and approved by MAA Operations and MAA Maintenance on a case-by-case basis.

Electrical outages shall be scheduled in accordance with, but not limited to, the following requirements:

1. All work that may potentially cause any electrical outage shall be performed during non-peak hours (usually from 12:00 midnight through 5:00 AM) unless otherwise approved by MAA. The designer shall obtain the Engineer's approval for electrical outage periods.
2. Equipment outages shall be allowed on only one major electrical equipment item at any one time unless otherwise approved by MAA.
3. All outage durations shall be kept to a minimum.
4. Any work requiring a sustained electrical outage shall be performed continuously around the clock until work is completed unless otherwise approved by MAA.
5. Whenever equipment is supplied by both a north and south feeder, at least one feeder shall remain connected and active unless otherwise approved by MAA. The de-energization of one of the two supply feeders (North or South) shall be considered an outage for the purpose of this standard.

Temporary emergency electrical generators shall be diesel powered, low noise, self-contained on a dedicated containerized mobile trailer with integral fuel tank and fuel spillage containment system.

18.8 AIRFIELD ELECTRICAL

On airfield work which requires temporary wiring of lights, signs, etc. – the temporary wiring shall be buried, placed in conduit and/or marked to prevent damage to cable or exposure to hazard by operations and maintenance personnel. All areas disturbed by temporary wiring shall be returned to its original condition following removal of the temporary wiring.

CHAPTER 19 LIGHTING

19.1 INTERIOR LIGHTING

This lighting design guideline should be considered for general purpose lighting throughout the Terminal. The Maryland Aviation Administration is committed to using lighting products that maximize energy efficiency and promote good light quality. New lighting designs will receive review from the Office of Design and Construction and the Office of Maintenance & Utilities. All projects shall be designed to specify light fixtures that require lamps that the Office of Maintenance and Utilities (OMU) currently keeps in stock. The following Table 19.1 has been prepared as a list of acceptable general purpose lamps for Terminal use. Approval for any lamps not listed in this table must be obtained from OMU.

Neon and cold cathode lighting are not acceptable for general purpose lighting. The use of neon, cold cathode or in combination with LED for signage and retail use will be reviewed on a case by case basis by OMU, OCM, and the Office of Design & Engineering.

Maximum lamp fluorescent tube length shall be 4 feet; No U shaped fluorescent tubes shall be used.

The use of dimming systems shall be limited. When applicable, the design shall be kept small in size – that is: simple, manually controlled, and not connected to the building-wide control system. Dimming systems should avoid complicated operating scenarios that would be difficult to maintain. Dimming system plans and details shall be submitted to the OMU for review. Specifications for comprehensive field commissioning and OMU training shall be included for any dimming control systems.

19.1.1 Lamps

Fixtures used at BWI Marshall and MTN airports shall be specified to use the types of lamps in the Table 19.1, below:

Approved equal lamps, or proposed substitutes shall have equal or better characteristics in the “Life”, and Color Rendering Index (“CRI”), columns, compared to the specified lamps, and shall have similar color temperatures.

19.1.2 Lamp Ballasts

Metal halide ballasts shall be electronic, for Pulse-start or Ceramic Metal Halide lamps.

Linear Tubular fluorescent ballasts shall be high efficiency and electronic, compatible with lamps listed below.

Compact fluorescent ballasts shall be electronic rapid-start, with end of lamp life cut-off circuiting and keyed, quick connect nylon plugs for secondary and primary wiring.

19.1.3 Light Emitting Diodes –LED

This is a developing and fast evolving field of lighting design & equipment. The Maryland Aviation Administration does not discourage the use of this lighting technology. The MAA is evaluating the durability, efficiency and cost of this new technology. Alternative lighting systems in LED will be considered by OMU, if it can be shown to have equal or better characteristics for life expectancy and color rendition compared to the specified lamps.

Ref. #	Type of Lamp	Lamp ID Code	Manufacturer	Product Code	Approved Equal	Life, hours@ 12 hours/ start	Base Type	Lamp Watts	CRI	Color Temperature	Location
Fluorescent Tube											
1	2 Foot 17 Watts T8	F17T8/XL/SPX41/ ECO	General Electric	15484	Osram Sylvania, Philips	24,000	G13 Medium bi-pin	17W	80+	4100K	Terminal and other Buildings
2	3 Foot 32 Watts T8	F25T8/XL/SPX41/ ECO	General Electric	15491	Osram Sylvania, Philips	24,000	G13 Medium bi-pin	25W	80+	4100K	Terminal and other Buildings
3	4 Foot 28 Watts T8	F28T8/XL/SPX41/ ECO	General Electric	72866	Osram Sylvania, Philips	30,000	G13 Medium bi-pin	28W	80+	4100K	Terminal and other Buildings
4	4 Foot 32 Watts T8	F32T8/XL/SPX50/ ECO	General Electric	16313	Osram Sylvania, Philips	36,000	G13 Medium bi-pin	32W	80+	5000K	Daily and Hourly Garage
5	4 Foot 49 Watts T5 HO	F54T5/841/HO/EA/ ALTO49W ECO	Philips	22052-5	General Electric	40,000	Miniature bi-pin	49W	85+	4100K	High Bay Lighting and Terminal and other building
Self-Ballasted Fluorescent Spiral											
6	15 Watt T3	FLE15HT3/2/841	General Electric	25183	TCP, Maxlite	8,000	Medium E26	15W	80+	4100k	Terminal and other Buildings
7	20 Watt T3	FLE20HT3/2/841	General Electric	25186	TCP, Maxlite	8,000	Medium E26	20W	80+	4100k	Terminal and other Buildings
Compact Fluorescent Plug-in											
8	27 Watt PL	PLT32W/ 841/XEW/ 4Pin /ALTO27W	Philips	26872-2	Osram Sylvania,	20,000	4 pin GX24Q4	27W	80+	4100K	Down lights in Terminal & Piers

Ref. #	Type of Lamp	Lamp ID Code	Manufacturer	Product Code	Approved Equal	Life, hours@ 12 hours/ start	Base Type	Lamp Watts	CRI	Color Temperature	Location
9	42 Watt PL	F42BX/SPX41/A/4P	General Electric	97636	Sylvania, Philips	17,000	4 pin GX24Q4	42w	82	4100k	Lower level Arrival loop
Pulse Start Metal Halide											
10	70 Watt, ED17, Universal Operating Position	MH 70W/U/PS	Venture	78138	Osram Sylvania, Philips, General Electric	30,000	Medium E26	70W	65+	4000K	Daily Garage
11	150 Watt, ED17, Universal Operating Position	MH 150W/U/PS	Venture	99584	Osram Sylvania, Philips, General Electric	15,000	Medium E26	150W	68+	4000K	Lower level Arrival loop Road crossing
12	320 Watt, ED28, Vertical Operating Position	MS 320W/V/PS/740	Venture	59194	Osram Sylvania, Philips, General Electric	20,000	Mogul E39	320W	68+	4000K	Hourly Garage pole Fixtures

Ref. #	Type of Lamp	Lamp ID Code	Manufacturer	Product Code	Approved Equal	Life, hours@ 12 hours/ start	Base Type	Lamp Watts	CRI	Color Temperature	Location
Ceramic Metal Halide											
13	39 Watt Par 30, 25 Degree Beam, Screw Base	CMH39/PAR30/FL25	General Electric	42067	Osram Sylvania, Philips	10,000	Medium E26	39 W	81	3000K	Pier A Lower Baggage Claim Wood Wall
14	70 Watt, ED 17, Open Rated, Universal Operating Position	CMH70/C/U/830/MED/O	General Electric	31070	Osram Sylvania, Philips	16,000	Medium E26	70W	80	3000K	Open Lamp Applications
15	70 Watt Par 30, 40 Degree Beam, Screw Base	CMH70/PAR30L/830/FL	General Electric	22159	Osram Sylvania, Philips	10,000	Medium E26	70W	82	3000K	Red Column Accent Lights
16	70 Watt, Screw Base	CMH70/U/830/MED	General Electric	22119	Osram Sylvania, Philips	16,000	Medium E26	70W	80	3000K	Main Terminal Concourse
17	70 Watt, T6, Bi-Pin	CMH70/TU/830/G12	General Electric	20016	Osram Sylvania, Philips	15,000	G12 Bi-Pin	70W	83	3000K	Main Terminal Concourse
18	100 Watt Par 38, 25 Degree Beam, Screw Base	CMH100/PAR38/FL25	General Electric	45681	Osram Sylvania, Philips	15,000	Medium E26	100W	81	3000K	Main Terminal Concourse and Point Light Effect
19	150 Watt, T6, Bi-Pin	CMH150/TU/830/G12	General Electric	20017	Osram Sylvania, Philips	15,000	G12 Bi-Pin	150W	82	3000K	Pier A/B Exterior Canopy
20	150 Watt, ED 17, Open Rated, Universal Operating Position	CMH150/C/U/942/MED/O	General Electric	31067	Osram Sylvania, Philips	15,000	Medium E26	150W	90	4200K	Main Terminal Concourse

19.2 EXTERIOR LIGHTING

19.2.1 Apron Lighting

All light poles and fixtures shall be specified based on aesthetics, design parameters, and replacement/maintenance considerations. Consultants shall match existing products when modifying and/or expanding existing facilities. A list of lamps that are kept in stock is available to Consultants in the Office of Design & Construction. In addition, all designs shall be coordinated with the MAA Resident Architect for aesthetics.

Consultants shall provide MAA's Project Manager and the Division of Maintenance (DOM) with cut-sheets on every light fixture and lamp proposed for MAA projects.

Exterior lighting on the airfield ramp shall meet the performance of Crouse-Hinds, GAL series with energy efficient high-pressure sodium lamps and ballast.

Each pole shall bear an identification tag (engraved on aluminum plate) which shall list the manufacturer, model number, and date of manufacture and installation.

Heights of the poles should match existing for all reconstruction and retrofit projects. For Green field construction designer shall provide recommendations for approval. Designers shall coordinate each light pole installation(s) with and submit an Airport Zoning Application to MAA's Office of Planning and comply with all state and federal regulations. Light pole design shall not penetrate any navigational surfaces, i.e. FAR Part 77. If penetration is unavoidable, Federal Aviation Administration approval must be acquired (Refer to Design Procedures, Section 4.2)

Color shall be black and smooth, unless otherwise approved by MAA's Resident Architect. Arms, luminaries, and all other attachments shall be provided in matching color.

19.2.1.1 Apron Lightpole Lowering Devices

All apron lightpoles installed at a height above 35 feet shall be designed and specified to include lowering devices for luminaries and their mounting assemblies. The height shall be measured from finished grade to top of lightpole mast, excluding lightning rod.

An external portable winch unit shall be used to lower the luminaire assembly down to the pole base for servicing.

Lowering Device Specification Requirements:

Lowering device specifications shall include the following requirements:

The lowering device shall be designed per the current American Association of State Highway and Transportation Officials (AASHTO) standards used by Maryland Aviation Administration (MAA).

Comply with AASHTO LTS (Standard Specifications for Structural Supports for Highway Signs, Luminaries and Traffic Signals). Verify current edition used by MAA.

Lowering device light fixtures and lightpole shall be manufactured and tested as a system and be provided and warranted by one manufacturer. Hoist cables for lowering device shall be stainless steel aircraft type, internal to lightpole, and factory installed.

A power outlet for testing of luminaries in the lowered position shall be provided.

Portable Winch Unit and Transformer Requirements to be specified:

Projects consisting of three (3) lightpoles or more - provide two (2) portable winch units per project.

Projects consisting of two (2) lightpoles or less - lightpole shall also be by same pole manufacturer currently installed at Airport. This will eliminate the need for providing a new portable winch unit. Designer shall coordinate with Procurement for the need of a sole source justification for the lightpole(s).

Portable winch units shall be 120-volt and be provided with wired remote controller, with cabling length of 15-feet minimum.

Transformer for portable winch unit shall also be portable, totally enclosed, permanent, primary and secondary, twist-locking plug connectors on pigtails to match pole-base power outlet and winch plug.

Primary of transformer shall be rated at the lighting-circuit voltage; secondary shall be rated at the voltage of the portable winch unit (120-volt).

19.2.2 Airfield Lighting and Visual Aids Systems and Fixtures

19.2.2.1 Light Fixtures

- a. Because of longer lamp life and lower energy consumption, Light Emitting Diode (LED) type lamps in fixtures shall be specified for new airfield lighting projects at BWI Marshall and MTN Airports.
- b. All fixtures used on BWI Marshall or MTN lighting projects shall be FAA approved types, with the type of lamp specified by the Designer. Fixtures

shall be certified under the Airport Lighting Equipment Certification Program described in Advisory Circular (AC) 150/5345-53, latest edition, and shall be of a type listed in Appendices 3 and 4 of the AC. Updates to the AC Addendum list of FAA approved fixtures are typically made monthly. Consult the FAA website at the following link and search for the most recent edition of 150/5345-53 to obtain the latest Addendums:

http://www.faa.gov/regulations_policies/advisory_circulars/index.cfm

The Designer shall include within Technical Specification L-125, "Installation of Airport Lighting Systems", the applicable FAA approved fixtures listed in the most recent edition of 150/5345-53.

- c. The current AC 150/5345-53 Addendum list has added a special designation for LED equipped fixtures. The fixture type now has an (L), following the last letter after the L- number designation to indicate an LED lamp is required. Example:

L-850A uses an incandescent lamp

L-850A(L) uses an LED lamp

In-pavement light fixtures shall be specified to be Class 2, Style 3. The class and style designation must be indicated in the Contract Documents. Class 2 indicates that the light fixture is constructed to accommodate base mounting. The Style 3 fixture is defined as having a maximum height of ¼ inch above finished grade and is intended to prevent damage to in-pavement light fixtures during snowplowing operations.

- d. Because of differences in appearance of LED lights and incandescent sourced lights, the two types shall not be mixed in a run of lights. Do not insert a series of LED lights within a length of incandescent lights, unless there is a change in direction. Every effort shall be made by the designer to minimize transitions from one type of light to the other.
- e. LED lights shall be specified without heaters unless the designer is otherwise advised by the MAA Project Manager of a project specific requirement.
- f. Steel reinforcing cages shall be provided on all in-pavement lights installed in both asphalt and concrete pavements. Steel reinforcing cages shall be in accordance with the Steel Reinforcing Cage detail. Detail is on following pages.

19.2.2.2 Lockout / Tag-out for Airfield Lighting for S-1 Series Plug Cutouts

All S-1 series plug cutouts shall be the lockable type. The following is the specification for the S-1 series plug cutout:

- “SERIES PLUG CUTOUT TYPE S-1. S-1 series plug cutouts shall be lockable, individually keyed with two keys, capable of carrying 20 Amperes, and shall have four contacts that close the circuit between the regulator and series lighting loop. The body shall be constructed of high strength plastic. Porcelain bodies may not be used. The series plug cutout shall be protected against arcing.”

19.2.2.3 Airfield Lighting Cable

- a. Cables for Airfield Lighting Circuits shall be FAA L-824, 5kV, Type B cable with EPR (Ethylene Propylene Rubber) insulation and CPE (Chlorinated Polyethylene) Jacket. Underground cable shall conform to the requirements of FAA AC 150/5345-7 or latest edition, be provided by an FAA certified manufacturer and conform to the following additional specifications:

- Cable shall be insulated and jacketed copper, #8 AWG, 7 strand (19 strand is acceptable).
- Cable shall be single conductor, suitable for direct burial and/or raceway installation in wet conditions, and shall be rated for a minimum 90° C for continuous service and 130° C, for short circuit conditions.

- b. Available Manufacturers: Certified L-824, 5kV, Type B cable manufacturers are listed in FAA Advisory Circular AC 150- 5345-53 or latest edition, and shall be listed in the current Addendum to Appendices 3 and 4. Updates to the Addendum list of FAA approved cables are typically made monthly. Consult the FAA website at the following link and search for the most recent edition of 150/5345-53 to obtain the latest Addendums:

http://www.faa.gov/regulations_policies/advisory_circulars/index.cfm

- c. There may be lead times of up to 16 weeks for cables, thus phasing of deliveries, contract completion time, and/or advance ordering should be considered.
- d. Permanent wiring shall be placed in conduit.

19.2.2.4 Airfield Lighting Cable Identification Tags

Designers shall include the following information on the contract documents:

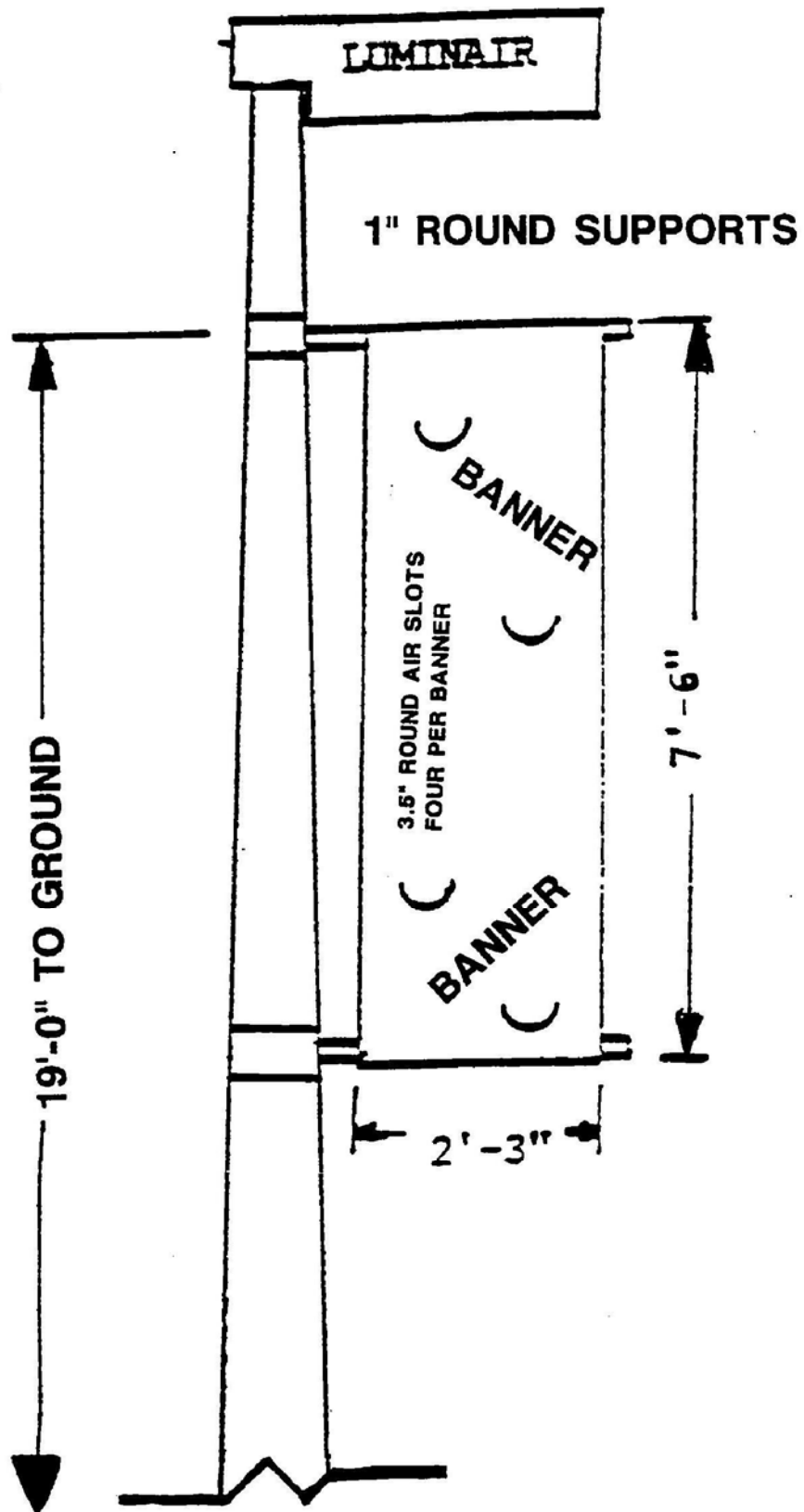
- a. Identification tags shall be provided for each cable entering or leaving manholes, handholes, junction boxes, and light fixture cans.
- b. All tags shall be plastic “phenolic” tags with colors as shown in the table below.
- c. Two heavy-duty UV resistant black nylon ties shall be used to secure each tag to the cable.

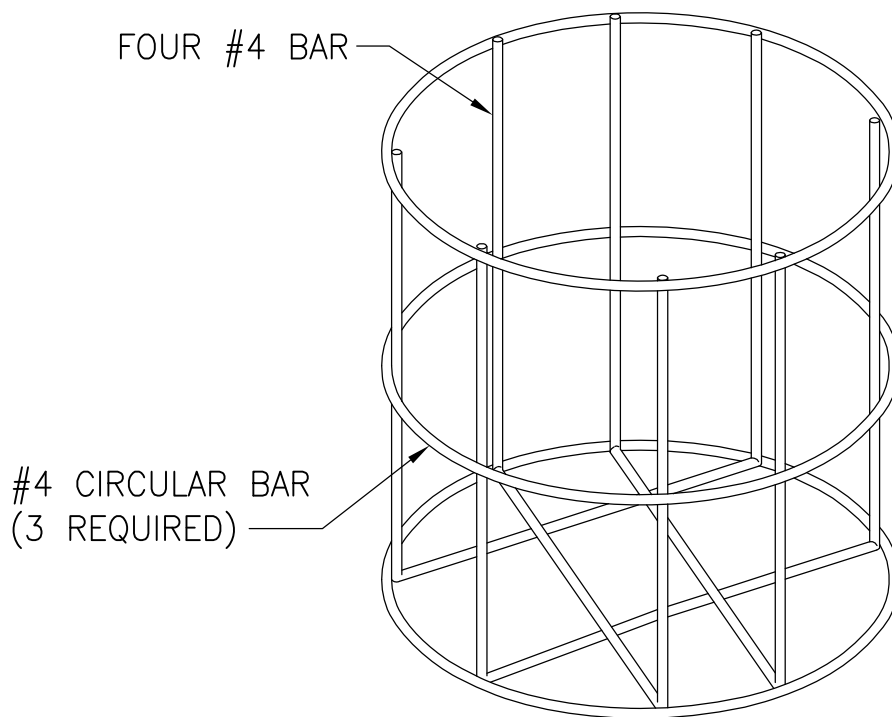
Identification	Tag Color	Engraved Letter Color
Primary Distribution	Red	White
Runway Edge	White	Black
Controls	Black	White
Taxiway Edge or Centerline	Blue	White
Runway Touchdown and Centerline	Yellow	Black
FAA and Communication	Green	White
Secondary Power	White	Red
Spare Wire	Orange	White

Additionally, cable identification tags shall be in accordance with the Cable Identification Tag detail. Cable Identification Tag detail is provided.

19.2.2.5 Airfield Lighting Fixture Identification Tags

Fixture identification tags shall be provided for all elevated light fixtures on the runways and taxiways. Fixture identification tags shall be in accordance with the Fixture Identification Tag detail. Fixture Identification Tag detail is provided.





NOTE:

1. STEEL REINFORCEMENT SHALL CONFORM TO ASTM-A184, STANDARD SPECIFICATION FOR FABRICATED DEFORMED STEEL BAR MATS FOR CONCRETE REINFORCEMENT, OR ASTM-A704, STANDARD SPECIFICATION FOR WELDED STEEL PLAIN BAR OR ROD MATS FOR CONCRETE REINFORCEMENT.

19.2.3 Landside Lighting (Parking and Roadways)

All light poles and fixtures shall be specified based on aesthetics, design parameters, and replacement/maintenance considerations. Consultants shall match existing products when modifying and/or expanding existing facilities. A list of lamps that are kept in stock is available to Consultants in the Office of Design & Construction. In addition, all designs shall be coordinated with the MAA Resident Architect for aesthetics.

Consultants shall provide MAA's Project Manager and the Division of Maintenance (DOM) with cut-sheets on every light fixture and lamp proposed for MAA projects.

Light poles shall be round tapered, fiberglass, breakaway poles with anchor base shrouds, transformer base and a smooth black finish. Poles shall meet the performance of Shakespeare #AHW30-0251BB01.

Luminaries shall meet the performance of Holophane (Somerset) contemporary low profile, rectangular luminaries with 5-3/4" arms and smooth black finish. Existing luminaries that are to be matched are 250W, 400W, or 1000W, HPS at 277V with a separate grounding wire.

Each pole shall bear an identification tag (engraved on aluminum plate) which shall list the manufacturer, model number, and date of manufacture and installation.

The need to install banners on light poles shall be coordinated with MAA's Project Manager and DOM. Light poles, banner supports, and foundations shall be designed for banners, when required by MAA. The detail shows BWI Marshall's standard banner configuration. The banner supports and hardware shall be coordinated with and approved by DOM.

Heights of the poles should match existing for all reconstruction and retrofit projects. For Green field construction designer shall provide recommendations for approval. Designers shall coordinate each light pole installation(s) with and submit an Airport Zoning Application to MAA's Office of Planning and comply with all state and federal regulations. Light pole design shall not penetrate any navigational surfaces, i.e. FAR Part 77. If penetration is unavoidable, Federal Aviation Administration approval must be acquired (Refer to Design Procedures, Section 4.2)

Parking lot foundation heights shall be a minimum of 2-1/2 feet above finished grade to resist vehicle impact.

Color shall be black and smooth, unless otherwise approved by MAA's Resident Architect. Arms, luminaries, and all other attachments shall be provided in matching color.

19.3 AIRFIELD LIGHTING COUNTERPOISE FOR LIGHTNING PROTECTION

19.3.1 Purpose

Per FAA Advisory Circular 150/5340-30D, "Design and Installation Details for Airport Visual Aids," Paragraph 12.5, "The purpose of the counterpoise or lightning protection system is to provide low resistance preferred paths for the energy of lightning discharges to enter the earth and safely dissipate without causing damage to equipment or injury to personnel. The counterpoise is a separate system and must not be confused with equipment safety grounds that provide personnel protection from electrical shock hazards." Equipment safety grounds shall be provided per Paragraph 12.6 of the above cited Advisory Circular.

19.3.2 Lightning Protection Requirements for Airfield Lighting Equipment

To provide a level of protection from lightning strikes to underground power and control cables for airfield electrical equipment owned and maintained by the Airport, all projects shall include installation of Counterpoise wire above the wiring and conduit intended to be protected. Following are installation requirements for the installation of Counterpoise wire.

1. The Counterpoise conductor shall be a bare solid copper wire, #6 AWG.
2. Counterpoise shall be connected to ground rods spaced a maximum of 500 feet apart.
3. Counterpoise shall be bonded to ground rods in accordance with Section 19.3.3.
4. Ground Rods shall be copper or copper-clad steel, 10 feet long by 3/4-inch diameter, minimum.
5. Ground rods shall be installed a minimum of 6" deep to top of ground rod.
6. Include provisions in the specifications that if the resistance to ground of a ground rod exceeds 25 ohms, a supplemental ground rod shall be added.
7. Counterpoise shall be connected to an exterior ground lug on ALL Light Bases that are intended to contain wiring for Airport-Owned and Maintained Lighting, Navigational Aids (Nav aids), and other miscellaneous Airfield Electrical Equipment. This includes, but is not limited to, all in pavement and elevated light base cans and sign base cans.
8. A rebar cage shall be installed around in pavement light bases in rigid pavement as well as in concrete encasement for light bases installed in flexible pavement. The counterpoise shall be bonded to the rebar cage.
9. Coat any exposed copper/brass at connections or bonds to base cans with a 6 mil layer of 3M ScotchKote electrical coating or approved equal.

10. Counterpoise connections shall be UL listed for direct earth burial.
11. Specifications shall require installation to comply with applicable requirements of NFPA 780, Standard for the Installation of Lightning Protection Systems.
12. At the Airfield Lighting Vault or other power source, bond counterpoise to vault or power source equipment grounding system.

19.3.3 Bonding

Whenever counterpoise wires are bonded to ground rods or other grounding electrodes, bonds shall be exothermic welds. Exothermic welds shall be coated against corrosion where direct buried.

Counterpoise Wire Installation. Provide Counterpoise wire in accordance with the following table:

COUNTERPOISE WIRE REQUIREMENTS

<u>Duct or Conduit Installation Method and Configuration</u>	<u>Counterpoise Wire Installation Requirements</u>
Single conduit, all sizes, not adjacent to pavement edge	4" above line to be protected
Single conduit, all sizes, running beneath pavement (apron area, paved shoulders)	4" above line to be protected
Single conduit, all sizes, running adjacent to edge of pavement, in grass area	8" below grade and located half the distance from edge of pavement to the conduit run centerline.
Multiple conduits and ductbanks, all widths and depths	Height of Counterpoise wire above conduit(s) to be protected shall be within a 45-degree zone of protection below the counterpoise. Provide number of Counterpoise wires as required to meet protection zone criteria. Minimum cover over counterpoise shall be 12".
Directionally drilled conduit, single, double or in group of three	None – provide ground rod at each end of directionally drilled conduit and bond to counterpoise of circuit being placed in directionally drilled conduits.
Group of 4 or more directionally drilled conduits	#6 AWG, Minimum, in separate directionally drilled sleeve, centrally located. Provide ground rod at each end of directionally drilled conduit and bond to counterpoise wire.
Conduits in steel casing	None – Provide ground rod at each end of casing and bond with #6 counterpoise wire.

<u>Duct or Conduit Installation Method and Configuration</u>	<u>Counterpoise Wire Installation Requirements</u>
Buried FAA cables	Refer to FAA Design Standard 19e or latest edition.

Required Specification Sections:

To supplement the above design standard items, include in the contract documents the following specification sections from Advisory Circular 150/5370-10D (or current edition), ITEM L-108 UNDERGROUND POWER CABLE FOR AIRPORTS.

1. 108-3.7 EXOTHERMIC BONDING
2. 108-3.8 TESTING

CHAPTER 20 SIGNAGE AND GRAPHICS

20.1 EXTERIOR SIGNAGE

20.1.1 Apron/Airfield Signage

20.1.1.1 Electrical Characteristics of Airfield Signs

Each circuit shall be designed to handle all combinations of VA loading and power factor or the Designer shall ensure that sign electrical characteristics, not covered by FAA Specifications, are included in the contract specifications, as appropriate. This is to help alleviate the substantial variances in volt-amp loading and power factor, from manufacturer to manufacturer as well as manufacturers who produce both high and low VA loading versions of the same sign.

20.1.2 Baggage Makeup Area Exterior Overhead Signage

All vehicle entrances to and exits from baggage make-up areas shall have a sign installed to caution drivers of possible low overhead clearances inside the baggage make-up area per the standard detail on the following pages. Exits are included in order to account for all driver situations. Signs are to be mounted centered above doors whenever possible. When signs cannot be mounted above, signs are to be mounted to the left or right of the door with the top of the sign aligned with the top of the doorway, or as determined by the Engineer. Sign detail include on the following page.

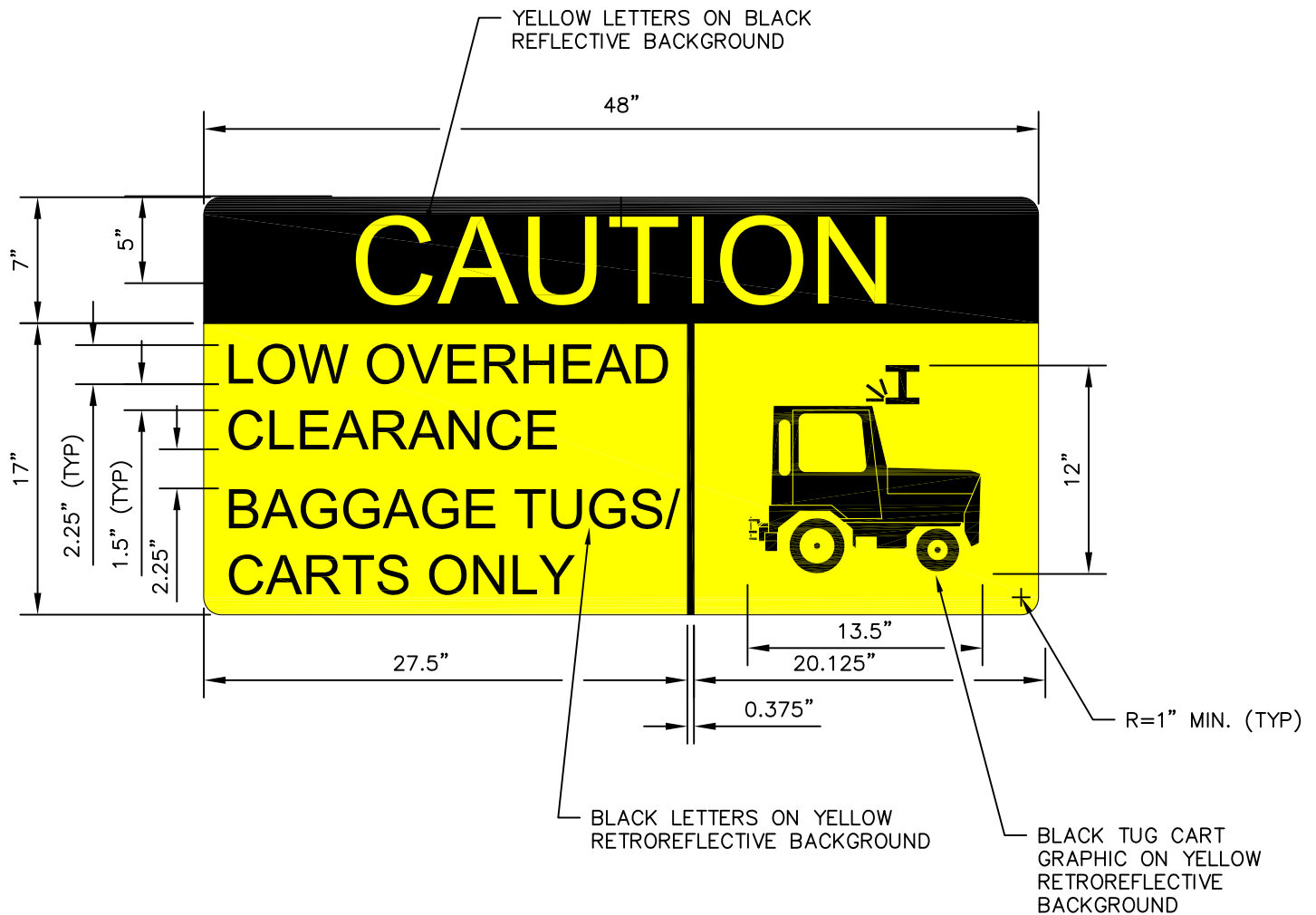
20.2 INTERIOR SIGNAGE

The graphic style for BWI Marshall signage is Helvetica Regular. All sign boxes shall be internally lighted. Sign boxes in the Domestic Terminal shall be black and those in the International Terminal shall match Benjamin Moore 1608 Grey. New signs shall match the Airport's Standard.

LED Signs shall match the existing signs manufactured by Winona Lighting, Cole Lighting, or Bergen Art Metal. LED message center shall be manufactured by Salescaster Displays or approved equal.

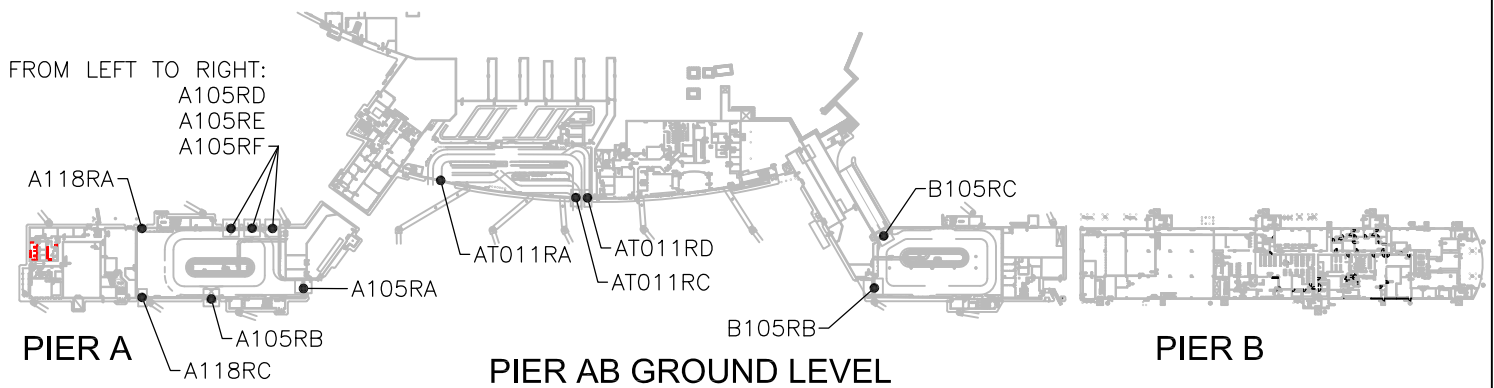
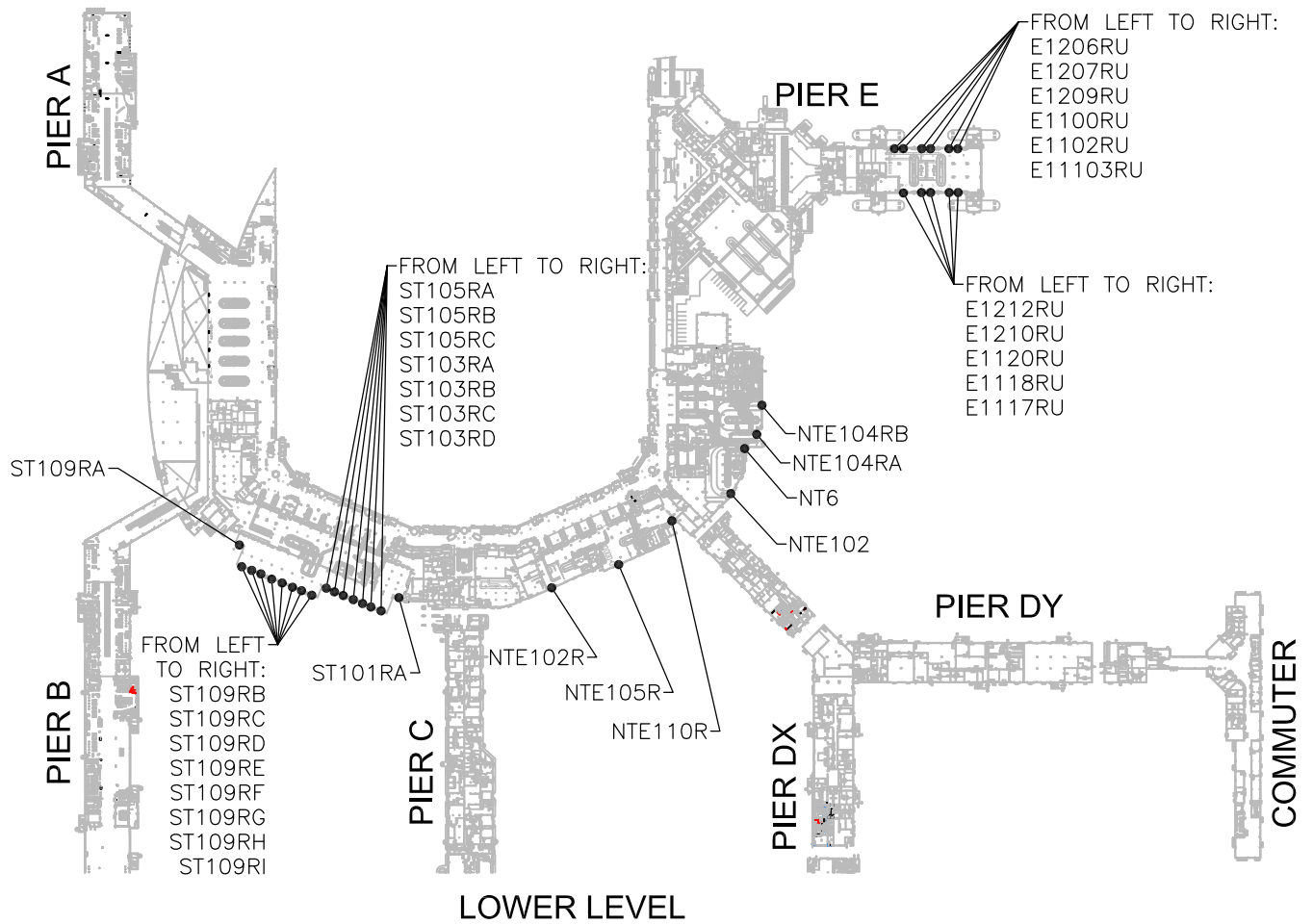
20.2.1 Exit Signs

All exit signs shall consist of red letters on a contrasting background, in accordance with NFPA 101. This type of sign is to match the existing area.



NOTES:

1. FONT TYPE: CLEARVIEWHWY-4-B
2. SIGN MATERIAL: ALUMINUM, 0.04" THICKNESS
3. ATTACHMENT METHOD: GALVANIZED HOLLOW MASONRY ANCHORS OR STAINLESS STEEL SHEET METAL SCREWS AND WASHERS, AS RECOMMENDED BY THE ENGINEER, PLACED IN EACH CORNER AND 24" O.C. MAX
4. INSTALL SIGN AT EACH ENTRY TO AND EXIT FROM BAGGAGE MAKE-UP AREAS. SIGN SHALL BE MOUNTED CENTERED ABOVE DOOR WHENEVER POSSIBLE. WHEN SIGN CANNOT BE MOUNTED ABOVE DOOR, SIGN SHALL BE MOUNTED TO LEFT/RIGHT WITH THE TOP OF THE SIGN ALIGNED WITH THE TOP OF THE DOORWAY, OR AS DETERMINED BY THE ENGINEER.



DOOR LOCATION	NUMBER OF DOORS
PIER A	7
AB	3
PIER B	2
BC	17
CD	3
DE	4
PIER E	11

TOTAL NUMBER OF DOORS = 47

20.2.2 Identification Signage

20.2.2.1 *Door Identification Signs*

Door identification signs will be provided as outlined below. Designer is responsible for developing a suitable sign attachment method for approval by the MAA Project Manager and the OFM.

1. “SPRINKLER CONTROL VALVES” and “SPRINKLER/STANDPIPE CONTROL VALVES”: Metal type sign with black background and reflective white letters. These signs will be placed both indoors and outdoors. Sign size shall be 10” x 6”. The sign shall be placed on the door closest to the valves.
2. Manual Fire Pull Sign (MFP 1111): The sign shall be used to identify the location of “Manual Fire Pull” stations at exit doors leading to the aircraft apron. The MFP shall be constant for all signs but the 4-digit number will change. The last four digits of the 12-digit fire alarm number shall be used. The sign shall be placed on the exterior doors as high as possible. Metal type sign with black background and white reflective letters and numbers. Sign size shall be 2” x 6”.
3. Electrical Substations (“WARNING ELECTRIC SUBSTATION PROTECTED BY WET SPRINKLER SYSTEM”): This sign shall be used to identify the location of Electrical Substations. Metal type sign with black background and white reflective letters shall be placed on the outside of the door. Sign size shall be 6” x 12”.
4. Standpipe Connection (“Fire Dept. Standpipe Connection”): This sign shall be made like a bumper sticker. It will be used indoors only and placed on smooth metal or glass. It will be placed over existing signage on glass that is stenciled on the interior of the glass. The sign contractor shall determine the sign size (minimum 10” x 3”), color and size of the lettering. The locations and placement shall be field determined.
5. Fire Command Room (“FIRE COMMAND ROOM FAP-HVAC-PA”): Metal engraved or plastic engraved type sign with black background and white reflective letters is required. The sign will be placed on the outside of the door. Sign size 9” x 11”.

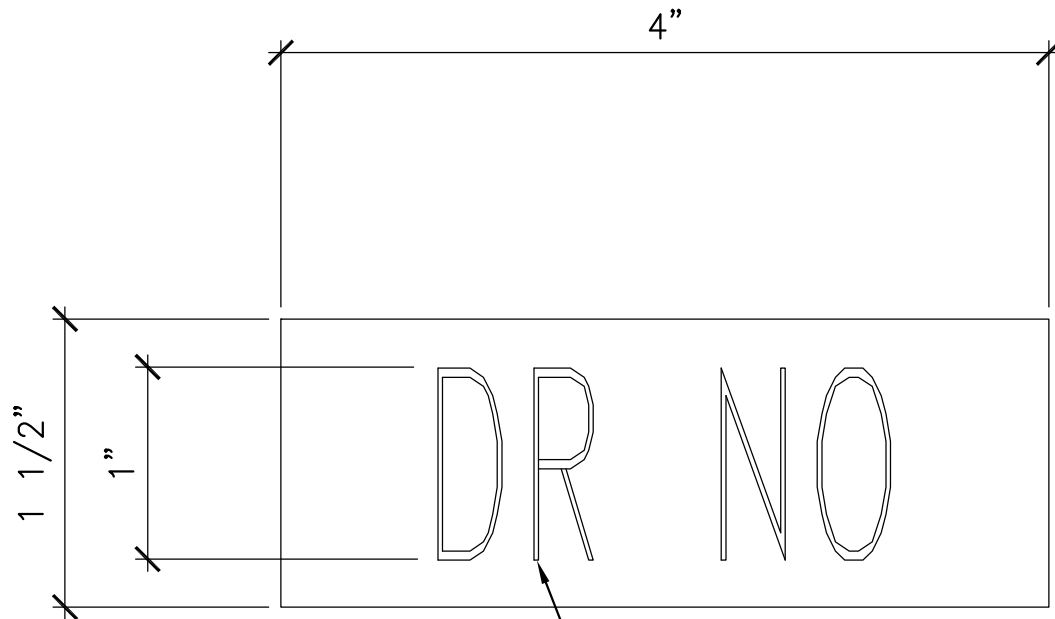
20.2.2.2 *Door Numbering Signage*

Door numbering signs will be installed centered on the doorframe head on the exterior (public) side of the door. The sign shall be plastic engraved and shall list the MAA door number. Sign size 1-1/2” x 4” with self-adhesive tape for

mounting. It will have a black background with white letters. Door number designations will be provided by the OFM.

20.3 TEMPORARY PARTITION WALL GRAPHICS

If a project (exterior or interior) involves the installation of construction or temporary partition wall(s) or barricade(s) with exposure to the public, the designer shall include in the plans and specifications the provisions for installation of informational signs (i.e., Excuse Our Appearance, While We Are Under Construction; Pardon the Dust, Construction Underway; Pardon the Mess, We Are Making Progress; etc.) and graphics if available (e.g., 3D images or renderings of the proposed work) on the public side of the wall or barricade. The size and content of the informational signs and graphics shall be coordinate with the MAA's Task Manager, Office of Transportation and Terminal Services, Office of Marketing, Communications and Customer Service, the Airport's Master Concession Developer through the Office of Commercial Management, and other appropriate MAA staff.



ENGRAVED BI-COLOR PLASTIC
SIGN ADHERED TO OUTSIDE DOOR
FRAME HEAD, TYP
ACTUAL TEXT VARIES – NUMBERS
TO BE PROVIDED BY THE OFM

MAA DOOR NUMBER PLAQUE

SPRINKLER CONTROL VALVES

Sign type No. 1

SPRINKLER / STANDPIPE CONTROL VALVES

Sign type No. 2

Metal type sign with red background and reflective white letters. These signs will be placed indoors and outdoors.

Sign size: 10"x6"

The sign shall be placed on the door closest to the valves.

MFP 1111

This sign shall be used to identify the location of "Manual Fire Pull" stations at exit doors leading to the aircraft apron.

The MFP shall be constant for all signs; the 4-digit number will change. The last four digits of the 12-digit fire alarm number shall be used. The sign shall be placed on the exterior of doors as high as possible.

Metal type sign with red background and white reflective letter and numbers.

Sign size 2"x 6"

**WARNING
ELECTRIC SUBSTATION
PROTECTED BY WET
SPRINKLER SYSTEM**

This sign shall be used to identify the location of Electrical Substations.

Metal type sign with red background and white reflective letters shall be placed on the outside of the door.

Sign size 6"x 12"

**FIRE
COMMAND
ROOM
FAP-HVAC-PA**

Metal type sign with red background and white reflective letters. The sign will be placed on the outside of the door.

Sign size 9"x11"

Fire Dept. Standpipe Connection

This sign shall be made like a bumper sticker. It will be used indoors only and placed on smooth metal or glass. It will be placed over existing signage on glass that is stenciled on the interior of the glass.

The sign contractor shall determine the sign size (minimum 10"x3"), color and size of the lettering.

The locations and placement shall be field determined.

CHAPTER 21 BAGGAGE HANDLING SYSTEMS

This standard is based on US airport baggage handling system applications and the design philosophies that have evolved / been established from projects already completed at BWI Marshall. Exceptions to these guidelines do exist. The baggage handling systems standards herein are for conventional slider bed conveyors, recirculating carousels, and checked baggage inspection systems as are being designed/installed in 2008. The standards are performance guidelines for either design/bid/build or design/build procurements. These standards can be utilized with all forms of TSA baggage screening equipment and protocols.

21.1 ABBREVIATIONS

AFF	–	Above Finished Floor
AHJ	–	Authority Having Jurisdiction
ATR	–	Automatic Tag Reader
BC	–	Baggage Claim
BIDS	–	Baggage Information Display System
BG	–	Between Guides
BHS	–	Baggage Handling Systems
BMA	–	Baggage Measurement Array
BVS	–	Baggage Viewing Station
CBIS	–	Checked Baggage Inspection System
CBRA	–	Checked Baggage Reconciliation Area
EDS	–	Explosive Detection System
ETD	–	Explosive Trace Detection
FAR	–	Federal Air Regulations
FPM	–	Feet per Minute
GUI	–	Graphic User Interface
HMI	–	Human Machine Interface
HVAC	–	Heating, Ventilation, and Air Conditioning
IBB	–	In-Bound Baggage
LEO	–	Law Enforcement Office
MCP	–	Motor Control Panel
MVI	–	Multi-Vendor Interface
NEMA	–	National Electrical Manufacturers Association
NFPA	–	National Fire Protection Association
OB	–	Out-Bound Baggage
OIT	–	Operator Interface Terminal
OLE	–	Object Linking and Embedding
OSB	–	Over-Size Baggage
OSHA	–	Operational Safety and Health Administration
OSR	–	On-Screen Resolution
PFD	–	Power Face Diverter
PLC	–	Programmable Logic Controller
PGDS	–	Planning Guidelines and Design Standards
TAF	–	Terminal Area Forecast
TOB	–	Top of Bed

TSA	–	Transportation Security Administration
SWS	–	Search Work Station
UL	–	Underwriters Laboratories
UPS	–	Uninterrupted Power Supply
VFD	–	Variable Frequency Drive
VPN	–	Virtual Private Network

21.2 GENERAL CODES AND CRITERIA

- a. BHS equipment shall be designed to meet OSHA, NEMA, NFPA, FAR requirements, as well as all local codes.
- b. For all Baggage conveyor projects involving Baggage Security Screening, obtain and comply with the latest version of the TSA document, 'Planning Guidelines and Design Standards for Checked Baggage Inspection Systems' (PGDS).
- c. Designs shall be based upon key parameters and metrics such as:
 - Federal Aviation Administration's Terminal Area Forecast (TAF) and specific airline-user flight schedules
 - Airline's Passenger Level-of-Service and operational procedures
 - Current and future EDS technology and TSA requirements
 - Airport development/master plans
 - Airport and Passenger characteristics
 - Aircraft Models
 - Passenger Arrival Curves
 - Bags per Passenger
 - Load Factors
 - Gate Utilization
- d. Checked Baggage Inspection Systems (CBIS) shall be designed to be efficient and cost effective. CBISs shall be designed to maximize equipment utilization and minimize systems jams, faults, and errors. All designs shall provide ample clearance for equipment replacement and maintenance while maximizing conveyor layout economy.
- e. The BHS shall be capable of processing standard baggage sizes up to 54" in length, 34" in height and 34" in width respectively. The smallest piece of luggage that a standard BHS must accommodate is 12" long, 3" high, and 3" wide; all baggage under these dimensions shall be processed in tubs, provided by the airlines. The maximum weight for standard luggage is 100 lbs.
- f. The BHS shall be specified to be installed with industry standard conveyor components, with 39" Between Guide (BG) segments for the transport of standard sized baggage.

- g. The BHS must accommodate oversize (O/S) baggage not exceeding 72" in length, 42" in height, 42" in width and 150 lbs in weight.
- h. Conveyor right-of-way envelopes shall be no less than 4.5' wide and 4.5' high without catwalk, and no less than 7' wide by 4.5' high with catwalk. Catwalk height clearance should be as tall as possible.
- i. Refer to the confined space sections (Section 2.1.2) within this manual with regards to classifying the catwalk spaces.
- j. All proposed baggage claim devices installed at BWI Marshall Airport shall be designed to prevent unauthorized access from the non-secure areas into the SIDA while the device is unattended. If the installation does not characteristically prevent such access, the design shall provide a "bag cage" or similar enclosure on the SIDA side. The design shall specify the enclosure be configured to open and close via CASS and all controls shall be incorporated into the belt control logic.

Designer shall meet with MAA Security at concept design phase to obtain approval of method(s) used to prevent unauthorized access from baggage claim devices to the SIDA.

21.3 PERFORMANCE

BHS and CBIS shall meet the following performance criteria:

- a. Baggage spacing (space between head and tail end of adjacent bags) shall be regulated to comply with current and future EDS technology requirements.
- b. Speeds between two adjacent belts shall not vary more than 30% from sending to receiving conveyor.
- c. CBIS/BHS shall transport all baggage from originating locations to security screening areas and then transport cleared bags to makeup, within the user's (airline and TSA) designated time frame. The designer shall model the entire system with EDS which is given by TSA to ensure that the maximum time of a bag in the system is not exceeded.
- d. Existing system shall be tied into new system.
- e. CBIS/BHS shall queue bags into security areas to allow for varying processing times and efficiently feed TSA workstations as they become available.
- f. Configure merges prior to make up units in a manner that does not cause dieback into the security screening matrix.

- g. The BHS/CBIS shall not have jams in excess of 1%, based on number of checked bags over the course of an hour.
- h. The maximum percentage of error bags entering the CBRA shall be 2% of the total bags for systems without a reinsertion line and 3% for systems with a reinsertion line, in a 24 hour period of time.
- i. ATR's misread rate shall not exceed 5% during normal operation.
- j. BMA's misread rate shall not exceed 5% during normal operation.
- k. Bag tracking error rate (Lost in track, Added bags, or Missing bags) shall not exceed 0.5%.
- l. Fail Safe operation activation shall not exceed 0.5% of total bag volume.
- m. All conveyor input lines that feed an EDS matrix shall have a minimum capacity of 1800 bags/hour.

21.4 MECHANICAL COMPONENTS

Conform to the following standards of mechanical components for BHS/CBIS for MAA projects:

- b. The standard baggage clearance shall be 36" above TOB.
- c. The maximum incline or decline angle for all non-tracked conveyors shall be 18°.
- d. The maximum incline or decline angle for all tracked conveyors shall be 15°.
- e. Slider-bed conveyor construction shall be 39" Between Guides (BG).
- f. Oversize Slider-bed conveyor construction shall be 42" BG.
- g. Install brake motors on incline and decline conveyors to keep belts from drifting under load.
- h. Motors/Gearboxes:
 - 1. For standard drive units, specify right angle drives as first preference.
 - 2. Where space is constrained, or drive units will not fit on either side of conveyor, use under-slung drives.
 - 3. All motors shall have a "C" faced flange and be listed and labeled by the Underwriters Laboratories (UL).
 - 4. All motors shall have "Class F" insulation and shall have a service factor of 1.25

- i. VFD's shall be utilized on all conveyors upstream of EDS machines, with the possible exception of the take-away conveyors in the public spaces. VFD's shall be utilized on all conveyors within the CBIS portions of the systems. VFD's shall be utilized on all conveyors in any tracking zones.
- j. Power Face Diverters (PFD) shall have a minimum throughput of 40 bags per minute and at least 5 years of proven successful operation in conveyor systems.
- k. Tapered side guard guides (wedges) shall be provided for centering bags before EDS. The guides shall be formed with stainless steel, minimum 10-gauge, Type 304 with #4 brushed finished. All connections shall be smooth and flush without openings. The guides shall be provided with all necessary stiffeners.
- l. Vertical Diverters shall have a minimum throughput of 30 bags per minute and at least 5 years of proven successful operation in conveyor systems.
- m. Conveyor support structure shall be designed for a minimum of 183 lbs. per linear foot of live load.
- n. Catwalk alongside conveyors shall be provided where conveyor TOB elevations are greater than 7'-0" AFF. Catwalk shall be of 30" wide with open grating, and fixed kneeling plates at drive locations.
- o. Provide ladders and/or crossovers at all locations identified as bag jam points, at control stations, at conveyor access points, and as required by code to properly access and maintain conveyors.
- p. Handrails shall be provided on all catwalks except where adjacent to conveyor.
- q. Protect all BHS equipment from damage caused by tug/cart movement using guardrails and/or pipe rails.
- r. Each conveyor section shall be permanently and indelibly marked with its respective number as shown on BHS Contractor's shop drawings for conveyor identification. Each conveyor number shall be carefully and neatly painted or stenciled in a contrasting color, nominally 4" high, in a conspicuous location on the conveyor drive. Temporary markings on the conveyors or other equipment shall be made with a medium which is readily removable with water or a readily available commercial solvent, such that they may be removed without requiring refinishing of the surface on which they appear.

21.5 ELECTRICAL/CONTROLS

Conform to the following standards of electrical components for BHS/CBIS for MAA projects:

- a. Remote access to the BHS control system head-end shall be provided through a Virtual Private Network (VPN) connection.
- b. E-Stops shall be incorporated into the design at a minimum of every 25' along each conveyor line.
- c. High resolution, shaft mounted tachometers/encoders shall be provided in tracking zones.
- d. Baggage Measurement Array (BMA) technology with a history of at least 5 years proven successful operation in conveyor systems shall be provided.
- e. Stack light colors within Screening area.
 1. Stand-Alone and Mini-Inline Systems (As defined by the PGDS):
 - Green – Cleared Bag
 - Red – Alarmed Bag
 - Amber – Unknown Bag
 - White – EDS/BHS Communications Error
 2. Medium Speed and High Speed Inline Systems (As defined by the PGDS):
 - Green – Normal Run
 - White – EDS/BHS Communications Error
 - Amber – BHS Fault
 - Red – Start Up
 - Blue – Failsafe
 3. All screening area stack lights shall be equipped with audible alarms.
- f. Photoelectric sensors shall be retro-reflective type with polarized lenses.
- g. When integrating L3-Examiner 6000's with the BHS, require one MVI card for each EDS device. [Note - other EDS, and later generations of L3 equipment may not require the MVI communications cards.]
- h. When a new section of BHS (or CBIS) is being integrated into an existing system, replace the existing PLC with a new control unit to control the entire system. In other words, do not attempt to integrate the new PLC with the existing.
- i. Meet or exceed the EDS manufacturer's electrical requirements.
- j. One Operator Interface Terminal (OIT)/Human Machine Interface (HMI) shall be provided per Motor Control Panel, to display subsystem diagnostic, maintenance, and control information.

- k. Each conveyor motor shall have one heavy duty, 480V, 3 Phase, NEMA 1 disconnect switch and an auxiliary contact to report status of disconnect to PLC for system monitoring.
- l. Each Automatic Tag Reader (ATR) shall be a minimum of ten head array and a history of 5 years of proven successful operations in conveyor systems.
- m. BHS Contractor shall provide software and hardware consistent with industry standards such as:
 - 1. Windows based software platform;
 - 2. Operating system and Graphic User Interface (GUI) shall be user friendly and capable of simultaneously handling multiple programs while incorporating Object Linking and Embedding (OLE); and,
 - 3. Shall not be Proprietary, or 'Sole Source' hardware or software.
- n. PLC System and Centralized Supervisory computers shall be fully redundant to meet the specific functional requirements of the BHS for maintenance information. The controls system shall constantly update the BHS control room's Graphic User Interface(s).

21.6 OUTBOUND CONVEYOR SYSTEM

The following design standards shall be met:

- a. Ticket Counter/Curbside - Standard ticket counter or curbside load conveyor belt speed shall be 90 Feet per Minute (FPM).
- b. Meet or exceed structural floor slab requirements per machine, as stated by EDS supplier.
- c. Comply with TSA and FAA noise requirements for staffed areas.
- d. Provide a tug aisle clear height of 8'-0" (minimum) from finished floor to lowest hanger or drive component.
- e. Make-up unit control stations shall be located within a 16" to 22" arm reach from the perimeter of the unit.

21.7 INBOUND CONVEYOR SYSTEMS

The following design standards shall be met:

- a. Design the length of each load belt for a four (4) cart tug train.

- b. Make provisions for an unimpeded thirty six (36) inch personnel work space between the load belt and the tug train parking lane.
- c. The standard tug train parking lane shall be seven (7) feet wide.
- d. Top of Bed elevations for load belts shall be 1'-6" AFF.
- e. Load belt speeds shall be 90 fpm.
- f. Claim Unit speed shall be 90 fpm.
- g. Claim Unit finishes which are visible to the public shall be stainless steel finish.
- h. Claim Unit drive motor (primary and redundant) will be capable of starting the carousel under full load conditions.

21.8 TESTING AND COMMISSIONING

Conform to the following standards for testing and commissioning of BHS/CBIS for MAA projects:

- a. TSA certification testing procedures shall be performed as defined in the TSA document, 'Planning Guidelines and Design Standards for Checked Baggage Inspection Systems', latest edition.
- b. Static and dynamic functionality testing, as well as a system throughput test or system 'stress test', shall be performed.

21.9 WARRANTY/MAINTENANCE/TRAINING/MANUALS

Conform to the following standards for BHS/CBIS Warranty Issues and Maintenance Manuals for MAA projects:

- a. The BHS Contractor shall provide one (1) year of Extended Warranty Services including Operation and Maintenance in addition to standard one (1) year general contractor warranty.
- b. On outbound systems with CBIS, provide a minimum of 40 hours training, flexible over all shifts. The training shall be divided up into:
 - 1. 8 hours of Operational Training for airline personnel.
 - 2. 8 hours of Operational Training for TSA personnel.
 - 3. 24 hours of maintenance training for designated operation and maintenance personnel.

- c. Draft copies of the Operation and Maintenance (O&M) Manuals shall be submitted 120 calendar days prior to substantial completion and final copies shall be submitted 30 calendar days prior to substantial completion. The final copies of the O&M Manuals shall be bound in an orderly manner in loose-leaf lockable 3-ring binders with complete table of contents. Manuals shall include the as-built drawings, operating and maintenance instructions, wiring diagrams, connections and complete parts list of all items. Include manufacturer's literature, catalog/cutsheet, sources of purchase and similar information.

21.10 DESIGN COORDINATION GUIDELINES

Conform to the following Design Coordination Guidelines for MAA BHS/CBIS projects:

- a. Coordinate issues with EDS supplier, such as:
 - 1. Refer to current integration guide for specific EDS machine (to be provided by TSA).
 - 2. Proper Standard and Emergency power (such as the NFPA section, 70-700-1).
 - 3. Uninterrupted Power Supply (UPS) quantities, requirements and locations.

- b. Coordinate issues with TSA:

The designer shall meet with TSA to determine baggage screening technology and protocol. Designer should also coordinate delivery of survey equipment with schedule for commissioning of BHS.

- c. Coordinate new equipment with existing:

The designer shall coordinate existing BHS and controls and compatibility with new equipment. They shall also coordinate new / existing electrical systems, as well as Motor Control Panels.

- d. Coordinate with electrical and special systems/communications designers for:

- 1. Start-up sequence (Audio & Video) and card swipe interface.
- 2. Security door integration.
- 3. Fire system integration to fire doors and conveyor system.
- 4. Smoke detectors and Spark detectors.
- 5. Baggage Information Display System (BIDS).
- 6. Power requirements for outlets and lighting in TSA and non TSA areas.
- 7. Emergency power for TSA and non TSA equipment.
- 8. Uninterrupted Power Supply (UPS) quantities, requirements and locations for all TSA equipment such as On Screen Resolution (OSR) workstations and Explosive Trace Detection (ETD) workstations.
- 9. Network architecture for TSA and BHS communications including master PLC interface with core switch(s) and primary edge switch(s) connections.

10. Audio/Video Systems interface for baggage control system oversight.

- e. Coordinate with the architectural/structural designer for issues such as:
 - 1. Spare parts room and maintenance workshop for spare parts and maintenance personnel.
 - 2. Baggage control room layout and furniture/casework.
 - 3. Coordinate sizes and locations of wall openings, and associated facility door numbers with MAA-AHJ Fire Marshal.
 - 4. Specify draft curtains location and wall interface detail.
 - 5. Coordinate sizes and locations of floor penetrations.
 - 6. Verify that structure above ceiling hung conveyor can support conveyor equipment.
 - 7. Design waterproofed server/communication rooms.
 - 8. Coordinate EDS machine placement for structural support.
 - 9. Threat Containment Unit/Threat bag removal paths to comply with local LEO procedure.
- f. Coordinate with mechanical engineers to:
 - 1. Identify complete heat dissipation for all electrical and mechanical loads of the baggage handling system.
 - 2. Coordinate the conditioning of TSA Checked Baggage Reconciliation Area (CBRA) and other equipment such as Baggage Viewing Stations (BVS), ETD, Search Work Stations (SWS), etc. (Check with TSA at the time of design to ensure updated design equipment and requirements, if possible). Ensure that all baggage conveyors and components have appropriate facility identity/numbering.
 - 3. Verify that all ancillary equipment installed is free from all conveyor clearance spaces.
 - 4. Confirm adequate EDS air conditioning condensate drainage.
 - 5. Specify proper fire protection over and under required areas according to local code.
- e. Safety Standards Coordination:
 - 1. As-Built Plans (Red-lined/CD's), equipment placed and system management systems shall have uniformity of labeling/signage placed in order to implement the appropriate safety standards associated with OSHA/MOSHA Lock-out/Tag-out work place policies for MAA Inspections and Final Acceptance Testing.