MARYLAND AVIATION ADMINISTRATION

2009 Design Standards

Volume I of III

BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

MARTIN STATE AIRPORT

OFFICE OF DESIGN

August 2009

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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 2009 Design Standards and its appendices. Below highlights the design standards (some previously issued) that have been added to the 2009 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:

- Designer Contact Page – Section 4.5 (DST 2008-10; November 6, 2008) – manual includes updates dated August 2009.
- Fuel Burning Equipment Permitting Process – Section 4.8.2 (DST 2009-03))
- Standard CD Label and Cover – Section 4.10.7, Appendix H
- General Construction and Safety Notes at Martin State Airport – Section 4.11.2.2, Appendix C
- Standard Survey Sheets – Section 4.11.4
- Quantities Sheet for FAA Projects – Section 4.11.5
- Construction Staging Areas – Section 4.11.6
- Operations and Maintenance Manuals – Section 4.12.1 #7 (DST 2008-05, September 22, 2009
- Guidelines for the Construction Procurement Process – Section 5.1 (DST 2008-07 – August 15, 2008
- Modifications for requirements for Conformed Documents – Section 5.2
- Modifications for requirements of the MAA Office of the Fire Marshal (OFM) – Section 6.1
- Modifications to Design Changes during Construction – Section 6.1.3
- International Energy Conservation Code 2006 (and other Code modifications) – Section 7.1 (DST 2008-01 – May 29, 2008)
- Fire Protection Design Information – Section 7.1.1
- BWI Marshall Airport Surveying Monuments - Section 8.1.1.1, Appendix F (Issued September 25, 2008)
- Modifications to bollards criteria – Section 8.1.7.2
- Emergency Vehicle Access/Fire Lanes – Section 8.2.3
- Passenger Boarding Bridge Design Criteria – Chapter 9
- Update to reference Stormwater Management Act of 2007 – Section 10.1.2
- Modifications to Underground Storage Tanks (UST) – Section 10.3
- Modifications to Asbestos and Other Hazardous Materials – Section 10.5
- Modification to Fuel Truck Parking – Section 10.7
- Modification to Commercial Storefronts and Signage – Section 11.1.5
- Modification to Solid Surface Product – Section 11.3.1 and 11.6
- Modifications to Rooftop Systems – Sections 11.5, 11.5.1
- Floor Drain Penetration Test - Section 11.6.8.6 (DST 2008-03, July 10, 2008)
- Modifications to Cipher Locks – Section 11.7.2
- Inserted Restroom Design Standards – Section 11.8 (previously in an Appendix)
- Terminal Stairtower Ramp Access – Section 11.12
- Trash Compactor Fall Protection Systems – Section 12.3 (DST 2008-11; November 6, 2008)

- Modifications to Duct Liner – Section 13.1.1
- CO_2 Demand Ventilation – Section 13.3 (DST 2008-02, June 23, 2008)
- Hydrostatic Water Pipe Testing – Sections 13.5 & 14.3 (DST 2008-04, September 22, 2008)
- Modification to Natural Gas Piping – Section 13.7
- Chapter 15 – Reorganized and Combined with previous Appendix H – Fire Alarm, Life Safety, and Security Systems and fire Protection Information for Architects and Engineers
- Modifications to Certification of Fire Protection and Detection System Design – Chapter 15
- Modifications to Fire Alarm, Life Safety, and Security Systems – Chapter 15.3
- Automated External Defibrillator (AED) – Section 15.2.3.1 (DST 2008-06 – September 22, 2008)
- Inserted OAT Standards – Chapter 17 (previously part of an Appendix)
- Medium Voltage Cable Terminations - Section 18.1.6 (DST 2008-09 – November 6, 2008)
- Modifications to Emergency and Standby Power Systems – Section 18.5
- Modifications to Apron Lighting – Section 19.2.1
- Apron Lightpole Lowering Device – Section 19.2.1.1 (DST 2009-02 – April 6, 2009)
- Modifications to 18.2.3 Landside Lighting (Parking and Roadways) – Section 19.2.3
- Modifications to Interior Signage – Section 20.2
- NEW CHAPTER 21 – Baggage Handling Systems
- Pre-Occupancy Fire Inspection Checklists – Appendix B
- Layering Modifications – Appendix H
- NEW APPENDIX G – Applicable Codes and Standards
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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, (410) 859-7093.

SECTION I: GENERAL PROCEDURES AND POLICIES

CHAPTER 1: INTRODUCTION

1.1 PURPOSE

The purpose of the Interim Design Standards is to provide a consolidated format for all existing MAA DSTs. These DSTs help 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 Interim Design Standards are mandated regulations of the MAA.

In this interim DST, the terms A/E, designer, and consultant are used interchangeably.

1.2 BACKGROUND

1.2.1 Baltimore/Washington International Thurgood Marshall (BWI Marshall) Airport

On October 1, 2005, Baltimore/Washington International Airport was officially renamed "Baltimore/Washington International Thurgood Marshall Airport." A new airport logo has also been issued to reflect the name change.

All documents and drawings submitted to the Maryland Aviation Administration should conform to the naming convention outlined below, and the new airport logo must be used in lieu of the old logo.

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 still be used in correspondence and other publications where necessary, for example, *Baltimore/Washington International Thurgood Marshall Airport (BWI Marshall).*

Existing Maryland Aviation Administration (MAA) contracts should not be revised for the sole purpose of reflecting the name change. As a contract is amended for other reasons, the contract can be revised at that time to reflect the airport name change.

Please note that the new airport logo has no impact or relationship with the MAA logo. There are no changes in how the MAA logo should be used.

An electronic file of the new airport logo is available; please contact the Manager of Engineering, Office of Design at 410-859-7768 to receive the file.

1.2.2 Martin State (MTN) Airport

An electronic file of the Martin State Airport logo is available; please contact the Manager of Engineering, Office of Design at 410-859-7768 to receive the file.

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, i.e., 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.

SECTION II: DESIGN PROCEDURES

CHAPTER 3: GENERAL ARCHITECT/ENGINEER CONTRACT MANAGEMENT

CHAPTER 4: DESIGN PHASE

4.1 AIRPORT CONSTRUCTION PROJECT CHECKLIST

The Maryland Aviation Administration, Office of Design has created an Airport Construction Project Checklist. All MAA, Office of Design 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. Nine ~~Seven~~ 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 seven 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 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, AT&T/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.

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.

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.

List of Deliverables

Task #:
Task Title:

	Letter Size	Half Size	Full Size	Mylar	CD/DWG	CD/TIFF	CD/PDF	Word/Excel	Other Type of Documents	
	QUANTITY OF HARD COPIES				QUANTITY OF ELECTRONIC MEDIA				QUANTITY	
CTP Cost Estimate	(1)							(1)		
Technical Memorandum	(1)						(1)	(1)		
Draft Report	(8)									
Draft Final Report	(15)									
Final Report	(15)						(2)	(2)		
Concept Plans		(15)					(2)			
Renderings		(8)					(2)			
Power Point Presentations	(1)									
Preliminary Design-Build Documents	(15)	(15)								
Final Design-Build Documents	(50)		(50)		(2)	(2)	(2)	(2)		
30% Drawings		(15)								
30% Outline Specifications	(15)									
30% Cost Estimate	(1)						(1)			
30% Engineer's Report	(15)									
60% Drawings		(15)								
60% Specifications/Bid Forms	(15)									
60% Cost Estimate	(1)						(1)			
60% Engineer's Report	(15)									
100% Drawings		(15)								
100% Specifications/Bid Forms	(15)									
100% Cost Estimate	(1)						(1)			
Final Engineer's Report	(15)						(2)	(2)		
Bid Drawing			(50)							
Bid Specifications/Bid Forms	(50)									
Cost Estimate to Match Bid Forms	(1)						(1)			
Conformed Drawings		(3)	(3)				(2)			
Conformed Specifications/Bid Forms	(5)						(2)	(2)		
Record Drawings			(2)	(1)	(2)	(2)	(2)			
Record Specifications	(2)						(2)	(2)		
GIS Data									(1 CD)	
Other Documents (specify):										

(#) Indicates suggested quantities, unless directed otherwise by the Task Manager.

4.4 DESIGN MEETING MINUTES

All meeting minutes prepared for MAA Office of Design 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

All BWI Marshall and Martin State Airport projects shall be coordinated with the MDE per the following procedures:

1. Consultants shall designate a Point of Contact to coordinate MDE permitting issues for all of their MAA projects.

2. MDE may review projects in-house or, with MDE approval, MAA may elect to designate a review consultant to expedite the review process. The review consultant previews calculations, evaluates drawings, and provides MDE with approval recommendations. At the beginning of each project, the consultant's Point of Contact shall contact the Reviewer and coordinate all aspects of the project. Consultants may request the Reviewer's name and company information from the MAA Project Manager.

3. Consultants shall expedite the review procedure by involving MDE in the entire design process. Early coordination and prompt responses to questions and comments will facilitate the approval. Coordination requirements include:

   a. For large and/or complex projects, Consultants shall set up a preliminary coordination meeting at 30% design with the Reviewer, MAA, and MDE. The meeting shall be used to present MDE the project scope and discuss stormwater management and sediment and erosion control design. If follow-up meetings are necessary as design progresses, Consultants shall set up additional meetings with the above-mentioned participants.

   b. Consultants shall submit review plans to MDE at the same time they submit review plans to MAA. A copy of the transmittal letter must be faxed to MAA and the MAA Reviewer at MDE the day of the submission.

   c. The Reviewer may provide Consultants with an advance copy of "draft" comments. Consultants shall assemble their responses to the "draft" comments within reasonable time of receipt. Additional items may be included in the "formal" comments provided by MDE. If additional comments are included, Consultants shall revise their responses accordingly. Consultants shall forward copies of MDE comments to the MAA Project Manager and Reviewer.

d. Prior to submission, Consultants shall provide MAA and the Reviewer with the estimated date submittals and responses to comments shall be submitted. This advance notice will allow the Reviewer to schedule his review accordingly. A cover letter outlining responses to the "draft" and/or "formal" comments shall be included with all resubmittals.

4.8.2 Fuel Burning Equipment Permitting Process

When new significant sources of air pollution are planned for installation at Baltimore Washington International Thurgood Marshall Airport (BWI Marshall) and Martin State Airport (MTN) Airports, an Air Quality Permit to Construct must be obtained from the Maryland Department of the Environment (MDE) MDE/ARMA prior to commencing construction. 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).

4.8.2.1 General

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 Maryland Department of the Environment (MDE). 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.

Note that Baltimore BWI Marshall and MTN Airports each have different environmental regulatory requirements depending on the type and size of equipment to be constructed. The requirements are largely the same with the exception of the need to integrate new significant sources at BWI Marshall into the Title V Permit.

4.8.2.2 Permitting Requirements for Diesel Powered Engine 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.

1. The Maryland Department of the Environment (MDE) requires that all engines with output greater than or equal to 500 hp (373 kW) have a permit to construct **prior to installation** of the equipment. The MDE permit application process for generators and fire pumps is three-fold:

(a) The Owner shall send a letter to Baltimore Gas and Electric (BGE) requesting relief from the Certificate of Public Convenience and Necessity (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. 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 MD Public Service Commission (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 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 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 permit to construct application, along with the waiver, to MDE for the generators. To complete the permit application Not-to-Exceed (NTE) emissions data is required and is obtained from the engine manufacturer submittal data. MDE permitting fees are $500 per source and MDE will notify the applicant of the appropriate fee upon receiving a complete application. Three copies of the permit application (Form 42), each signed and dated individually, must be submitted to MDE. The appropriate form for installation of generators is Form 42 and can be found on the MDE website at http://www.mde.state.md.us/Permits/AirManagementPermits/ptc/index.asp.

2. If pollution control equipment is to be installed on the unit, then a Form 6 application, *Application for Permit to Construct Gas Cleaning or Emission Control Equipment*, is required and must be submitted with the permit to construct application. A copy of the Form 6 application can be found on the MDE website at http://www.mde.state.md.us/assets/document/air/form6.pdf.

3. All Permit to Construct Applications (Form 11 or General) 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 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 Permit to Construct.

4.8.2.3 Permitting Requirements for Boilers, Water Heaters, and Other Fuel Burning Equipment

1. The Maryland Department of the Environment (MDE) 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**. MDE defines "fuel burning equipment" as any boiler or furnace that has the primary function of producing hot air, hot water, or steam through indirect heat transfer from the burning of fuels.

   (a) All fuel burning equipment with a maximum heat input of 10 MMBtu/hr or greater, requires a Form 11 application (see link below) for a *Permit to Construct Fuel Burning Equipment* unless the boiler meets the requirements for a General Permit (see below). A Form 11 application for boilers with heat input of 10 MMBtu/hr or greater must be completed for units installed at BWI Marshall. 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 stack parameters, construction start and end dates for the permitted equipment, and other information associated with the equipment must also be provided. The applicable permit fee of $500 per piece of equipment will be invoiced once MDE receives the permit application. Three copies of the permit application (Form 42), each signed and dated individually, must be submitted to MDE. A copy of the Form 11 Permit to Construct Application 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 a Form 6 application, *Application for Permit to Construct Gas Cleaning or Emission Control Equipment*, is required and must be submitted with the permit to construct application. A copy of the Form 6 application 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 between 1 MMBtu/hr and 10 MMBtu/hr can use an *Air Quality General Permit to Construct for Small Fuel Burning Equipment*. The General Permit does not apply to fuel burning equipment that burns residual fuel oil (ASTM fuel oil Numbers 4, 5, and 6). This General Permit will be applicable to most of the boilers at Martin State Airport as long as they have a maximum heat input less than 10 MMBtu/hr.

In order to obtain a General Permit to Construct for Small Fuel Burning Equipment, the Designer must request a General Permit to Construct package from MDE which includes the Request for Coverage Form (i.e., the application) with instructions on how to submit the form, and information regarding the required permit fee. The General Permit delineates standard construction and operating requirements and other regulatory obligations. The permit fee required is $500 per piece of equipment and must be submitted to MDE with the application form. Once a request for the General Permit is made, the MAA shall submit the Request for Coverage form and permit fee, allowing the boiler or other small fuel burning equipment to be installed and operated at the facility as stated on the request form. Any small fuel burning equipment moved to another facility must be covered by a new Request for Coverage form and another permit fee. Three copies of the permit application (Form 42), each signed and dated individually, must be submitted to MDE. A copy of the General Permit and application can be found on the MDE website at http://www.mde.state.md.us/assets/document/00%20Small%20Fuel%20Burning%20Package(1).pdf.

(d) Fuel burning equipment with a maximum heat input of 10 MMBtu/hr to 40 MMBtu/hr may be eligible for the Medium Fuel Burning Equipment General Permit. This General Permit also does not apply to fuel burning equipment that burns residual fuel oil. 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 can not use the Medium Fuel Burning Equipment General Permit since it is a major source of nitrogen oxide (NO_x).

In order to obtain a General Permit to Construct for Medium Fuel Burning Equipment, the Designer must request a General Permit to Construct package from MDE, available on their website, which includes the *Air Quality General Permit for Medium Fuel Burning Equipment*, the Request for Coverage Form (i.e., the application) with instructions on how to submit the form, and information regarding required permit fee. The General Permit delineates standard construction and operating requirements, and other regulatory obligations including NSPS Subpart Dc requirements. The permit fee required is $500 per piece of equipment, and must be submitted to MDE with the application form. Once a request for coverage under the general permit is made, the MAA shall submit the Request for Coverage form and permit fee, allowing the boiler or other medium fuel burning equipment to be installed and operated at the facility as stated on the request form. Any medium fuel burning equipment moved to another facility must be covered by a new Request for Coverage form and another permit fee. Three copies of the permit application (Form 42), each signed and dated individually, must be submitted to MDE. A copy of the General Permit and application can be found on the MDE website at http://www.mde.state.md.us/assets/document/00%20medium%20boiler%20permit%20package(3).pdf.

2. All Permit to Construct Applications (Form 11 or General) 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).

    (a) If the boilers and heaters 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 Permit to Construct.

4.8.2.4 Design Guidelines for Diesel Powered Engine Generators and Fuel Burning Equipment

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 required equipment data.

- For generators, the CPCN exemption process can take up to 2 months and the permitting process can take up to 90 days after a waiver is received and a complete application is received by MDE.
- For boilers with a maximum heat input of 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 90 days after a complete application is received by MDE; but for fuel oil-fired boilers with a maximum heat input of 10 MMBtu/hr or greater, the permit process can take up to 6 months after a complete application is received by MDE

iv. The specific equipment data required for permit application listed in the "Submittals" paragraph.

(b) The Designer shall specify equipment that meets the Federal requirements for units that are subject to New Source Performance Standards Subpart IIII – Standards of Performance for Stationary Compression Ignition Internal Combustion Engine:

<u>Subpart IIII Applicability</u>

i. Units modified or reconstructed after July 11, 2005;

ii. Engine generators ordered after July 11, 2005, and manufactured after April 1, 2006;

iii. Fire pump engine ordered after July 11, 2005, and manufactured after July 1, 2006; and

iv. Relocated engines may not be applicable to Subpart IIII.

<u>Subpart IIII Requirements</u>

i. Emission standards vary based on model year and function (see attached table);

ii. Sulfur content of distillate fuel oil used in the generators must be less than or equal to 0.05%; and

iii. A non-resettable hour meter must be a part of the unit.

(c) 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 NO_x burner system for guaranteed NO_x performance when using natural gas at no greater than 30 parts per million (ppm), dry volume basis and corrected to 3% excess oxygen (O_2).

ii. Burner, boiler/water heater, and low NO_x system shall be manufactured as a package by a single manufacturer. The unit's nameplate shall include the approved Underwriter's Laboratory (UL) low NO_x 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 NO_x 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.

(d) The Designer shall specify equipment that meets the Federal requirements for 40 CFR Part 60 New Source Performance Standards Subpart Dc - Small Industrial Steam Generating Units for all fuel burning equipment with a maximum heat input between 10 MMBtu/hr and 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 and §26.11.09.07A.

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 Division of Facility Design, 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 (Attic Stock) 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 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: XXXXXXXXXXXXX
- **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: XXXXXXXXXXXXX
- **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: XXXXXXXXXXXXX
- **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: XXXXXXXXXXXXX
- **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 sub-folders.
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

Item X-1. 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 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 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 *1994 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: All title sheet information needs to be completed.
- 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.

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= 3100 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 I-V:

- 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

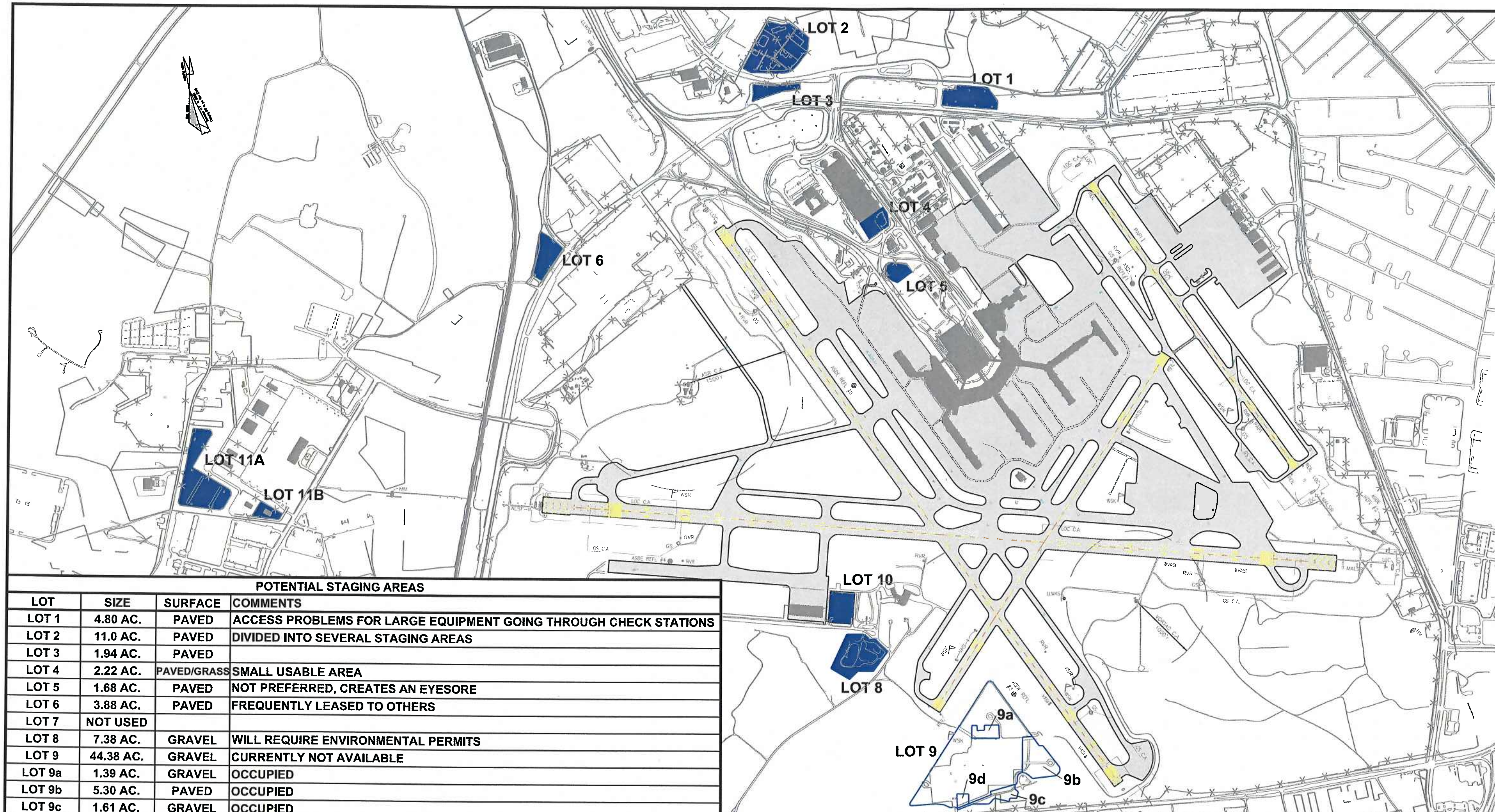
A Quantities Sheet is required for all federally funded projects. The Quantities Sheet shall identify federally and non-federally funded quantities.

4.11.6 Construction Staging Areas

The consultant shall identify construction staging area 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 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.



POTENTIAL STAGING AREAS

LOT	SIZE	SURFACE	COMMENTS
LOT 1	4.80 AC.	PAVED	ACCESS PROBLEMS FOR LARGE EQUIPMENT GOING THROUGH CHECK STATIONS
LOT 2	11.0 AC.	PAVED	DIVIDED INTO SEVERAL STAGING AREAS
LOT 3	1.94 AC.	PAVED	
LOT 4	2.22 AC.	PAVED/GRASS	SMALL USABLE AREA
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 10	3.45 AC.	PAVED	ONLY TO BE USED FOR CONTRACTOR EMPLOYEE PARKING
LOT 11A	9.60 AC.	PAVED	REMOTE AND DIFFICULT TO SECURE
LOT 11B	1.40 AC.	PAVED	

CONTACT LIST PRIOR TO DETERMINING STAGING LOT

AGENCY	CONTACT	'PHONE NO.
COMMERCIAL MANAGEMENT	GARY ROSENBAUM	410-859-7923
CONSTRUCTION MANAGEMENT	ALEX NOORANI	410-859-7593
MAA LANDSIDE OPERATIONS	STEPHEN MOE	410-859-7298

AGENCY	CONTACT	'PHONE NO.
MAA AIRSIDE OPERATIONS	JOHN STEWART	410-859-7022
ENVIRONMENTAL PLANNING	ROBIN BOWIE	410-859-7103
AIRFIELD PLANNING	SHAWN AMES	410-859-7089

BWI BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION

OFFICE OF ENGINEERING & CONSTRUCTION MANAGEMENT
DIVISION OF FACILITES DESIGN

PROJECT TITLE

POTENTIAL STAGING AREAS AT
BALTIMORE / WASHINGTON INTERNATIONAL
THURGOOD MARSHALL AIRPORT

File: O:\SMO\050466_000General_Files\Task 2700.18 Gold Lot\Deliverables\Design Standard\CADD\Potential Staging Areas.dwg
Aug 10, 2009 - 9:03:46am

4.12 CONSTRUCTION SPECIFICATIONS

The items below shall be verified and included in all construction documents prepared for the MAA Office of Design. The designer should identify, in writing to the MAA Manager, Division of Facility Design, 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.

Standard MAA Specifications that are to be utilized on all relevant contracts are included in Appendix E.

4.12.1 General Specification Requirements

1. All contract milestones shall be specified in calendar days from NTP. Specifying "specific dates" must be approved by the MAA.

2. All incentives must be approved by the MAA.

3. All sole source and proprietary items must be approved by the MAA.

4. Performance specifications which require the contractor to design/build shall be identified and brought to the attention of the MAA. 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. 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.

7. All projects shall include specification language requiring the contractor to provide pdf files of Operations and Maintenance manuals, as well as the required hard copies.

8. 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.

4.12.2 Building Specification Format

The MAA has adopted the American Institute of Architects (AIA) "MasterSpec®" building construction specifications system, which incorporates the Construction

Specifications Institute (CSI) MasterFormat™ 2004 Numbers and Titles. All building contract specifications shall be developed using the current edition of "MasterSpec®."

The "MasterSpec®" Division 01 requirements must be closely coordinated with the MAA "Standard Provisions for Construction" and individual construction management requirements. MAA's "Standard Provisions for Construction" addresses many of the "MasterSpec®" Division 01 requirements, and will take precedence. Generally, Division 01 should only be used to supplement and enhance the MAA "Standard Provisions for Construction Contracts."

4.12.3 Site Work Specifications

The Maryland Aviation Administration (MAA) has adopted the Maryland State Highway Administration revised Standard Specifications for Construction and Materials, dated January 2001 for non-airfield related construction. Projects which start design after April 15, 2004 shall be designed in accordance with the revised standard specifications for all construction contracts.

Copies of the specifications 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.

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 E.

4.12.4 Sole Source Specifications

Sole Source Specifications are found in Appendix D.

4.13 SECURITY PLAN AND SPECIFICATION REQUIREMENTS

4.13.1 Security Specification (X-1)

All construction projects at BWI Marshall shall include the standard specification X-1 Security Requirements for Construction. The designer shall request the latest version of the Security Specification from the MAA Project Manager.

This specification shall be included with all construction projects in its entirety. There are three items for consideration during design:

1. Section titled "Project Specific Requirements" shall be edited for each project. Guidelines are provided in the specification.
2. The Basis of Payment section shall be edited as indicated in the specification.
3. Add Alternate Items and Allowance Items shall be paid as L.S. under X-1. A separate pay item shall be created for each alternate and allowance.

4.13.2 Security Plan

The Project Security Plan (PSP) 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 PSP and specified in Specification X-1 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.
8. Locations/phases where an escort from MAA Operations is required.
9. Any other job specific security items.
10. Areas for the Contractor to complete the following information:
    - Name and contact information for the person who is coordinating the overall security for the project.
    - Name and contact person for each Security Liaison/Worksite Supervisor and designated alternates.
    - Hardhat color designations assigned for escorts, non-badged personnel, and badged personnel not escorting; and

- Approximate dates for each phase of construction.
- Signature Block on each sheet

The Airport Security Division (ASD) requires a forty-five calendar day review period for review of the PSP. Consider that more than one submittal may be required when scheduling the submittal. A Transportation Security Administration (TSA) representative, currently Mr. B. Lee Nettles, Assistant Federal Security Director, Office of Compliance, 410-689-3677, should be invited to all meetings involving review of the Project Security Plans at BWI Marshall.

Upon completion of the PSP, a meeting shall be set up with the ASD. If the plans are intended to be final, two sets shall be brought to the meeting so that if they are approved without changes, two original signatures can be obtained at the meeting – one set of security plans will remain on file with ASD, the other will become part of the contract documents.

4.14 CONSTRUCTION SAFETY AND PHASING PLANS

All construction safety and phasing plans shall be 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 should be prepared based on a joint effort between MAA Operations, the ATCT, MAA Engineering, and the Designer. A signature block shall be placed on all Construction Safety and Phasing Plans.

4.14.1 Placement of Construction Barricades

Construction Safety and Phasing Plans 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 have a line item for X-1 Security Requirements During Construction. This item shall consist of the work associated with the Project Security Plan and Specification as outlined in Section 4.13. This line item should be a percentage of the base construction cost.

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 2008 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.

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 Office of Design and 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 Manager of Engineering ~~Chief of Document Management/Technical Support~~:

1 – One (1) full size set of drawings.
2 – One (1) electronic copy of the drawings (pdf files) and specifications.

The following shall be submitted to MAA's Manager of Construction (for use by the Construction Manager and/or the Contractor):

1 – Two (2) full size sets of drawings
2 – Three (3) half size sets of drawings
3 – Five (5) 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. In addition, the MAA Project Manager for the task shall be copied on the transmittals distributing the Conformed Documents.

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

☐ REJECTED WITH NOTED COMMENTS
☐ REVISE AS NOTED AND RESUBMIT (_) AS-BUILT'S
☐ APPROVED WITH RED LINED REVISION
☐ APPROVED AS SUBMITTED ____/____/____
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 (PDF, DWG, DWF)

Drawings shall include:

- Revision block shall be labeled "Record" with date of issue.
- The disclaimer Record Drawing Stamp (on the following page) shall be placed on each sheet (including the title sheet) and applicable boxes should be checked.
- Every drawing shall have the file name clearly located within the sheet border.
- Disks shall be labeled with the contract number, title, date, AIP number (if applicable), disk number, and any other pertinent information.
- CD inserts shall be formatted per *CD INSERTS*.
- All electronic files shall be stand-alone; bind all external reference files.
- All electronic files shall be purged of all unused layers, blocks, and fonts. Only the attributes required for the final CD set should be in the archived file.
- All electronic file names shall be identical to the sheet number or title on the contract documents.
- All drawings shall be in DWG (or TIF for scanned images), DWF, TIFF, and PDF formats. One folder shall be set up for each format and the respective drawings placed in each. The folders shall be labeled "AUTOCAD", "DWF"; "TIFF" and "PDF".
- A standard pen setting should be used to allow the MAA to plot the drawings with the same line weights as the originals. Pc2 files shall be used and embedded into the drawing files.

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.

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

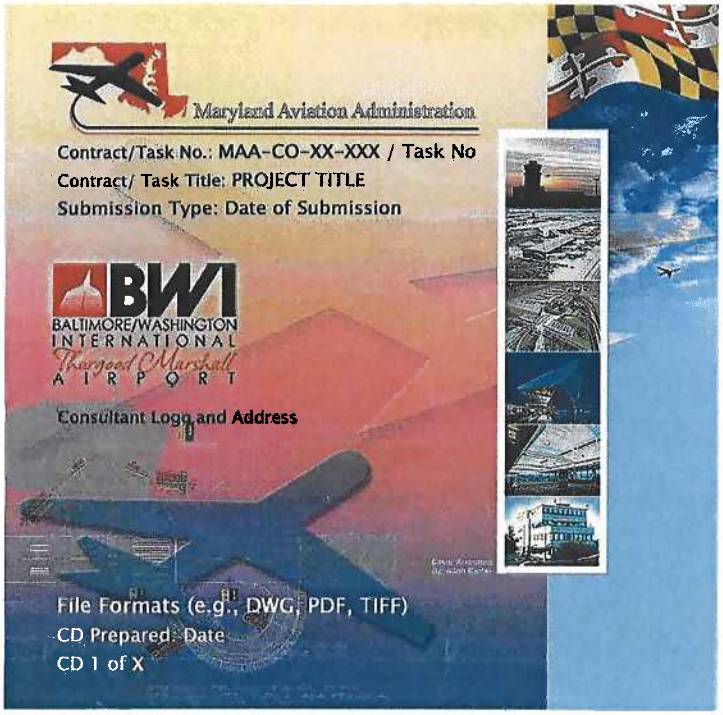
☐ CONFORMED DRAWINGS

☐ 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."

SHEET TITLE: RECORD DRAWING STAMP	DATE: SEPT 2007

LIST OF DRAWINGS & FILES
MAA-CO-XX-XXX
Drawings & Files



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 and applicable codes and standards within this Chapter, and as listed in Appendix G. The Designer Statement of Work may also designate additional codes or standards applicable to the particular design.

ENFORCEMENT OF FIRE RELATED CODES AND STANDARDS BY THE MAA OFFICE OF THE FIRE MARSHAL (OFM) AS THE AUTHORITY HAVING JURISDICTION (AHJ)

The OFM is the AHJ for the enforcement of the Maryland State Fire Prevention Code, the fire safety aspects of the adopted Building Codes, and all other adopted fire related Codes and Standards for the BWI Marshall and MTN Airports.

The following Codes and Standards are applicable to all new project designs, specifications, construction, and occupancy. As such, the OFM enforces them during plan review and inspections as authorized representatives of the Maryland State Fire Marshal. Failure to comply with the fire and life safety related requirements of the Codes and Standards listed herein would result in the withholding of project design approvals, inspection approvals, or occupancy approvals by the OFM. Additionally, violations of these codes are subject to the penalties set forth in the Public Safety Article of the Annotated Code of Maryland.

Questions regarding interpretations and application of the referenced codes should be referred to the BWI Marshall OFM. If there are any discrepancies in this list, the latest editions adopted by the State of Maryland take precedence. Whenever a newer Edition of the NFPA Codes or Standards becomes available, it may be accepted for use by the OFM. Please contact the OFM in advance concerning the use of newer Standards than are listed below.

Whenever a newer Edition of the Codes listed herein becomes adopted under COMAR Regulations or the State Fire Code, they supersede the Editions listed herein. It is recommended that the following resources be used to determine the latest adopted Editions of these Codes and Standards.

For State of Maryland Fire Codes:
http://www.firemarshal.state.md.us

FOR FIRE RELATED ASPECTS OF BUILDING CODES:
HTTP://MDCODES.UMBC.EDU/DHCD2/MBPSLIST.HTML ADOPTED CODES AND STANDARDS

The following Codes and Standards are applicable to all new project designs, specifications, construction, and occupancy at BWI Marshall and MTN airports.

- Maryland State Fire Prevention Code

- Maryland Aviation Administration Design Standards (DST)
- International Building Code (IBC), 2006 Edition
- International Plumbing Code (IBC), 2006 Edition
- International Mechanical Code (IMC), 2006 Edition
- International Existing Building Code, 2006 Edition

Applicable COMAR (Code of Maryland) Regulations:

COMAR 05.02.01 Maryland Model Performance Code 20 September 2004.
COMAR 05.02.07 Maryland Building Performance Standards (MBPS) 20 September 2004.
COMAR 29.06.01.07 State Fire Prevention Code 01 August 2004.
COMAR 05.02.02 Maryland Accessibility Code 18 March 2002.
COMAR 09.20.01 Maryland State Plumbing Regulations 23 July 2001.

Applicable COMAR Regulations above incorporate by reference, and contain amendments to the following Model Codes:

International Building Code, 2006.
International Existing Building Code, 2006
International Energy Conservation Code (IECC) 2003
International Plumbing Code 2003 (Maryland Model Performance Code for industrialized buildings).
NFPA 1, Uniform Fire Code, 2006 Edition
NFPA 70, National Electrical Code, 2006 Edition
NFPA 101, Life Safety Code, 2006 Edition
Americans with Disabilities Act Accessibility Guidelines 23 July 2004.
International Mechanical Code 2006 Edition
National Standard Plumbing Code Illustrated 2000, and 2001 Supplement (Maryland Building Performance Standards)

NFPA CODES AND STANDARDS

In addition to the above, the Codes and Standards listed in Appendix G, as published by the National Fire Protection Association (NFPA), are also applicable. While those listed in Appendix G comprise the most widely used regulations concerning new construction, please refer to Chapter 2 of NFPA 1, Fire Prevention Code, for a complete list of other reference Standards that may also apply to particular projects or unusual hazards.

Additionally, projects must comply with requirements of several regulatory agencies:

- Federal Department of Transportation Regulations
- Federal Aviation Administration Federal Aviation Regulation Subchapters
    - Part 77: Objects Affecting Navigable Airspace
    - Part 139: Certification of Airports

- Part 150: Airports
- Part 151: Federal Aid to Airports
- Part 152: Airport Aid Program

- Transportation Security Administration
  - 49 CFR Part 1542
- Maryland State Highway Administration
- Maryland Department of Transportation (MDOT)
- Maryland Department of the Environment (MDE)
- Occupational Safety and Health Administration (OSHA) codes
- Environmental Protection Agency (EPA) Regulations
- Codes of Anne Arundel and Baltimore Counties
- Federal Department of Agriculture

Landside (non-airfield) projects shall follow the American Association of State Highway and Transportation Officials'(AASHTO) publication "A Policy of Geometric Design of Highways and Streets 1990" for all project design criteria. Design exceptions will only be required if the design falls below AASHTO minimum standards. In such cases, the designer shall obtain SHA approval concurrently with MAA approval.

The Designer shall incorporate appropriate references to nationally accepted standards for the design, fabrication and installation of particular equipment. Also, the Designer shall include in the design appropriate reference to the published MAA Directives. These address such topics as security, vehicle operations, AOA licensing, badging, radio communications, display of signs, and key control.

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)***
4. ***International Energy Conservation Code, (list applicable Edition)***
5. ***NFPA 13, Automatic Sprinklers (list applicable Edition)***
6. ***NFPA 14, Standpipes (list applicable Edition)***
7. ***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).***

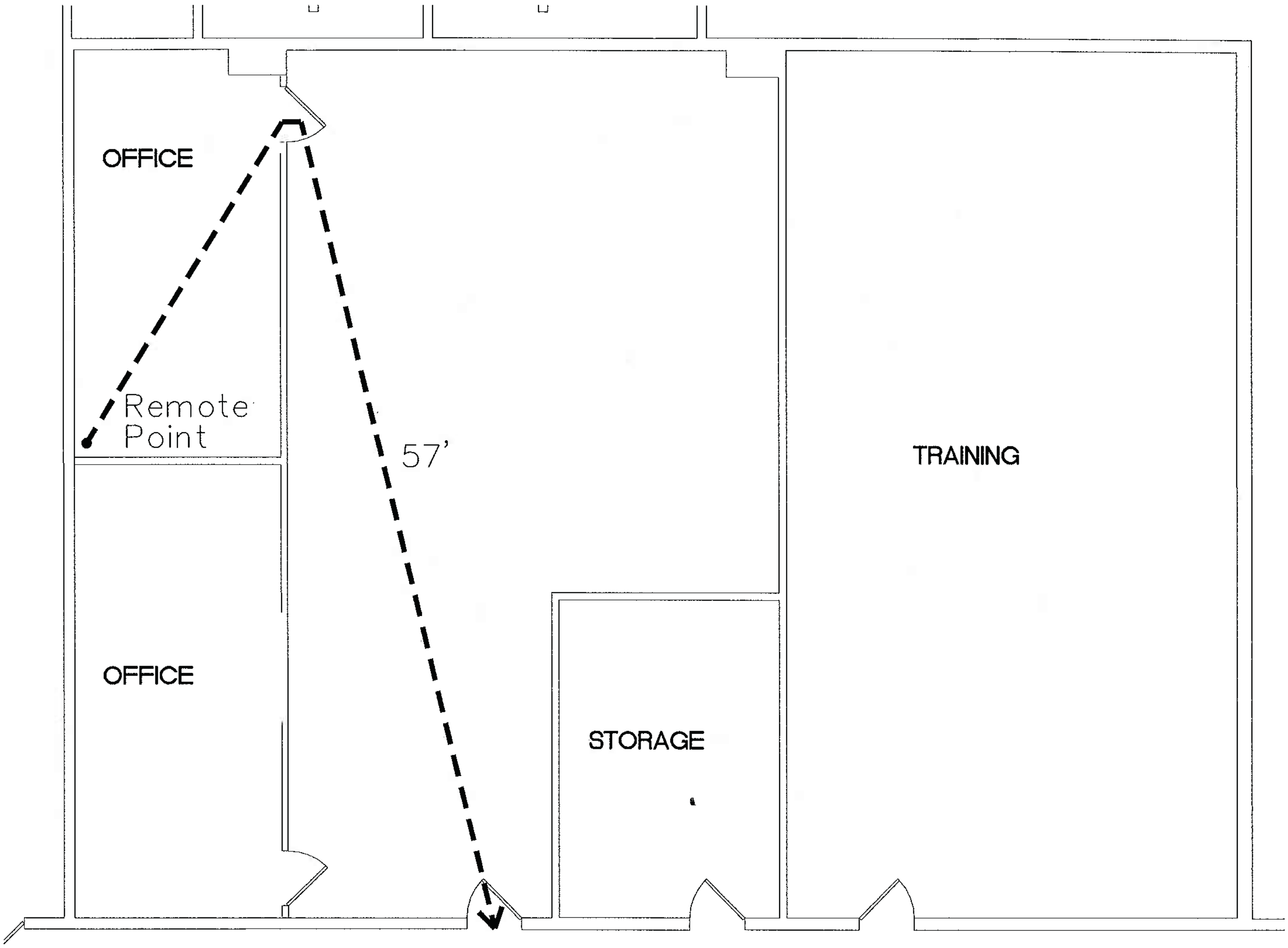
ADDITIONAL REQUIREMENTS

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'

SHEET TITLE: SAMPLE EGRESS PLAN	DATE: JULY 2009

7.1.2 Terminal Evacuation Plans

The MAA Office of Design, in coordination with the OFM ~~BWI Marshall Fire and Rescue Department (FRD)~~, are 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 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 ¾" 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 (12") inch 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 2^{nd} 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, 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 ~~Assistant~~ Airport Operations Manager of Martin State Airport (410-682-8826) and the Director of MAA's Office of Design 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.

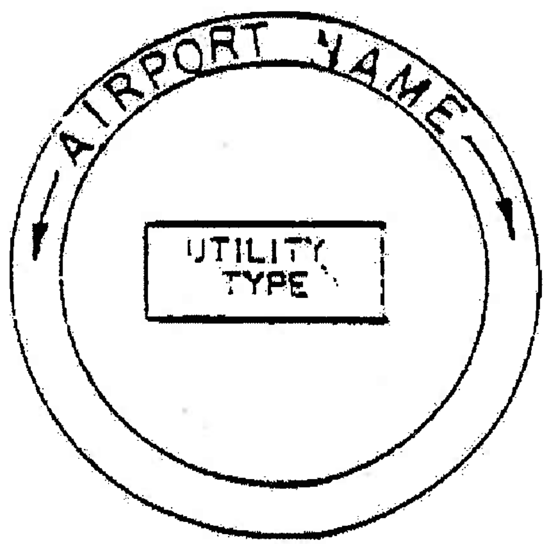
8.1.3 Underground Utility Trenches, Utility Markings, and Manhole/Handhole Covers/LIDS

Utility Markings: The design and construction of all BWI Marshall and Martin State Airport projects shall include the requirement to mark all underground utilities with magnetic tape. The tape should be 3” wide and positioned at a maximum 8”-12” deep below top of ground, or 4” wide and positioned at a maximum 3”-6” deep below the bottom of pavements.

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"



SHEET TITLE: MANHOLE/HANDHOLE COVER LIDS

DATE: APRIL 2005

8.1.4 Water Mains

8.1.4.1 Backflow Prevention

Refer to Chapter 14 Plumbing for Backflow Prevention requirements.

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 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 wetside/dryside pit. All motors, pumps, impellers, and equipment would be installed on the dryside with pipe connections to the wetside (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 project manager and the Division of Maintenance. Refer to 11.4.1 Restroom Design for further information on sewage ejection 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.

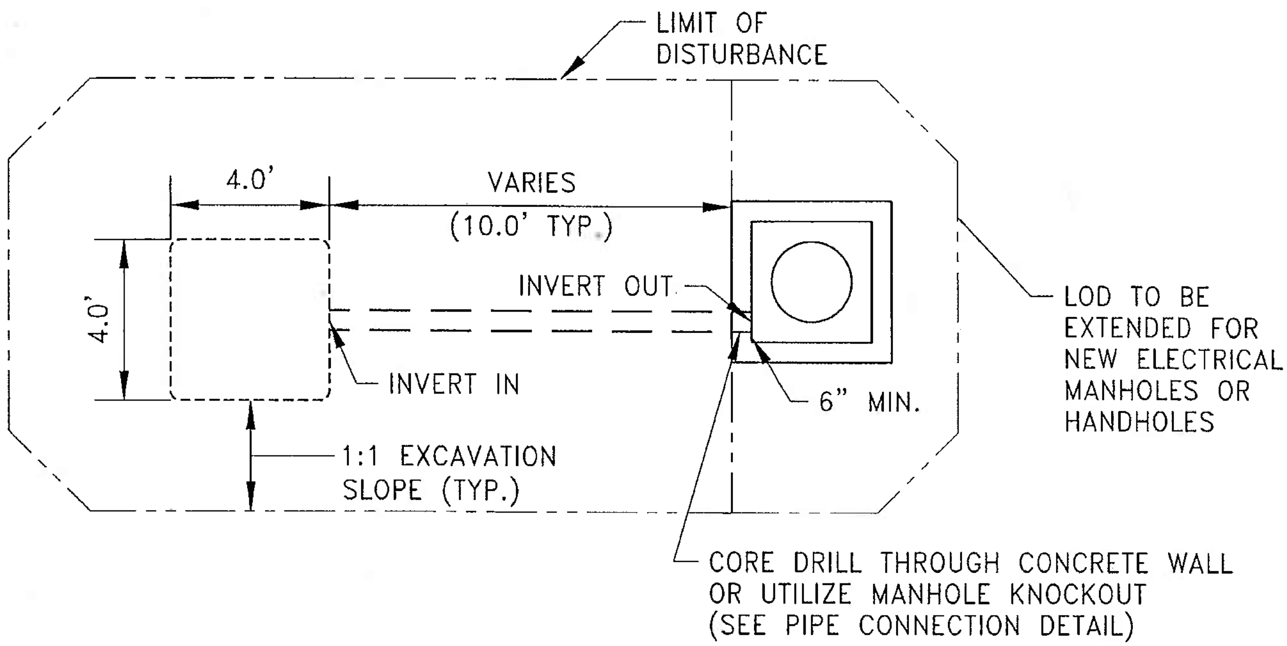
Qualifying Preferred Alternate Drainage Measures are the following:

- 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.

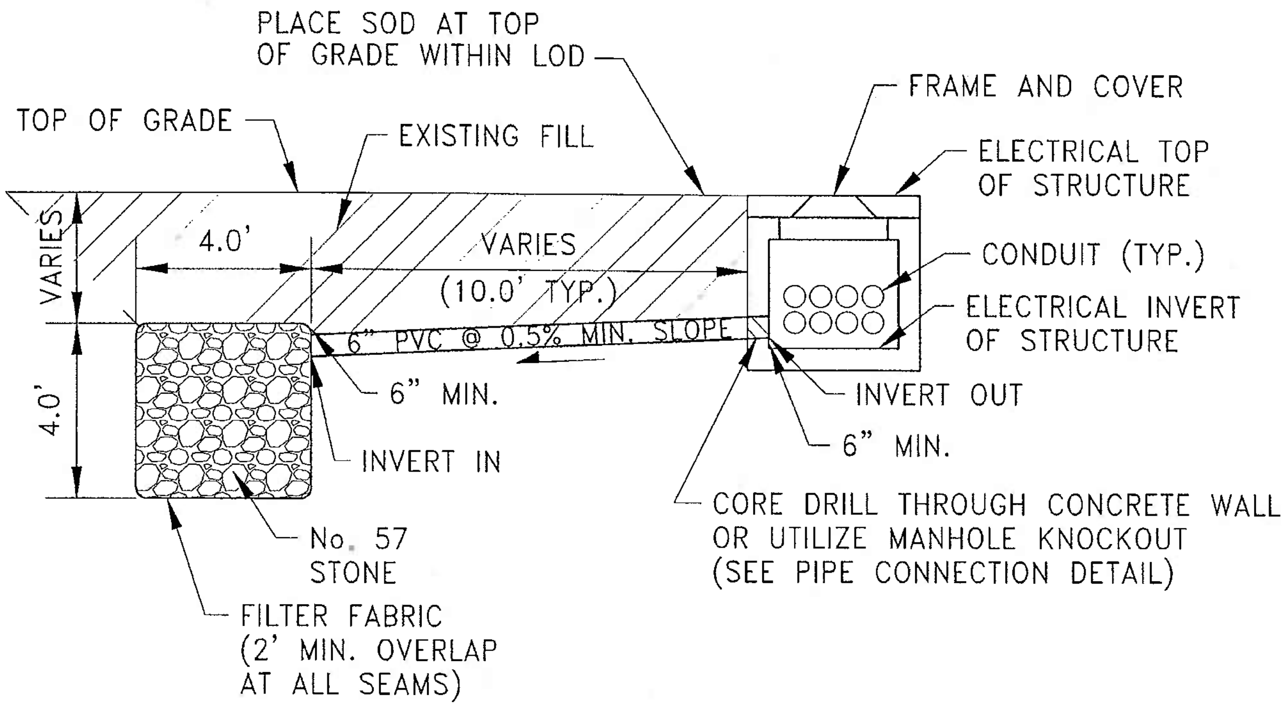
The following details depict the plan and section view of a typical ESD, section view of a typical pipe connection detail, and the plan view of a typical rodent screen detail.



ELECTRICAL STRUCTURE DRAIN DETAIL (PLAN)

N.T.S.

SHEET TITLE: ELECTRICAL STRUCTURE DRAIN DETAIL (PLAN)



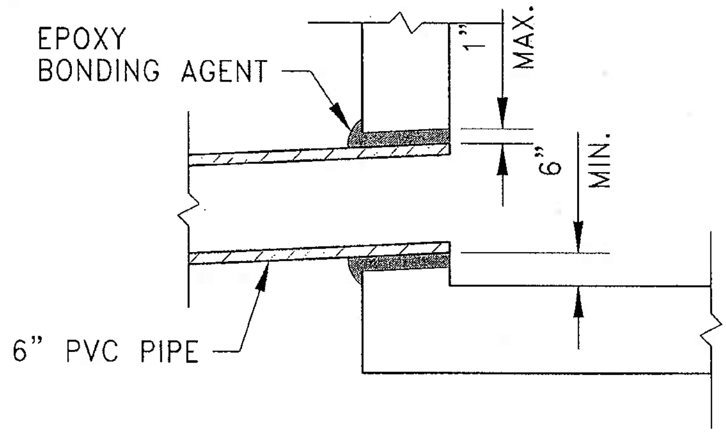
NOTE:

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.

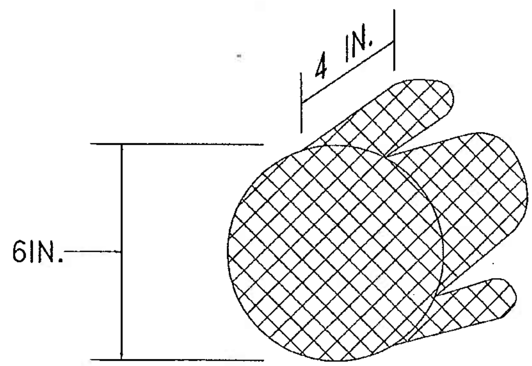
SHEET TITLE: ELECTRICAL STRUCTURE DRAIN DETAIL (SECTION)



PIPE CONNECTION DETAIL

N.T.S.

SHEET TITLE: PIPE CONNECTION DETAIL



RODENT SCREEN

A REMOVABLE RODENT SCREEN SHALL BE CONSTRUCTED AT THE END OF ALL ELECTRICAL STRUCTURE DRAINS AS SHOWN. COMMERCIALLY 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 3/8- TO 1/2-INCHES. THE COST OF THE SCREEN IS TO BE INCLUDED IN THE COST OF THE DRAIN.

SHEET TITLE: RODENT SCREEN

8.1.7.2 Bollards

All bollards shall be a minimum of six (6) inches in diameter steel pipe and concrete filled, painted yellow.

8.2 AIRFIELD CIVIL/SITEWORK

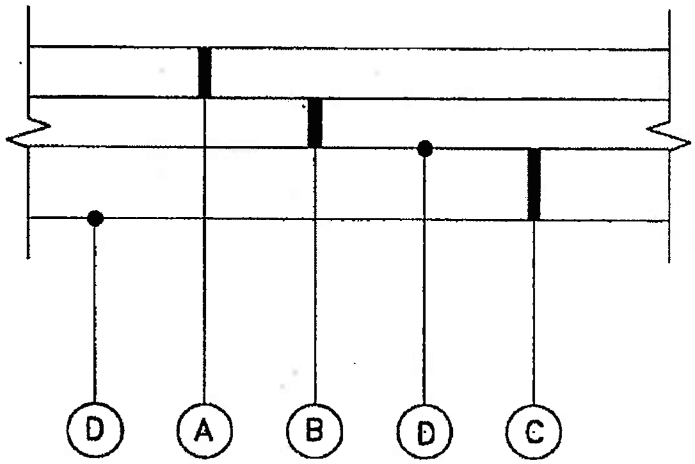
8.2.1 Pavement Design

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

SHEET TITLE: MARTIN STATE AIRPORT SECTION	DATE: APRIL 2005

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.

8.1.1.2.1 Federal Aviation Administration (FAA) Specification Incentives

The Federal Aviation Administration (FAA) P-501 Portland Cement Concrete Pavement specification and the P-401 Plant Mix Bituminous Pavement specification includes an incentive for flexural strength.

In order to accommodate the increased costs associated with the incentive, without issuing a change order, MAA is providing the following directions for preparation of the contract specifications and bid tabulation forms:

In the specifications, add the following to the P-501 Basis of Payment Section:

"An allowance has been included as Item P-501-8.1c. Payment of any or all of the bid amount for P-501-8.1c will be based on any adjusted payment in excess of 100 percent when computed in accordance with Paragraph 501-8.1a.

Payment will be made under:

Item P-501-8.1c (__)*-inch Portland Cement Concrete Pavement Incentive."
* filled in by designer

In the bid tabulation forms, add a Portland Cement Concrete Incentive allowance item. The allowance amount should be calculated by multiplying the estimated costs for Portland Cement Concrete Pavement by 0.06.

In the specifications, add the following to the P-401 Basis of Payment Section:

"An allowance has been included as Item P-401-8.1c. Payment of any or all of the bid amount for P-401-8.1c will be based on any adjusted payment in excess of 100 percent when computed in accordance with Paragraph 501-8.1a.

Payment will be made under:

Item P-401-8.1c Bituminous Concrete Pavement Incentive."

In the bid tabulation forms, add a Bituminous Concrete Pavement allowance item. The allowance amount should be calculated by multiplying the estimated costs for Bituminous Concrete Pavement by 0.06.

8.2.2 Pavement Marking

All permanent pavement markings on the airfield 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 light colored pavements. Black paint shall not contain glass beads.

Glass beads shall meet the requirements for Federal Specification TT-B-1325C, 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.

8.2.3 Emergency Vehicle Access/Fire Lanes

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.

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.

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.

8.3.2 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 1/12 or 8.33 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, then subtracting 0.5 foot for each tunnel transition, and finally 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.

$$\text{PBB Slope} = \frac{RE - CE - (T-1)*0.5}{X}$$

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, Item PBB-100 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:

<u>Contractor Testing Requirements</u>
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.

<u>Pavement Marking</u>
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.

9.4 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.

9.4.1 Pantograph

The PBB shall be provided with a 3-inch diameter aluminum pantograph with enough length to cover the movable sections of the PBB for routing power to the Pre-Conditioned Air and the 400 Hertz 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

Pre-Conditioned Air (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

400 Hertz (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 to ensure that there are no conflicts with the equipment placement.

9.4.5 Electrical Submetering

The airport is installing electrical submetering on PBBs. Electrical submetering shall be 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 Aircraft Side Shift Cab

Aircraft Side Shift Cabs shall be installed on new or relocated PBBs to provide the capability to further adjust a PBB's alignment, increasing the PBB's flexibility to minimize the time required to service multiple aircraft configurations (See PBB Specification in Appendix D).

9.4.8 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) 60-minute rotary timers to minimize lighting costs (See Task Lighting Wiring Diagram on the following pages) (See PBB Specification in Appendix D).

9.4.9 Solid Tires

Solid Rubber Tires shall be included in the specification requirements for all BWI Marshall PBBs.

9.4.10 Gate Identification Signs

Three Sided Gate Identification Signs shall be installed on new or relocated PBBs (See PBB Specification in Appendix D).

9.4.11 Baggage Slides

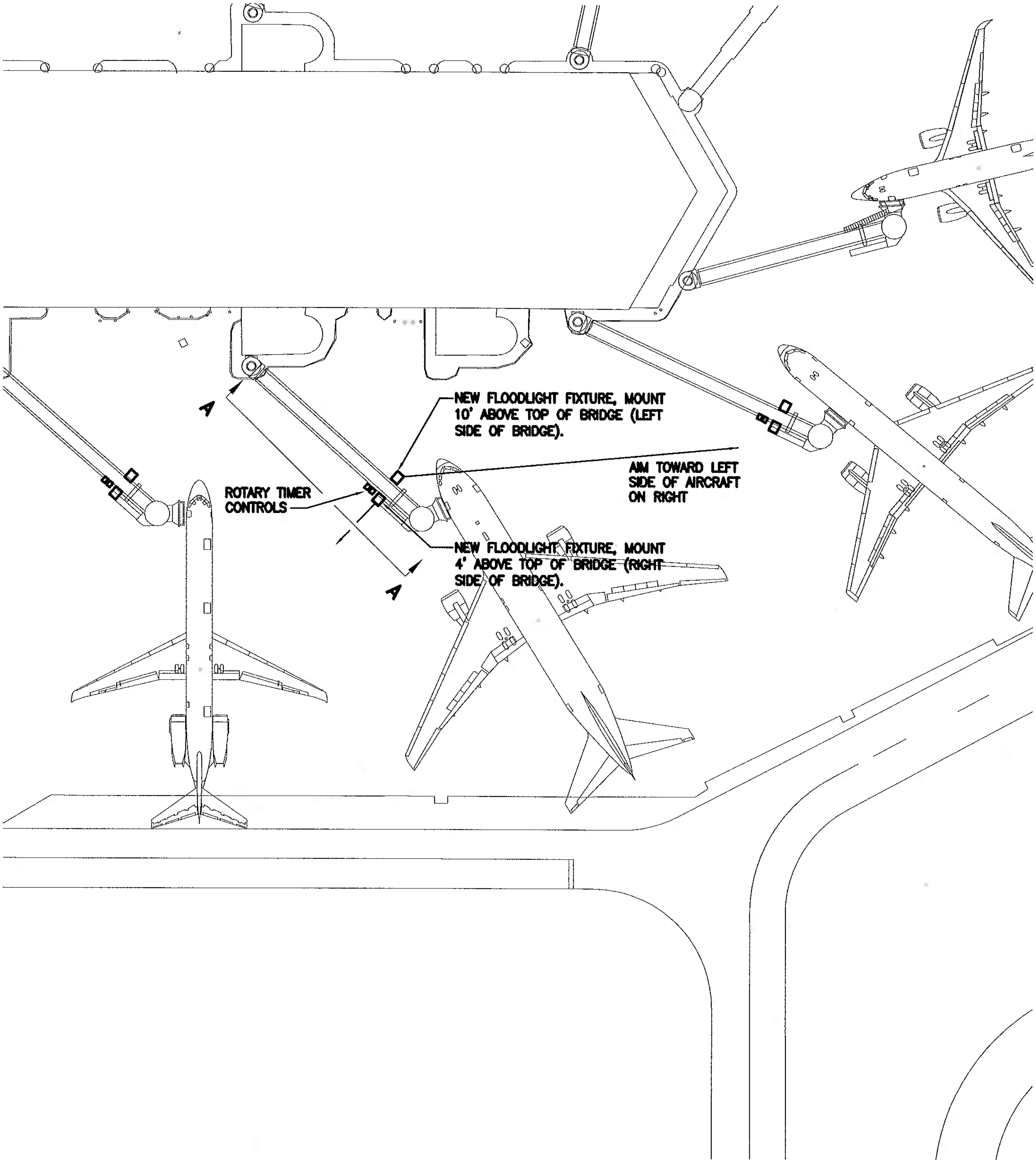
Automated baggage slides are not to be provided with new (or relocated) bridges. The designer shall coordinate with MAA Commercial Management to confirm. The designer shall also coordinate with Commercial Management to confirm current accessories located at each gate (i.e. - cover, motorized lifting platform, etc.) and airline preferences, if any.

9.4.12 Carpet

Carpet shall be installed on the flooring of the PBBs (See PBB Specification in Appendix D).

9.4.13 Exterior Finishes

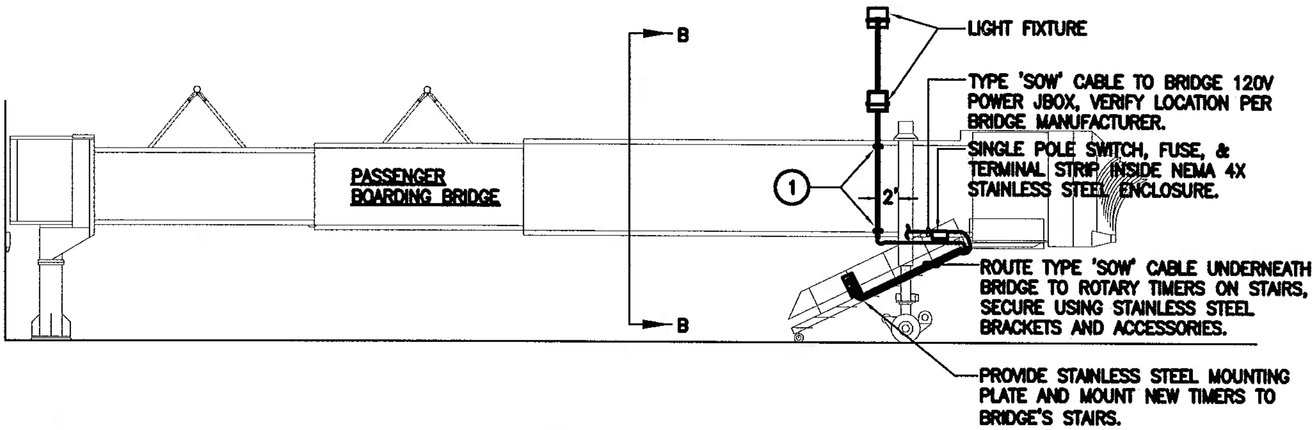
Surface preparation, primer, and finish coat for the PBBs shall be provided (See PBB Specification in Appendix D).



TYPICAL TASK LIGHT FIXTURE MOUNTING DETAIL

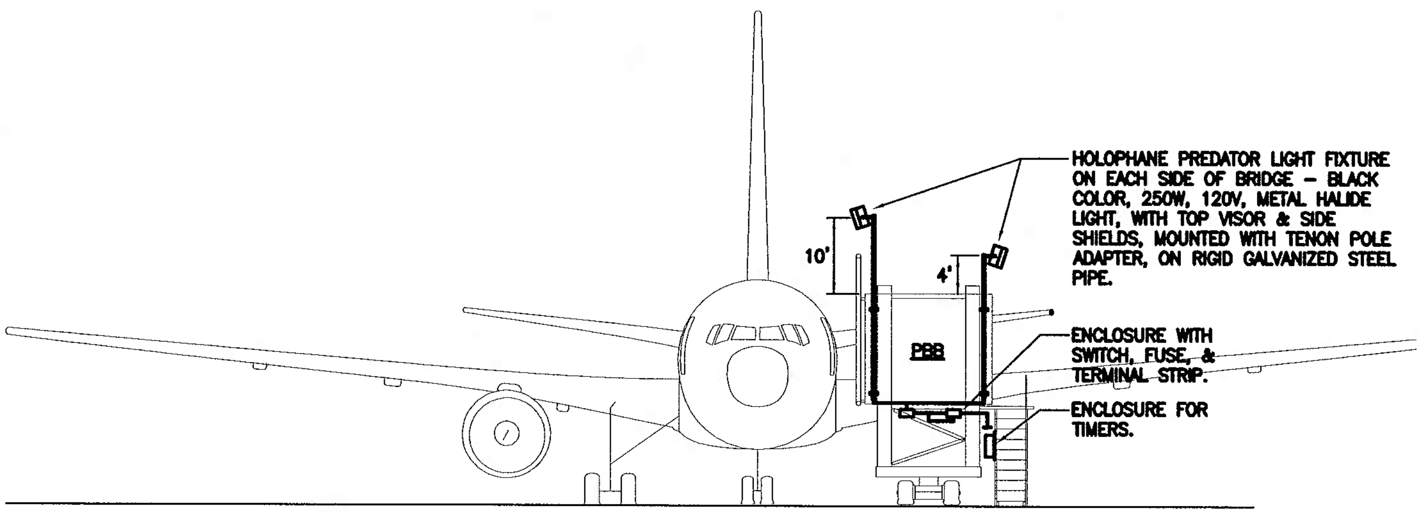
SCALE: 1" = 60'-0"

SHEET TITLE: TYPICAL TASK LIGHT FIXTURE MOUNTING DETAIL	DATE: JULY 2009



ELEVATION VIEW AA – TYPICAL TASK LIGHT FIXTURE MOUNTING DETAIL

NOT TO SCALE



ELEVATION VIEW B–B

NOT TO SCALE

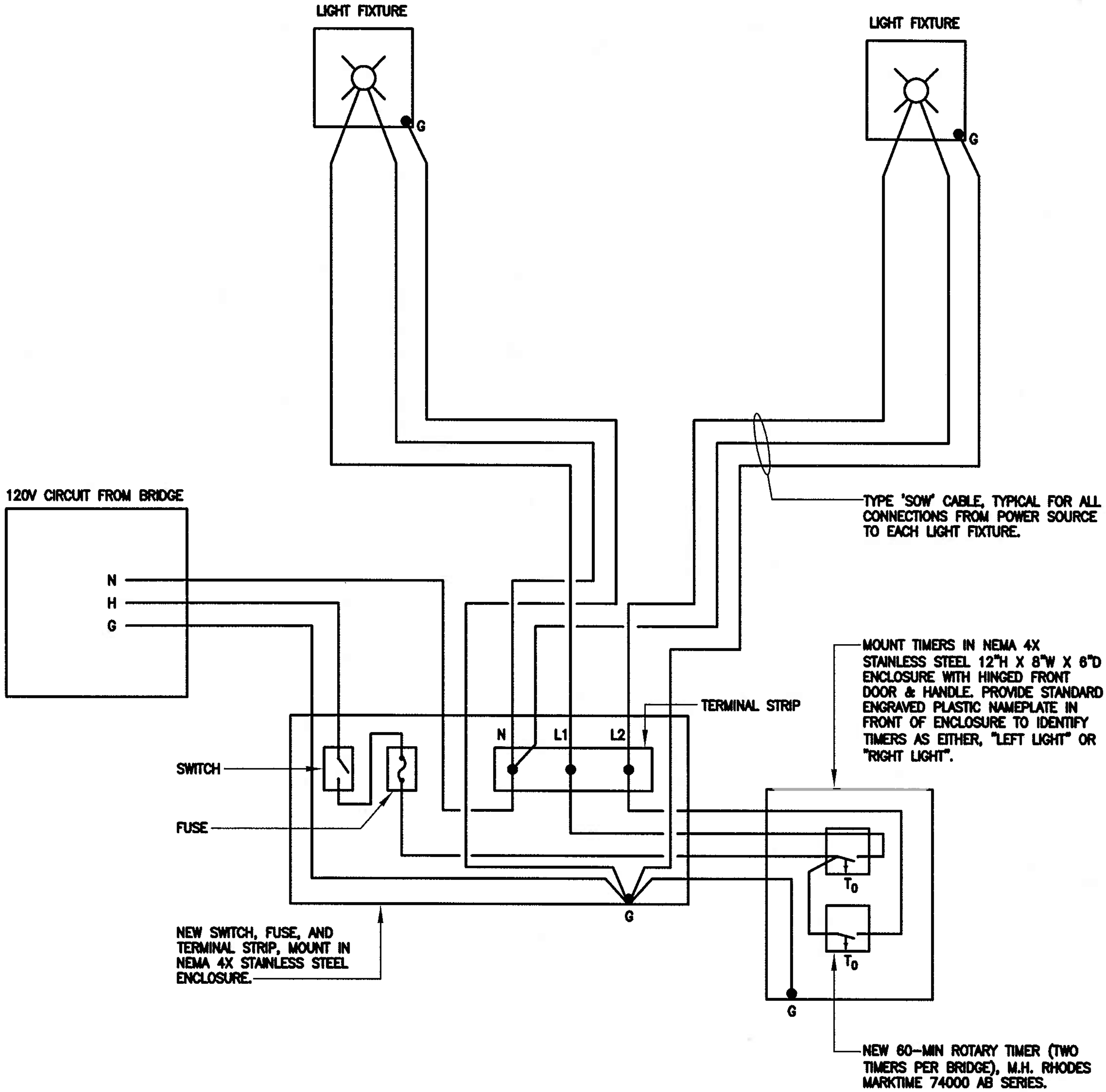
GENERAL NOTES:

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.

SHEET TITLE: TASK LIGHTING MOUNTING DETAIL - ELEVATION VIEWS	DATE: JULY 2009



SHEET TITLE: TASK LIGHTING WIRING DIAGRAM	DATE: JULY 2009

9.4.14 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.

9.4.15 Cab Flooring

Three quarter inch (3/4") Marine Plywood shall be installed on new PBB floors to protect them from weather exposure.

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.

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 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, and not on the ground. In situations where supporting equipment from the underside of the passenger boarding bridge is not possible and requires ground mounting, equipment must be located to allow efficient and safe snow removal and ramp operations. All proposed locations of PC Air and 400 Hz ground mounted equipment must be approved by MAA.

7. 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.

8. 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.

9.6 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.

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.

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 statue 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

<u>Stormwater Management Ponds</u>

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.

<u>Stormwater Wetlands</u>

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 E).

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	• 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.	• 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.	• 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	• Typically used to treat and store the water quality volume through the use of small permanent pools and extended detention periods.	• Neither stormwater wetlands nor artificial marshes should be constructed within 5 miles of an approach or departure surface.	• Neither stormwater wetlands nor artificial marshes should be constructed on MAA property within 5 miles of an approach or departure surface.
Filtering Systems	• Sand filters should drain within 40 hours. • Bioretention facilities should drain within 48 hours and replaced when water remains for more than 72 hours.	• 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	• 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	• 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.	• 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.	• 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	• 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.	• 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.	• 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 *Specifications for Performing Landscape Activities for the Maryland Aviation Administration* (see Appendix E).
Vertical Clearance Requirements	• MDE provides vertical clearance guidelines for the groundwater table to reduce the potential for prolonged periods of standing water.	• FAA guidance warns against the creation of standing water for prolonged periods	• 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 Requiements (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	• Cannot be sited within WHM Zone A	• 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	• 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.	• 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	• Cannot be sited within WHM Zone A if an open water component exists.	• 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

Maryland Aviation Administration Stormwater Management Siting Criteria and Design Guidance

Facility	Zone A	Zone B
Infiltration Systems	• Cannot be sited within WHM Zone A if an open water component exists.	• 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	• Cannot be sited within WHM Zone A	• 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 C).
Vertical Clearance Requirements	• Adhere to Section 4.4 of MDE's guidance for the minimum depth to the seasonally high water table.	• 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]

[1]A 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.

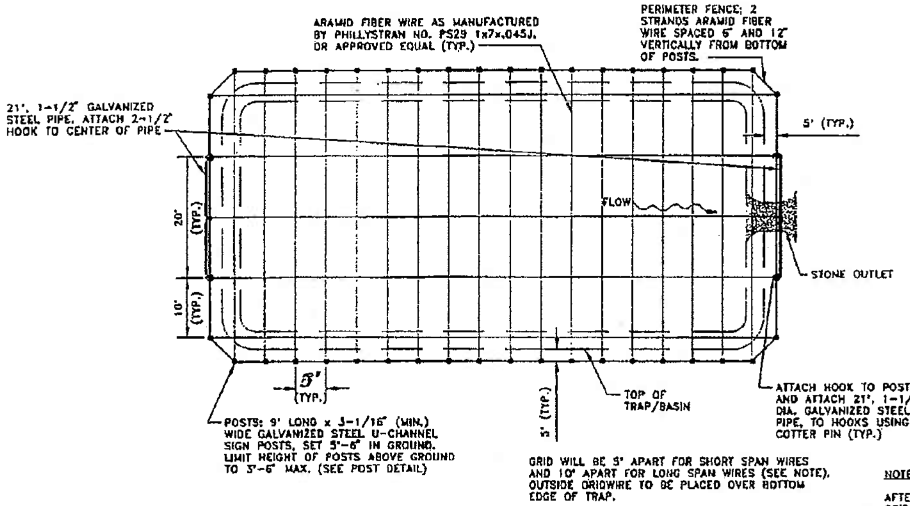
Initial grid spacing will be five feet for short spans and ten feet for long spans. See details for a typical layout. The ends of the grid wires will be strung from hooks placed on posts three feet above the ground. It is expected that the wires will sag as much as two feet and will exert a maximum line 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

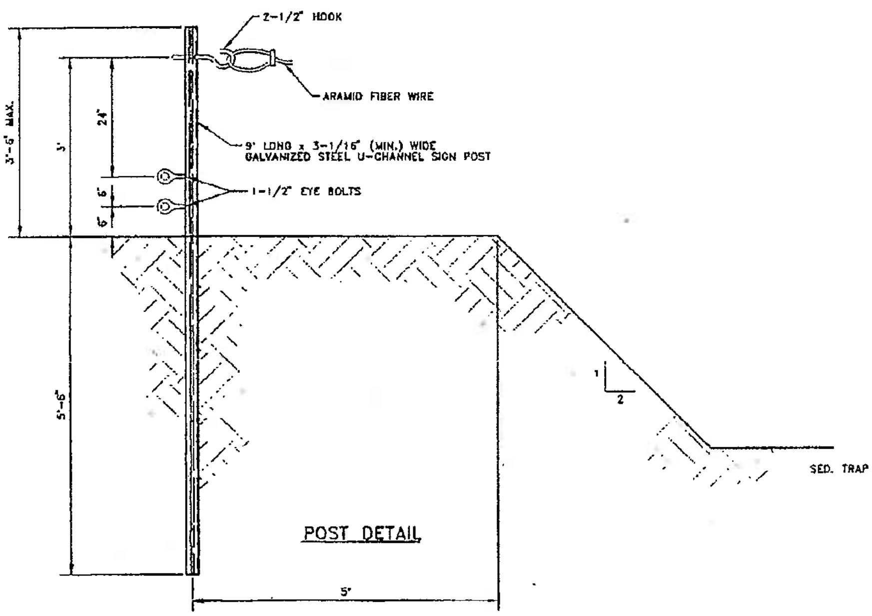


NOTE:

AFTER MONITORING THE EFFECTIVENESS OF THE GRID WIRE SYSTEM, THE ENGINEER MAY ORDER ADDITIONAL POSTS AND WIRES TO BE INSTALLED ON THE LONG SPAN, TO DECREASE SPACING TO 5-FEET.

BIRD DETERRENT SYSTEM FOR SEDIMENT TRAPS AND SEDIMENT BASINS

N.T.S.



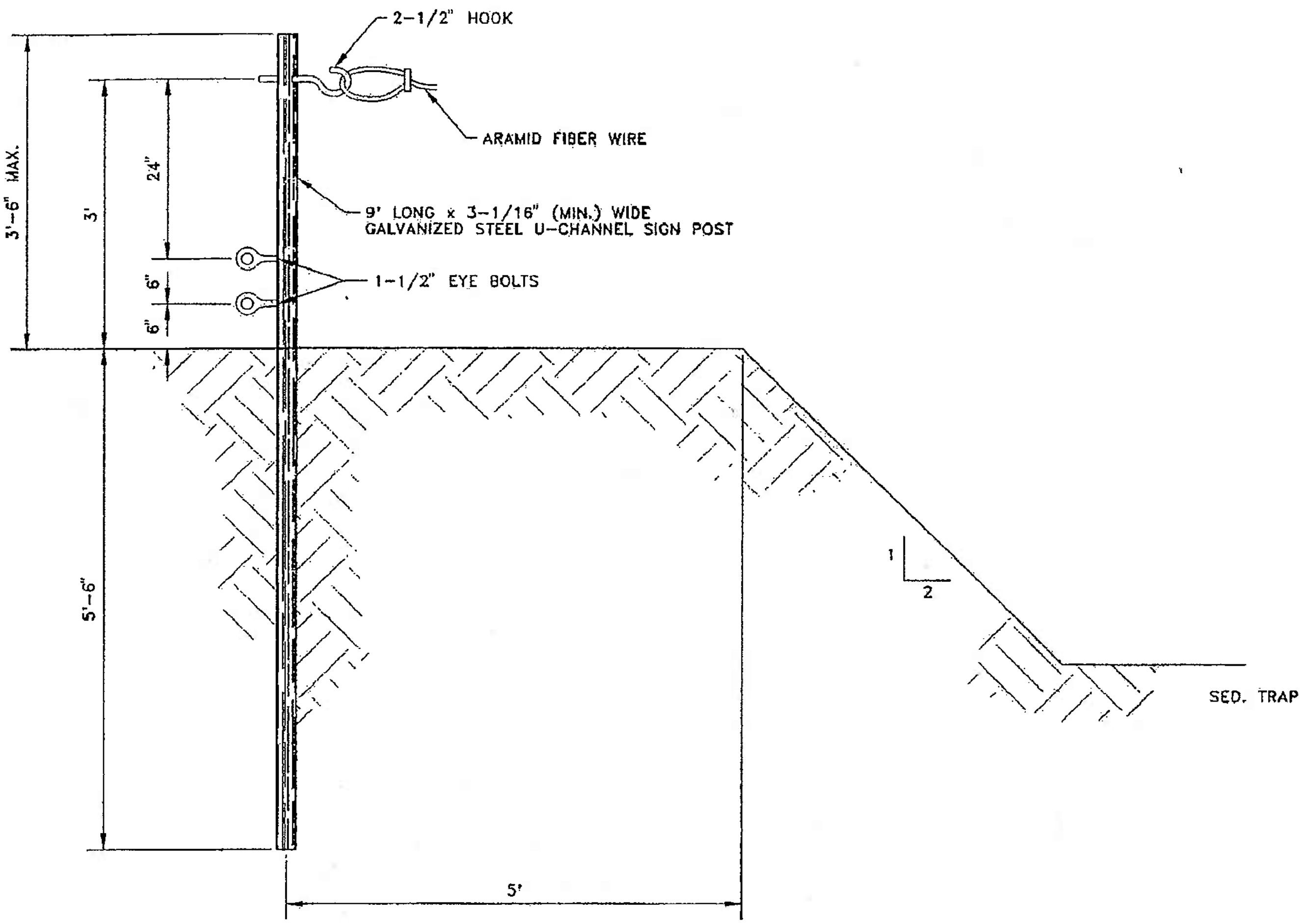
POST DETAIL

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.

SHEET TITLE:	BIRD DETERRENT SYSTEM FOR SEDIMENT TRAPS AND SEDIMENT BASINS	DATE: APRIL 2005



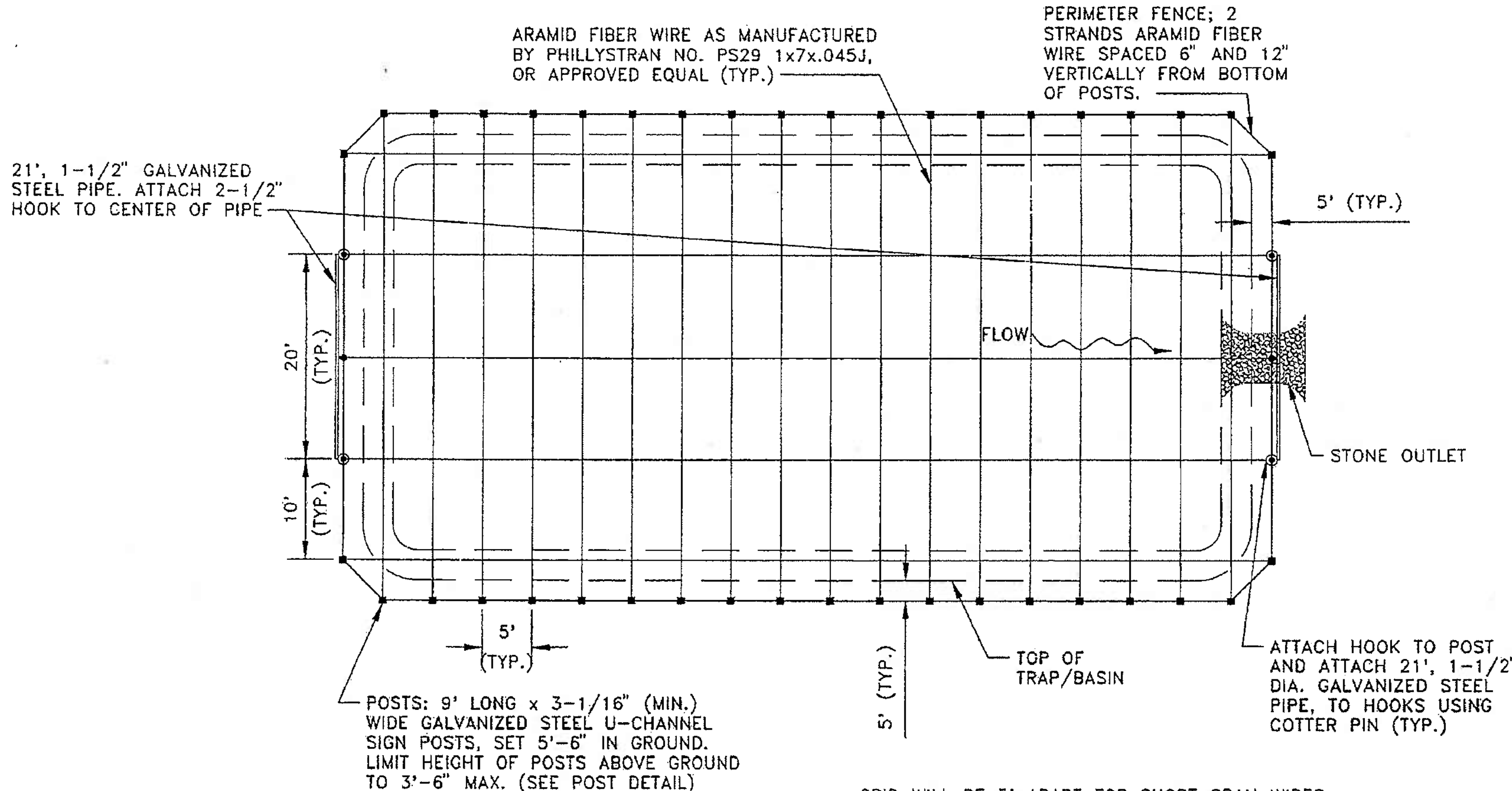
POST DETAIL

SHEET TITLE: WATER FOWL DETERRENT SYSTEM FOR SEDIMENT TRAPS

DATE: APRIL 2005

SHEET TITLE: WATER FOWL DETERRENT SYSTEM FOR SEDIMENT TRAPS

DATE: APRIL 2005



GRID WILL BE 5' APART FOR SHORT SPAN WIRES AND 10' APART FOR LONG SPAN WIRES (SEE NOTE). OUTSIDE GRIDWIRE TO BE PLACED OVER BOTTOM EDGE OF TRAP.

NOTE:

AFTER MONITORING THE EFFECTIVENESS OF THE GRID WIRE SYSTEM, THE ENGINEER MAY ORDER ADDITIONAL POSTS AND WIRES TO BE INSTALLED ON THE LONG SPAN, TO DECREASE SPACING TO 5-FEET.

BIRD DETERRENT SYSTEM FOR SEDIMENT TRAPS AND SEDIMENT BASINS

N.T.S.

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 x 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)

Underground Fuel Storage Tanks (UST) containing fuels or chemicals designated hazardous by the EPA, or by the applicable codes and standards, shall have approved secondary containment systems and shall be in compliance with the most recent: COMAR 26.10, Maryland Department of the Environment, Oil Pollution and Tank Management Regulation; National Fire Protection Association Code; API; COMAR 12, State of Maryland Fire Prevention Code; and all related EPA or Federal regulatory requirements.

In addition, UST's shall meet the following requirements:

1. Underground storage tanks shall be UL listed of one of the following type: double-walled fiberglass, double walled steel fiberglass-clad, or jacketed steel with secondary containment. All UST shall have an interstitial leak detection monitoring system.

2. UST product and return piping shall be one of the following: UL approved double-walled fiberglass, or UL approved double-walled corrosion resistant flexible piping, including the installation of product containment sumps.

3. UST monitoring system shall include the following as applicable: automatic tank gauging including interstitial monitoring, containment sump, and/or dispenser sump monitoring, with UST high level alarm and overfill prevention device.

4. UST shall be anchored by means of concrete dead-men or hold-down slab. Dead-men shall be provided with mechanical restraints for anchoring in accordance with NFPA 30.

5. UST excavation shall be lined with geotextile fabric.

6. Cathodic protection shall be provided for any portion of the tank and piping which are not fiberglass and shall be in accordance with standards published by the American Petroleum Institute and the National Association of Corrosion Engineers.

7. All UST installations must have proper inventory control and overflow alarm as mandated by applicable federal, state, and local laws.

10.4 ABOVE GROUND STORAGE TANKS

Aboveground Fuel Storage Tanks (AST) shall be in compliance with the most recent: COMAR 26.10, Maryland Department of the Environment, API, Oil Pollution and Tank Management Regulation; all applicable codes of the National Fire Protection Association, including but not limited to, NFPA 1, 30 & 30A, 58, 59, 59A, 70, 385, and 395; COMAR 12, State of Maryland Fire Prevention Code; ATA; and all related EPA or Federal regulatory requirements.

In addition, AST's shall meet the following requirements:

1. Aboveground Storage Tanks shall be UL Listed Double-Walled in accordance with the referenced standards. Installation shall be in accordance with manufacturer's specifications. An AST with a storage capacity greater than 10,000 gallons shall be surrounded by a continuous containment dike capable of holding the total tank volume, including a lockable drain valve, in accordance with COMAR 26.10.01.12B-1.

2. AST 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 aviation fuels. Underground product piping shall be one of the following: UL approved double-wall fiberglass, or UL approved double-wall 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. AST monitoring system shall include a tank gauging system, interstitial monitoring, containment sump and/or dispenser sump monitoring, and high-level alarm.

4. Provide a site specific Spill Prevention Control and Countermeasures Plan (SPCC) in accordance with 40 CFR Part 112 for review and approval by the MAA Manger of Environmental Compliance.

10.4.1 Glycol ASTs

1. All glycol ASTs shall be in compliance with the most recent regulations of Code of Maryland Regulations (COMAR) 26.10, Oil Pollution and Tank Management and all related Environmental Protection Agency or Federal regulatory requirements.

2. All glycol ASTs shall be in compliance with all applicable codes of the National Fire Protection Association (NFPA), particularly NFPA 1, 10, 30 & 30A, 70, 415, and 704; COMAR 12, State of Maryland Fire Prevention Code, Code of Federal Regulations, and BWI Marshall Tenant Directives as follows:

   a. NFPA 1, Fire Prevention Code
   b. NFPA 704, Identification of Fire Hazards
   c. NFPA 10, Fire Extinguishers
   d. NFPA 30, 30A, Flammable & Combustible Liquids Code
   e. NFPA 70, National Electric Code
   f. NFPA 101, Life Safety Code
   g. NFPA 415, Airport Terminal Building, Fuel Ramp Drainage
   h. NFPA 704, Identification of Fire Hazards, Signs/Signal System
   i. Code of Maryland Regulations (COMAR) 26.10, Maryland Department of the Environment Oil Pollution and Tank Management
   j. COMAR Title 29.06.01, State Fire Prevention Code
   k. Code of Federal Regulations 40 CFR 112.7, Spill Prevention Control and Countermeasure Plan

l. BWI Marshall Tenant Directive 215.1, Deicing Procedures at BWI Marshall
m. BWI Marshall and MTN Tenant Directive 007.1, Building Permits – BWI Marshall
n. BWI Marshall Tenant Directive 502.1, Airport Fuel/Oil and Hazardous Material Spill Procedures for Legal Reporting Responsibilities
o. ICC International Plumbing Code

3. Transport trailer tanks are not permitted for glycol storage.

4. The MAA will permit glycol ASTs to be placed only at those Concourse locations where gate deicing is permitted (See BWI Marshall Tenant Directive 215.1 Deicing Procedures at BWI Marshall). Positioning of tanks shall not interfere with:

    - Emergency terminal exits
    - Fire protection equipment
    - Vehicle traffic
    - Other airport operations
    - Line of sight concerns from the Air Traffic Control Tower

5. Request for tank locations must be approved by the MAA Director of Operations Center prior to submittal of building permit or conceptual design for MAA Capital Projects.

6. All glycol ASTs shall be, at a minimum, steel or noncombustible material, UL Listed single walled construction. Installation is to be in accordance with the manufacturer's specifications.

7. All glycol ASTs and associated pumps, piping and equipment, regardless of capacity shall be installed within a steel containment dike capable of holding 110% of the total tank volume, providing protection from collision, and shall include a lockable drain valve, in accordance with COMAR 26.10.01,12B-1. Penetrations through the tank must be watertight.

8. The tank owner must develop procedures to respond to a spill. The spill response procedures must be submitted to the MAA Environmental Compliance Section. The spill procedures must be developed according to BWI Tenant Directive 502.1, Airport Fuel/Oil and Hazardous Material Spill Procedures for Legal Reporting Responsibilities, to address any possible spills or leaks that may occur. In addition, the procedures shall include a process for emptying stormwater from the containment dike area. The procedure shall be developed to prevent stormwater from reaching a level that will decrease the capacity of the containment dike area below the storage capacity of the tank. The tank owner must also have a spill kit available at the tank location. The kit must contain drain protection booms or mats.

9. Tank owner must visually inspect tanks weekly and keep records of tank inspections.

10. All leaks and spills must be addressed immediately by the tank owner. Immediate measures must be taken to prevent the migration of spilled material into stormwater drains. The MAA Airport Operations Center must be notified immediately of a leak or spill.

11. When required, tanks must be placed on concrete pads of sufficient strength to support the tank's full weight (including other necessary structural support).

12. All tanks must be provided with a flow meter with a totalizer applicable for glycol usage. They must be capable of providing a reading of the total amount of glycol discharged from the tank. An annual calibration must be performed according to manufacturer's recommendations. The meter must be accessible to the MAA at all times.

13. All tanks shall have a label affixed identifying their contents and tanks' maximum capacity, e.g., Propylene Glycol, Type IV, 5,000 gallons. The NFPA-704 symbol shall also be displayed.

14. All connections to potable water supply must have a back-flow preventer.

15. All glycol AST equipment must be secure from tampering and unauthorized use and must be limited to personnel trained by the tenant according to its company's standards.

16. All operator hoses must be in good working order and be securely fastened in an upright manner to prevent leaking. Valves must be in closed position when not in use.

17. The MAA Project Manager and Resident Architect must approve the color of the tanks.

10.5 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. The Contractor will be permitted a time extension (if justified) for removal of any unforeseen asbestos plus the costs of the asbestos removal; however, the Contractor will not claim and MAA will not pay for delays associated with the 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.

10.5.1 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.

10.5.2 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.

10.6 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).

10.7 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.

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.

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 exists 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.

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 mental 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. ~~D315-TM, PLATINUM TEMPEST.~~

11.4 PUBLIC AREA MATERIALS, FINISHES AND COLORS

11.4.1 Restrooms

Refer to Restroom Design Standards in Appendix G 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.

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.

~~Satellite receiving dish antennas located on the roof of Concourse B can cause operational problems with the airport surveillance radar (ASR-9). A software program can be used to alleviate the problem but no additional dish antennas shall be installed at Concourse B or in the vicinity of Concourse B. All proposed satellite dish antenna locations should be reviewed and coordinated with MAA Operations and FAA-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. ~~SSV D315-TM Platinum Tempest.~~

~~Wilsonart no longer manufactures the SSV (Solid Surface Veneer) line of products, which was a panel consisting of 1/8-inch solid surface material laminated (in most cases) to gypsum board. The actual solid surface material color may still be available, but minimum thickness may be 1/4- to 1/2-inch~~

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.)

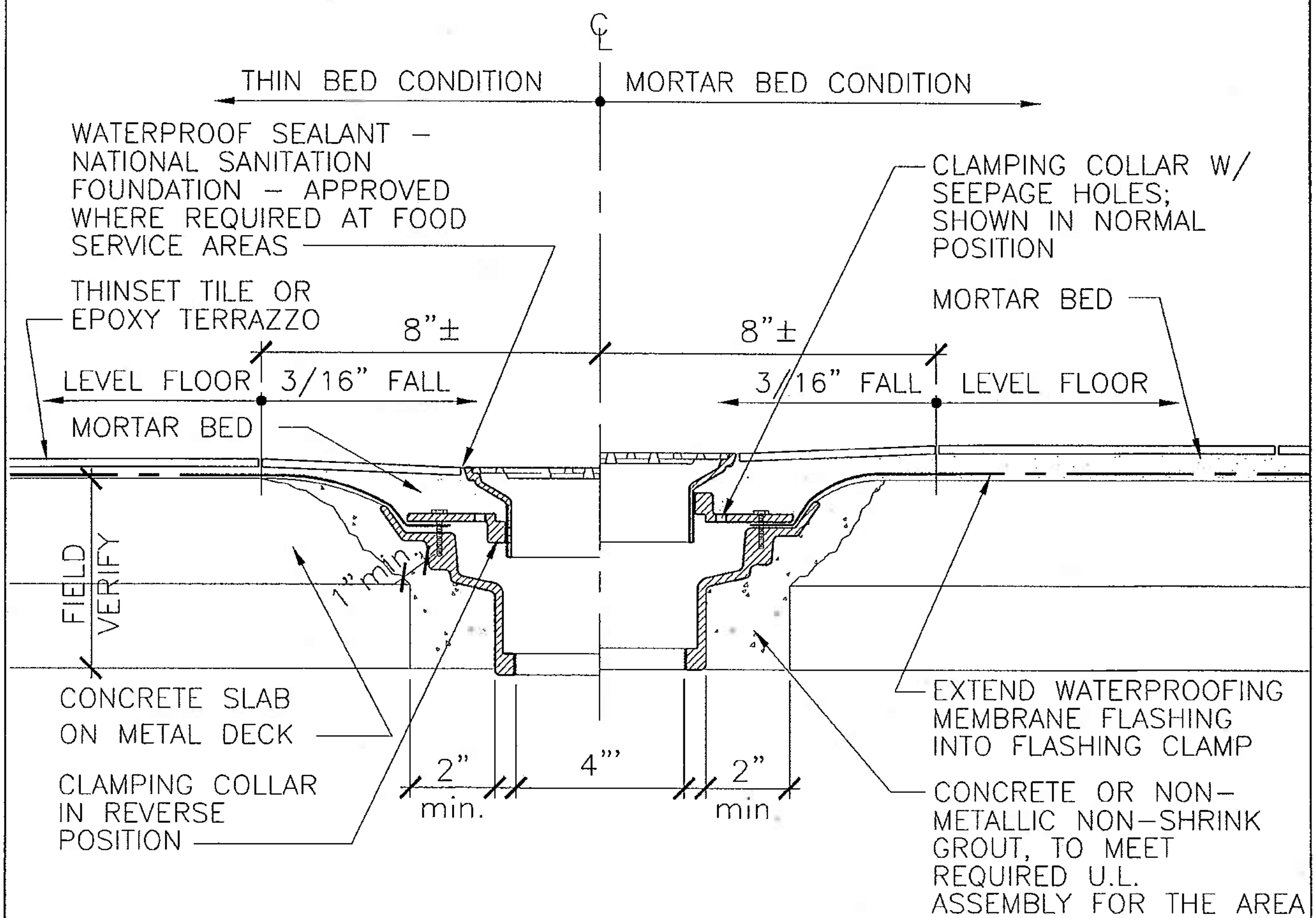
2. At perimeter walls, etc., turn floor covering up as a wall base and to protect turned-up vertical waterproofing.

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.



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

SCALE: 3" = 1'–0"

DRAIN AS SHOWN – J.R. SMITH FLOOR DRAIN # 2005–A
EQUIVALENT DRAINS ACCEPTABLE FROM JOSAM OR ZURN

BALTIMORE/WASHINGTON INTERNATIONAL *Thurgood Marshall* AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
OFFICE OF ENGINEERING AND CONSTRUCTION MANAGEMENT

CONSULTING ENGINEERING AND PLANNING
849 International Drive
Suite 320
Linthicum, MD 21090
Phone: 410-855-6160
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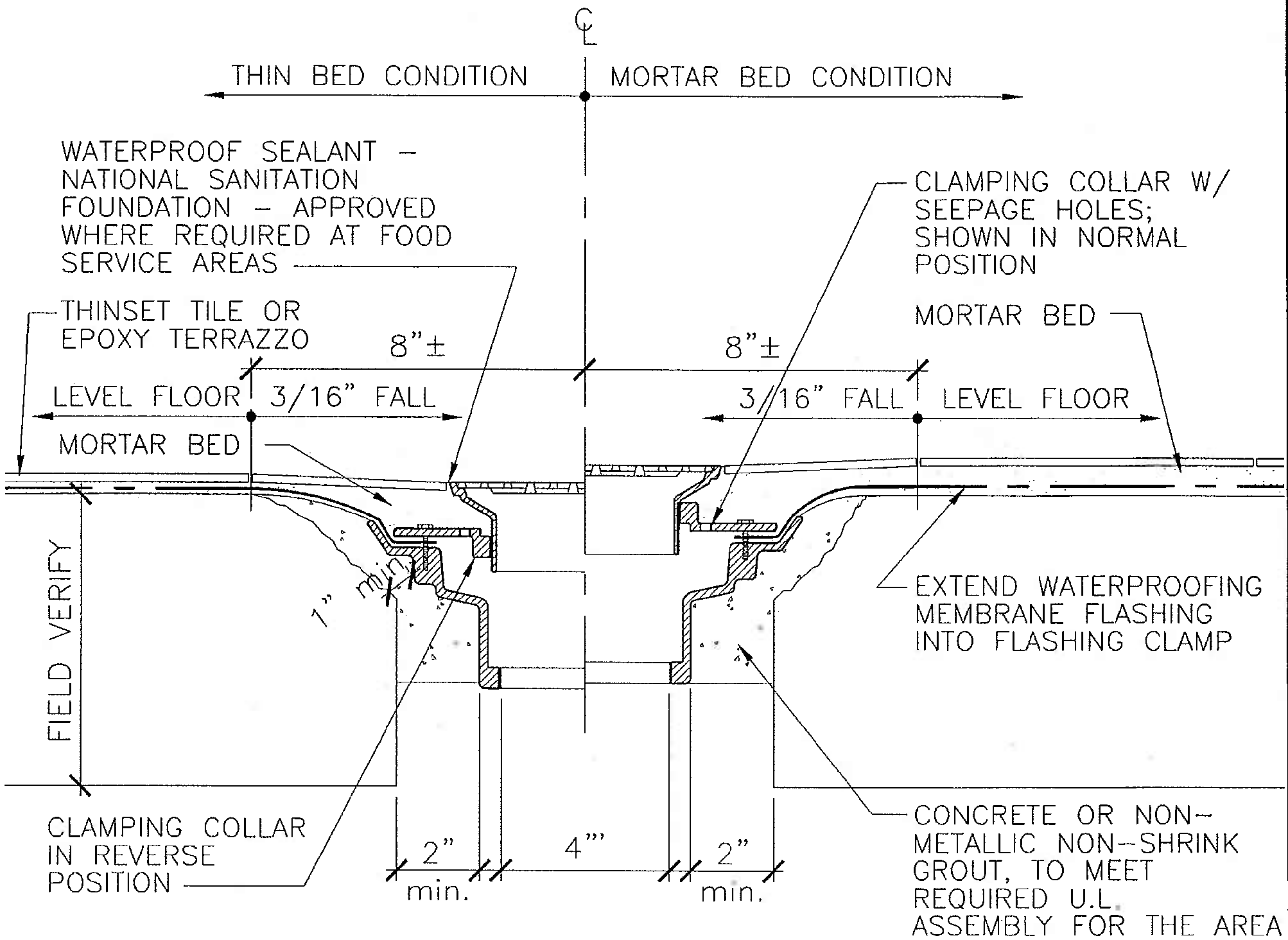
PROJECT TITLE	DESIGN STANDARD FOR FLOORING IN WET AREAS
SHEET TITLE	FLOOR DRAIN IN COMPOSITE SLAB LOCATION

SCALE	PROJECT NO.	EXHIBIT NO.
AS NOTED	20831385	
DATE	SHEET REFERENCE	
09/19/06		

FILE NAME: P:\20830082–A05\CAD\arch\DRAIN DETAILS 2.dwg PLOTTED: Thursday, September 21, 2006 – 10:07am



NOTE:
CORE DRILL OR SAW CUT AS NECESSARY TO REMOVE SLAB.
SLAB REINFORCEMENT CAN ONLY BE CUT WITH STRUCTURAL ENGINEER'S APPROVAL.

FLOOR DRAIN — SUSPENDED REINFORCED CONCRETE SLAB CONDITION

SCALE: 3" = 1'–0"

DRAIN AS SHOWN – J.R. SMITH FLOOR DRAIN # 2005–A
EQUIVALENT DRAINS ACCEPTABLE FROM JOSAM OR ZURN

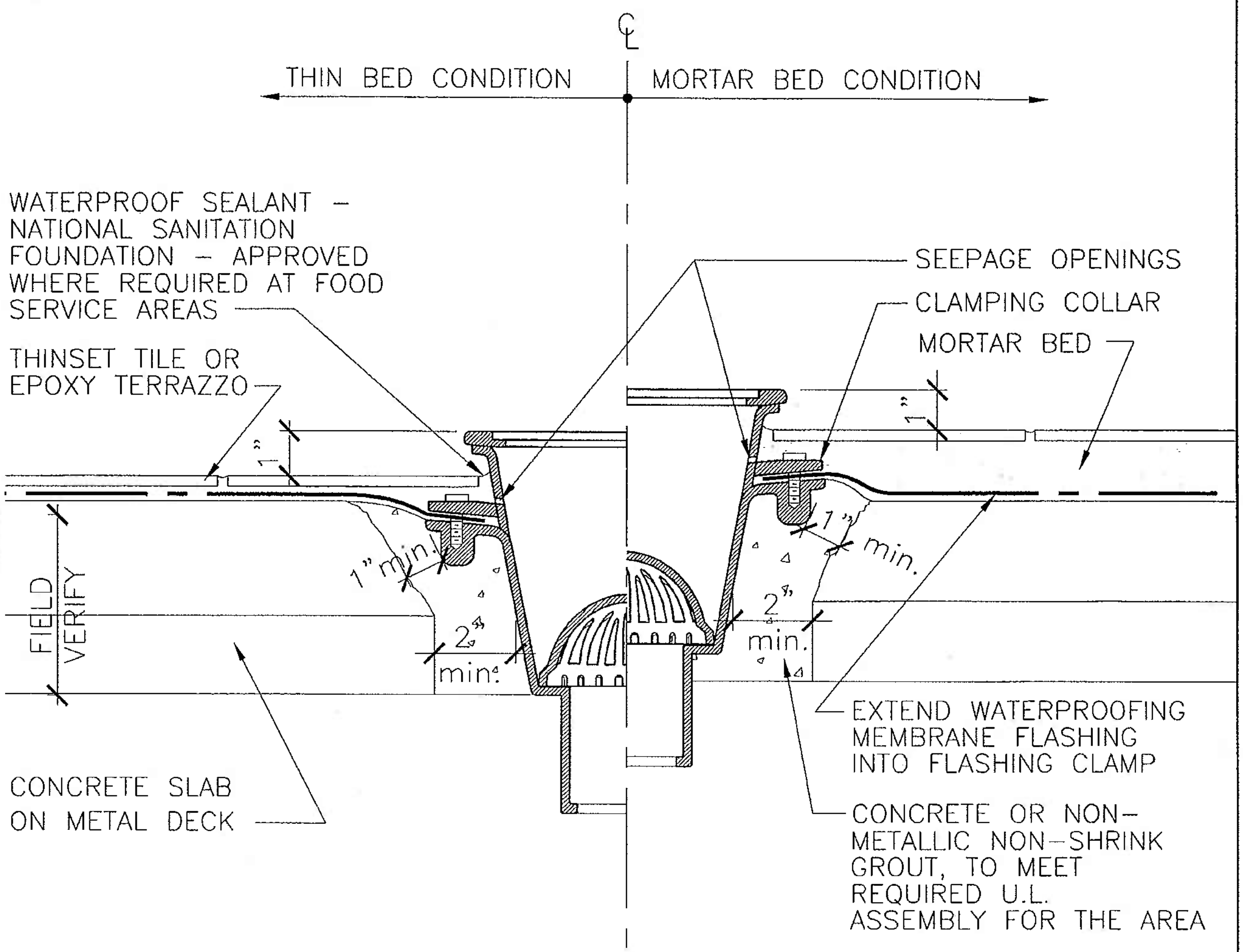
BWI
BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
OFFICE OF ENGINEERING AND CONSTRUCTION MANAGEMENT

URS
CONSULTING ENGINEERING AND PLANNING
849 International Drive
Suite 320
Linthicum, MD 21090
Phone: 410-855-6160
Fax: 410-855-6163

PROJECT TITLE: DESIGN STANDARD FOR FLOORING IN WET AREAS			
SHEET TITLE: FLOOR DRAIN IN SUSPENDED REINFORCED CONC. SLAB LOCATION			
	SCALE: AS NOTED	PROJECT NO.: 20831385	EXHIBIT NO.
	DATE: 09/19/06	SHEET REFERENCE	

FILE NAME: P:\20830082–A05\CAD\arch\DRAIN DETAILS 2.dwg PLOTTED: Thursday, September 21, 2006 – 10:07am



NOTE:
CORE DRILL OR SAW CUT AS NECESSARY TO REMOVE SLAB. OPENINGS LARGER THAN 10"x10" REQUIRE STRUCTURAL ENGINEERS APPROVAL.

LOCATE FLOOR SINK UNDER EQUIPMENT/ ETC. TO AVOID TRIPPING HAZARD.

FLOOR SINK – COMPOSITE SLAB CONDITION

SCALE: 3" = 1'–0"

SINK AS SHOWN – J.R. SMITH SANI–CEPTOR # 3100
EQUIVALENT SINKS ACCEPTABLE FROM JOSAM OR ZURN

BWI BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
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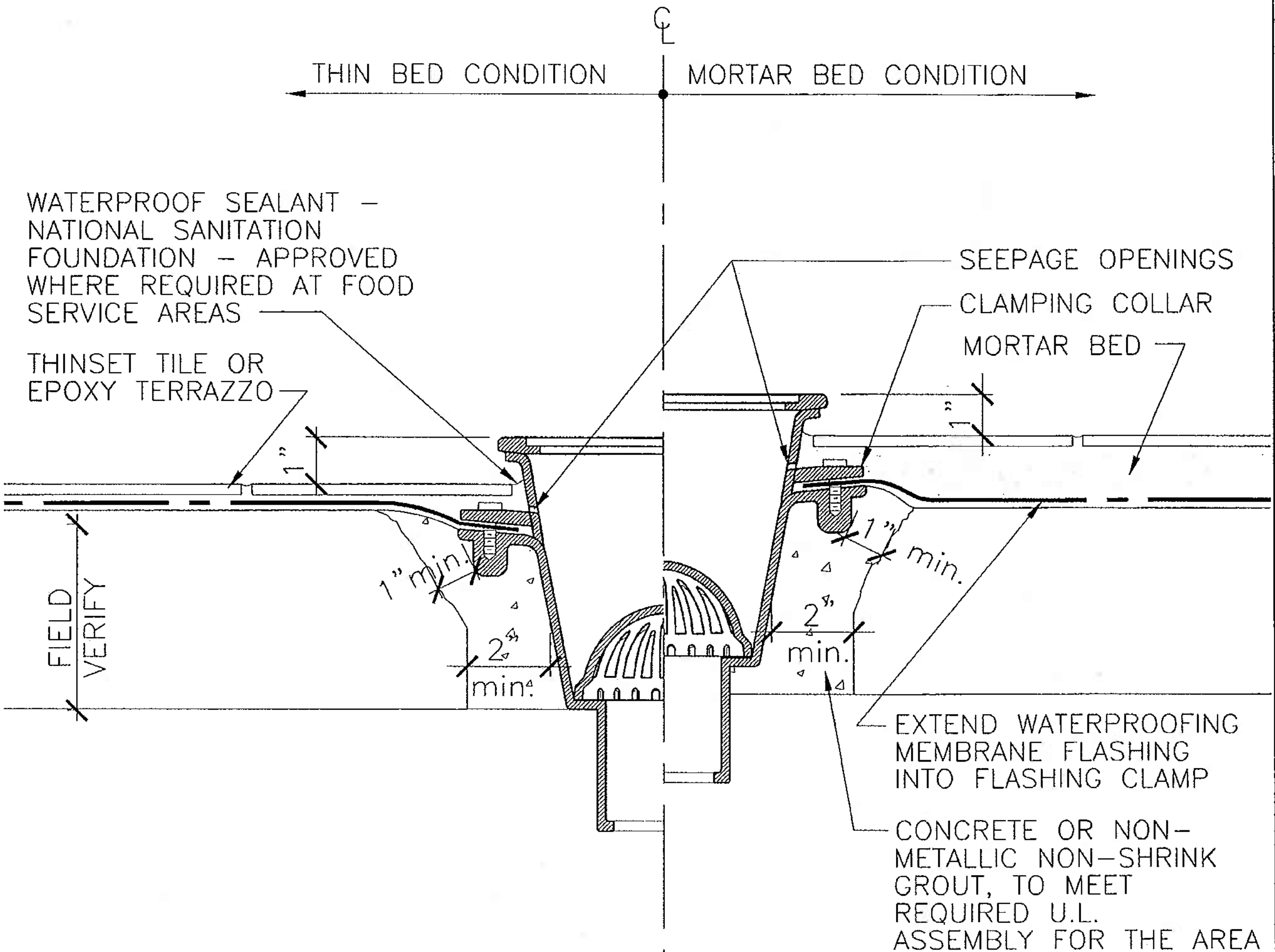
PROJECT TITLE	DESIGN STANDARD FOR FLOORING IN WET AREAS	
SHEET TITLE	FLOOR SINK IN COMPOSITE SLAB LOCATION	
SCALE AS NOTED	PROJECT NO. 20831385	EXHIBIT NO.
DATE 09/19/06	SHEET REFERENCE	

FILE NAME: P:\20830082–A05\CAD\arch\DRAIN DETAILS 2.dwg PLOTTED: Thursday, September 21, 2006 – 10:09am



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.

FLOOR SINK — SUSPENDED REINFORCED CONCRETE SLAB CONDITION

SCALE: 3" = 1'–0"

SINK AS SHOWN – J.R. SMITH SANI–CEPTOR # 3100
EQUIVALENT SINKS ACCEPTABLE FROM JOSAM OR ZURN

BWI
BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
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Suite 320
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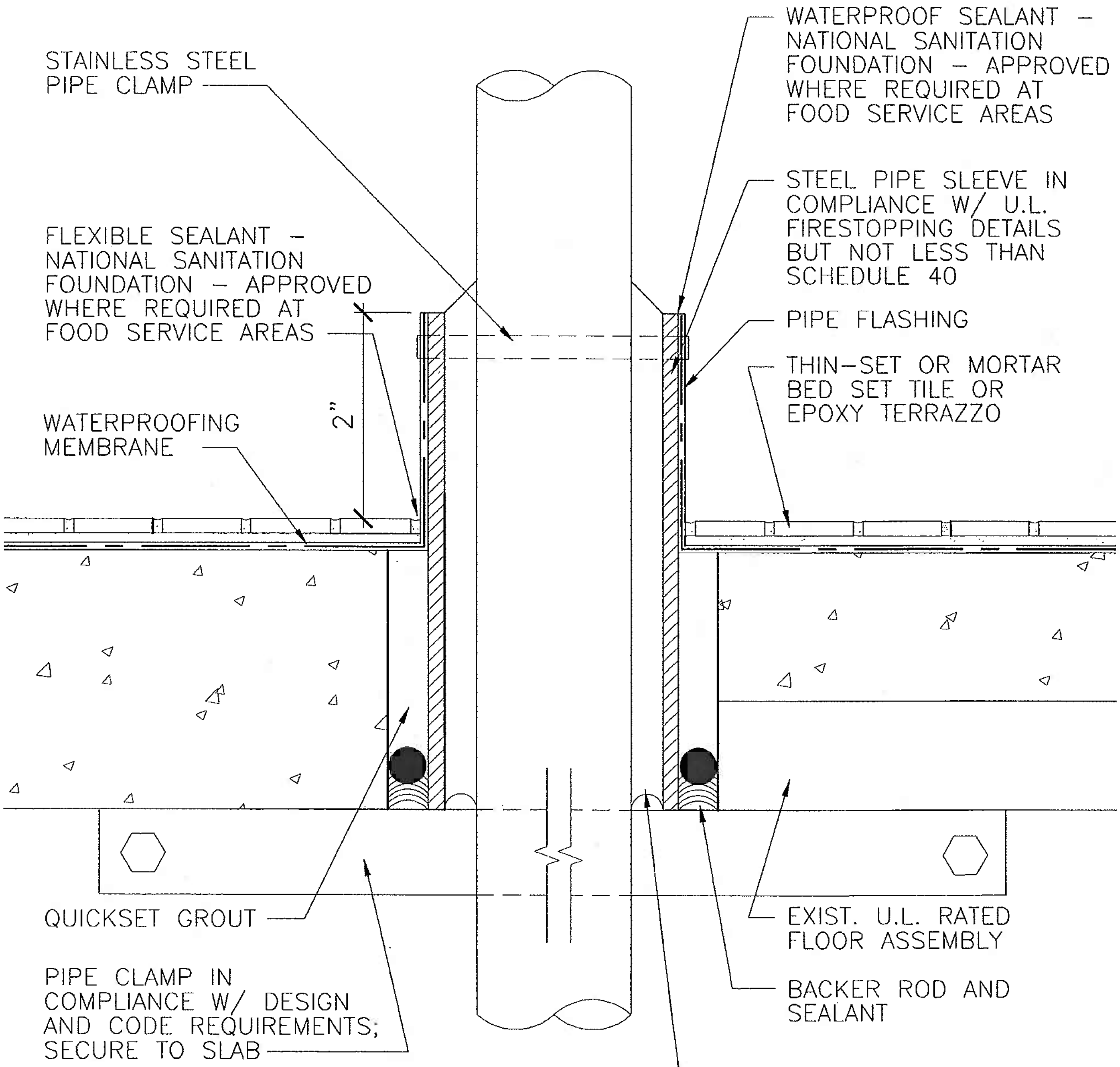
Phone: 410-855-6160
Fax: 410-855-6163

PROJECT TITLE: DESIGN STANDARD FOR FLOORING IN WET AREAS			
SHEET TITLE: FLOOR SINK IN SUSPENDED REINFORCED CONCRETE SLAB LOCATION			
	SCALE AS NOTED	PROJECT NO. 20831385	EXHIBIT NO.
	DATE 09/19/06	SHEET REFERENCE	

FILE NAME: P:\20830082-A05\CAD\arch\DRAIN DETAILS 2.dwg PLOTTED: Thursday, September 21, 2006 – 10:10am



NOTE:
CORE DRILL OR SAW CUT AS NECESSARY TO REMOVE SLAB. STRUCTURAL ENGINEER'S APPROVAL REQUIRED FOR CUTTING OF SLAB REINFORCEMENT.

FLOOR PENETRATION

SCALE: N.T.S.

BWI BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT	MARYLAND DEPARTMENT OF TRANSPORTATION MARYLAND AVIATION ADMINISTRATION OFFICE OF ENGINEERING AND CONSTRUCTION MANAGEMENT	PROJECT TITLE: DESIGN STANDARD FOR FLOORING IN WET AREAS		
	URS CONSULTING ENGINEERING AND PLANNING 849 International Drive Suite 320 Linthicum, MD 21090 Phone: 410-855-6160 Fax: 410-855-6163	SHEET TITLE: PIPE FLOOR PENETRATION DETAIL		
		SCALE: AS NOTED	PROJECT NO. 20831385	EXHIBIT NO.
		DATE: 09/19/06	SHEET REFERENCE	

FILE NAME: P:\20830082-A05\CAD\arch\DRAIN DETAILS 2.dwg PLOTTED: Thursday, September 21, 2006 - 10:10am

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 born 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 ½ 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.

11.7 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. 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 E.

1. Hinges should be stainless steel ball bearing type.

2. Door Lever should be type required by ADA. The lever should 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 E.

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 E.

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. Wastes 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 E.

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 E):

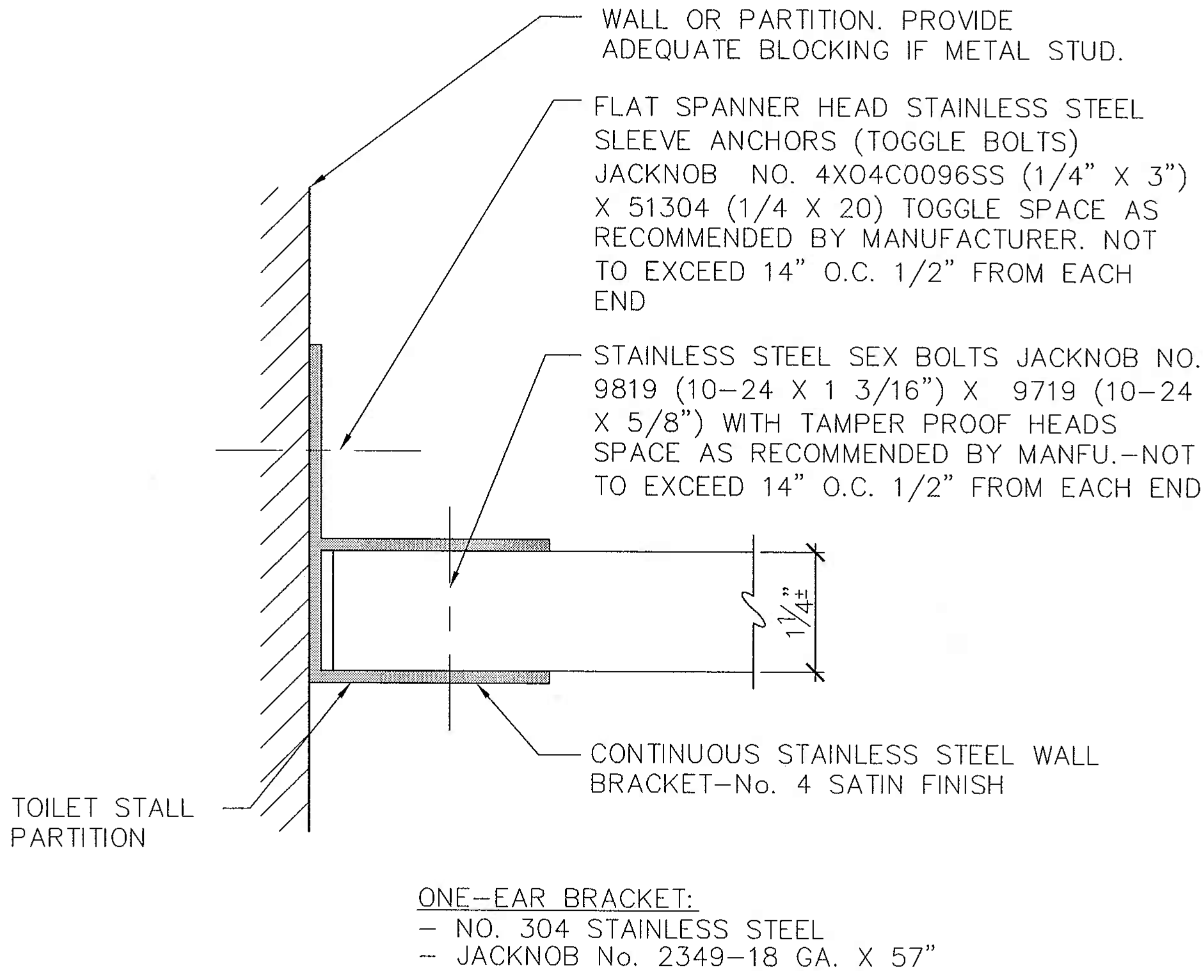
1. Designed in accordance with current ADA requirements.
2. The compartment should be a prefabricated solid surface material.
3. Each compartment should have grab bars, soap dish or dispenser, a shower seat, and a heavy-duty curtain rod.
4. The mixing valve should be in the wall.
5. The showerhead should 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.

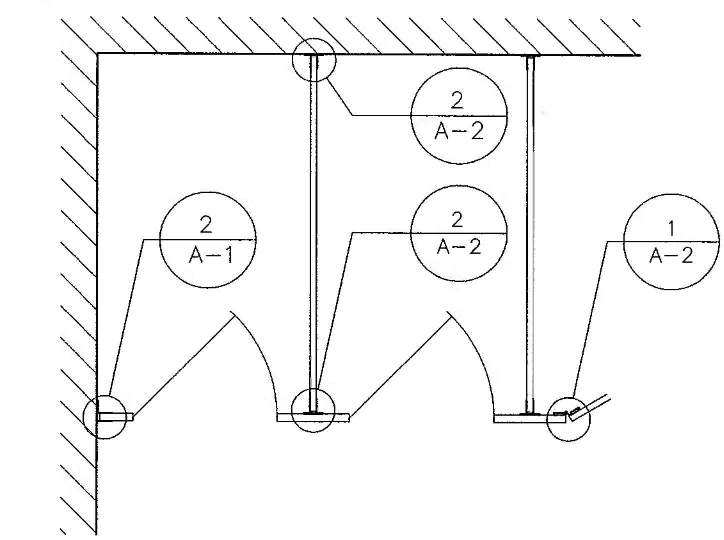
R. **Sanitary Lines:** All restroom fixtures should drain by gravity to the sanitary piping system. If existing conditions prohibit gravity flow then lift station/ejector pits are to be included in the design. Lift stations and ejector pits should be located outside the footprint of the building structure 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.

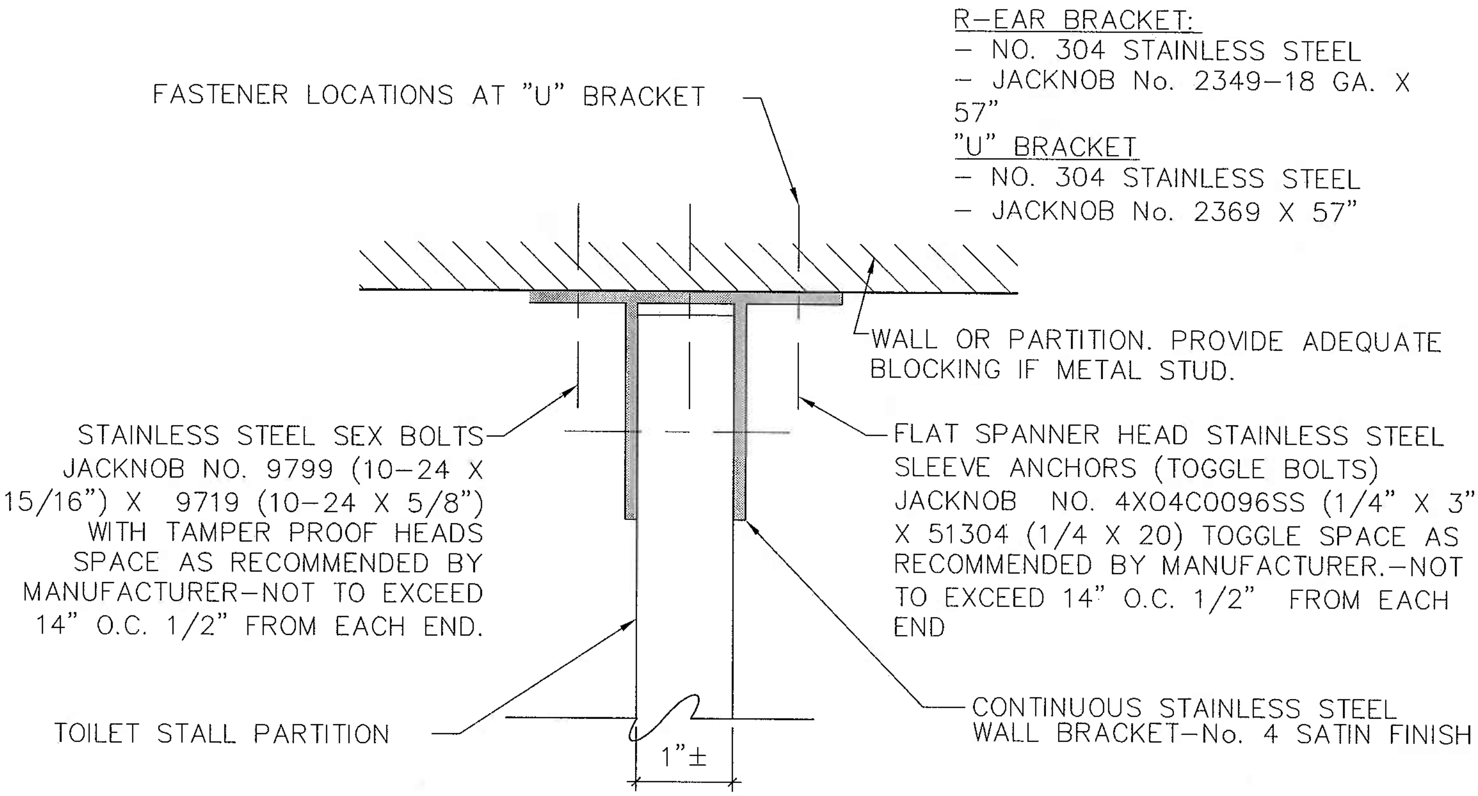


2
A-1
TYPICAL PILASTER-WALL ANCHOR
NOT TO SCALE



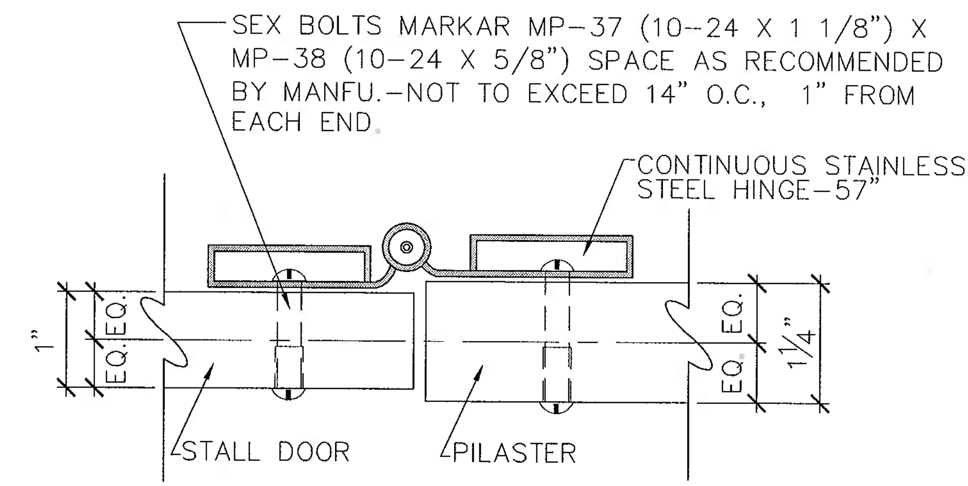
1
A-1
REFERENCE PLAN-TOILET STALLS
NOT TO SCALE

SHEET TITLE: TOILET STALL AND DETAILS	DATE: MAY 2004



2
A-2
TYPICAL STALL PARTITION ANCHOR

NOT TO SCALE



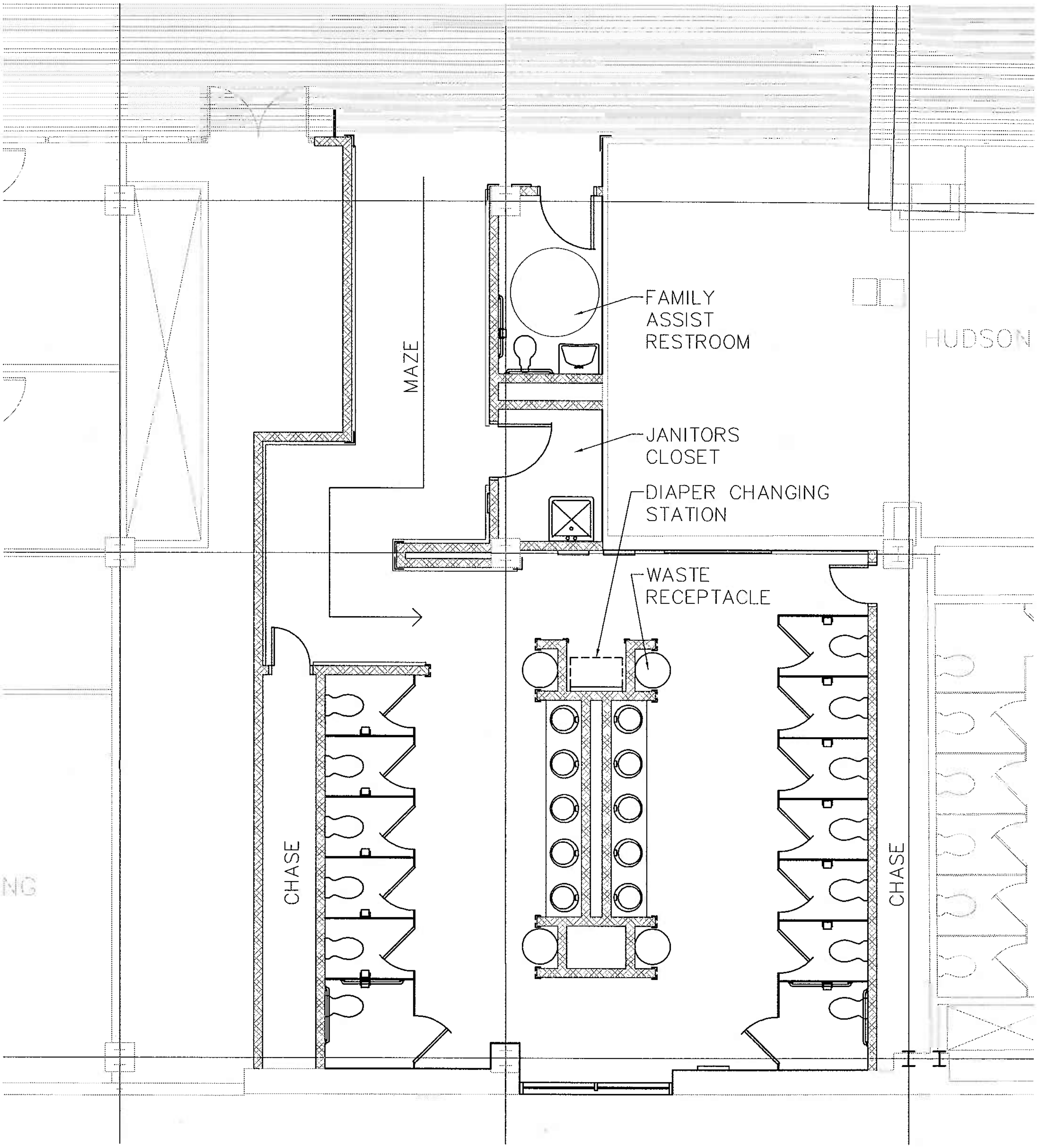
HINGE:
- MARKAR PRODUCTS INC.
- No. FS-901-TP BHMA 630-14 GA.
- NO. 304 STAINLESS STEEL

1
A-2
TYPICAL STALL DOOR

NOT TO SCALE

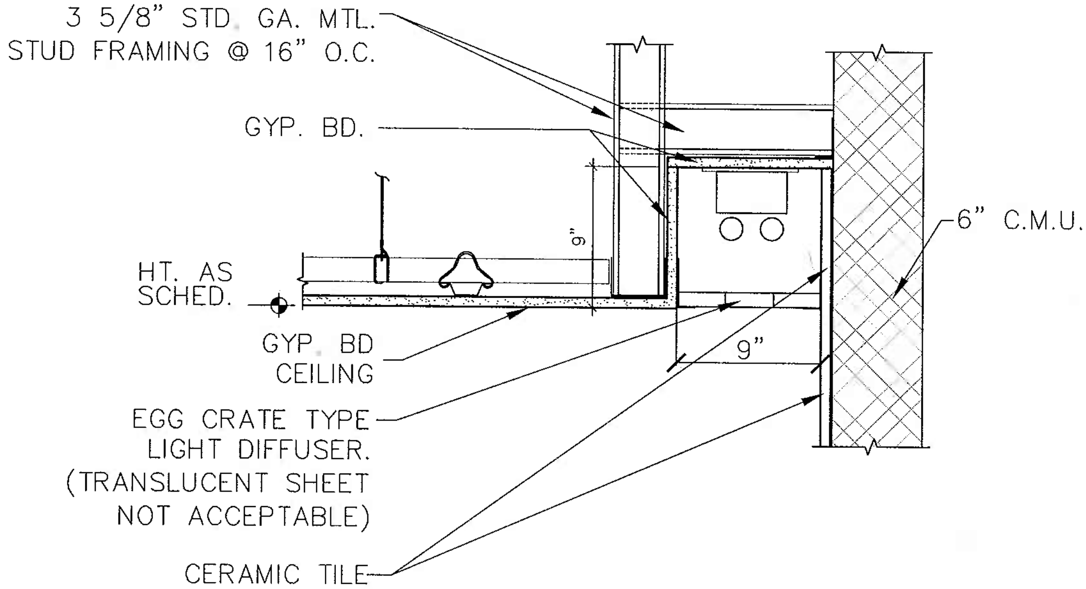
SHEET TITLE: TOILET STALL DETAILS

DATE: MAY 2004



SHEET TITLE: SAMPLE LAYOUT - WOMEN'S ROOM

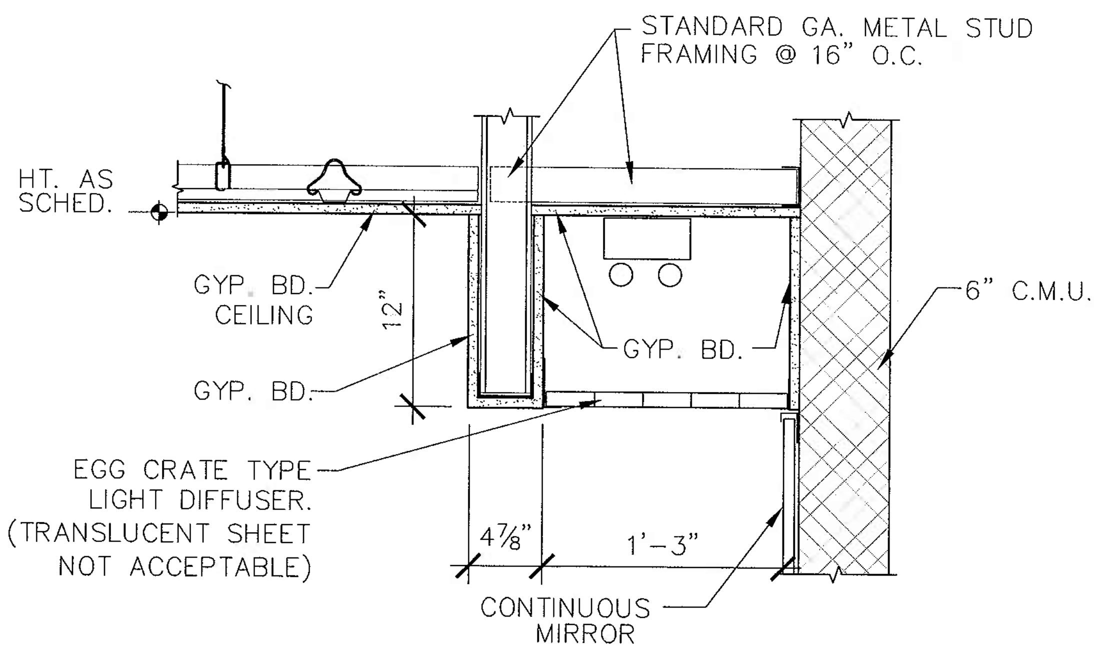
DATE: MAY 2004



2
A-4

LIGHT COVE DETAIL ABOVE WATER CLOSET

NOT TO SCALE

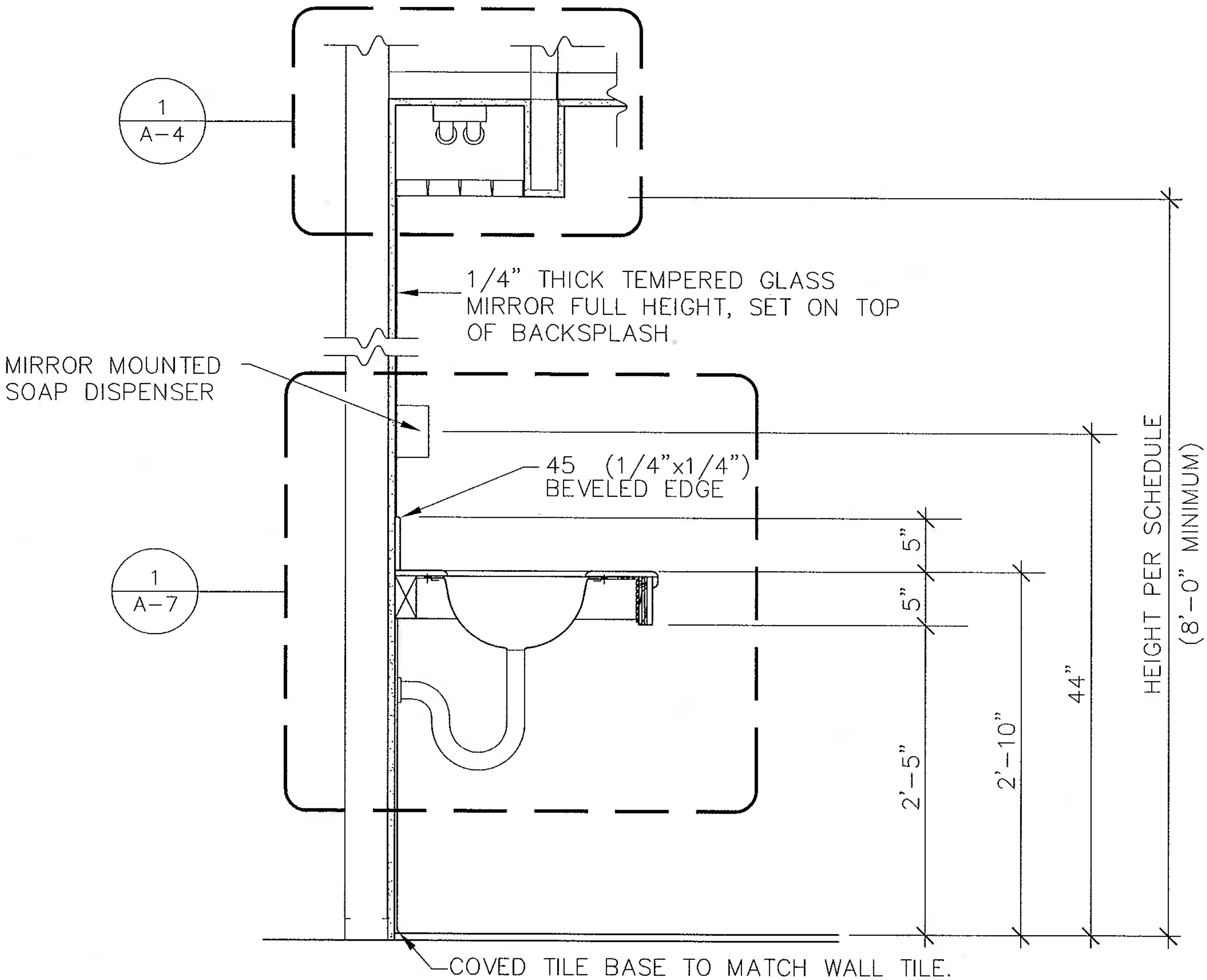


1
A-4

LIGHTING COVE ABOVE LAVATORIES & URINALS

NOT TO SCALE

SHEET TITLE: LIGHT COVE DETAILS	DATE: MAY 2004

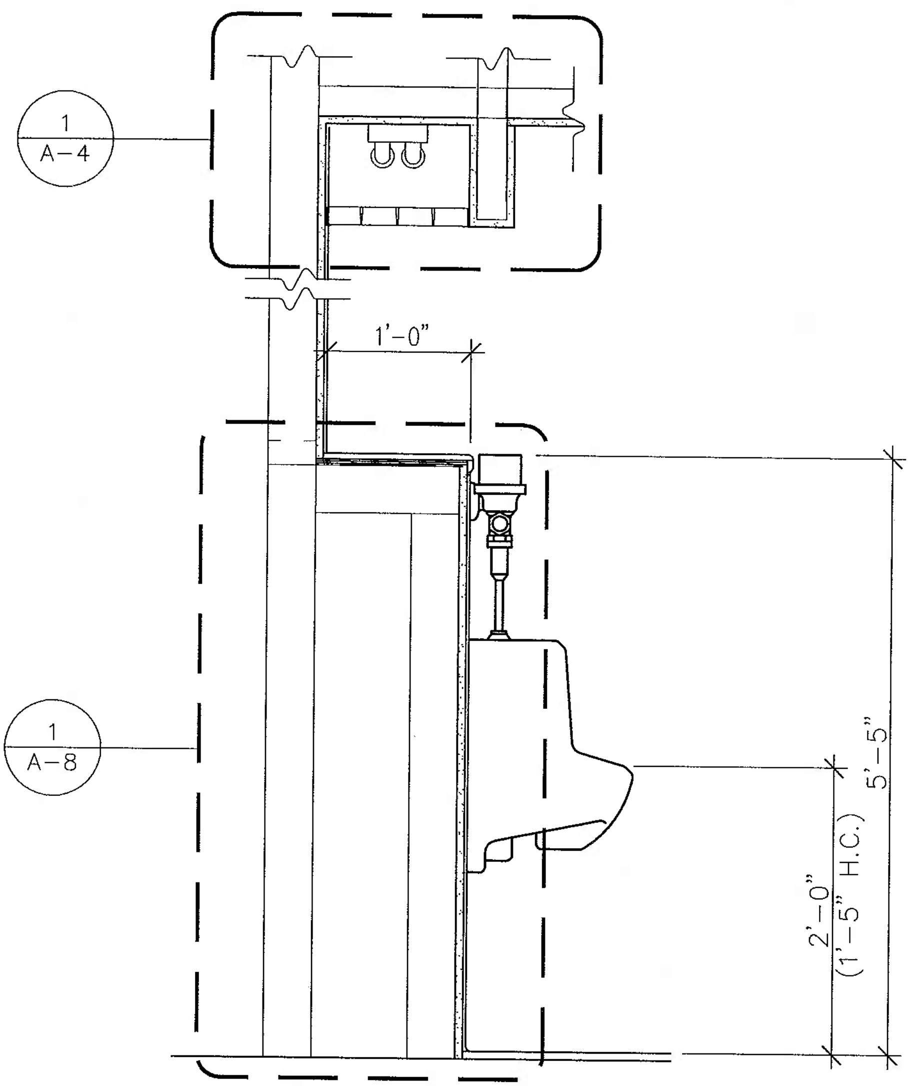


1
A-5

SECTION THROUGH LAVATORIES

NOT TO SCALE

SHEET TITLE: SECTION THROUGH LAVATORIES	DATE: MAY 2004



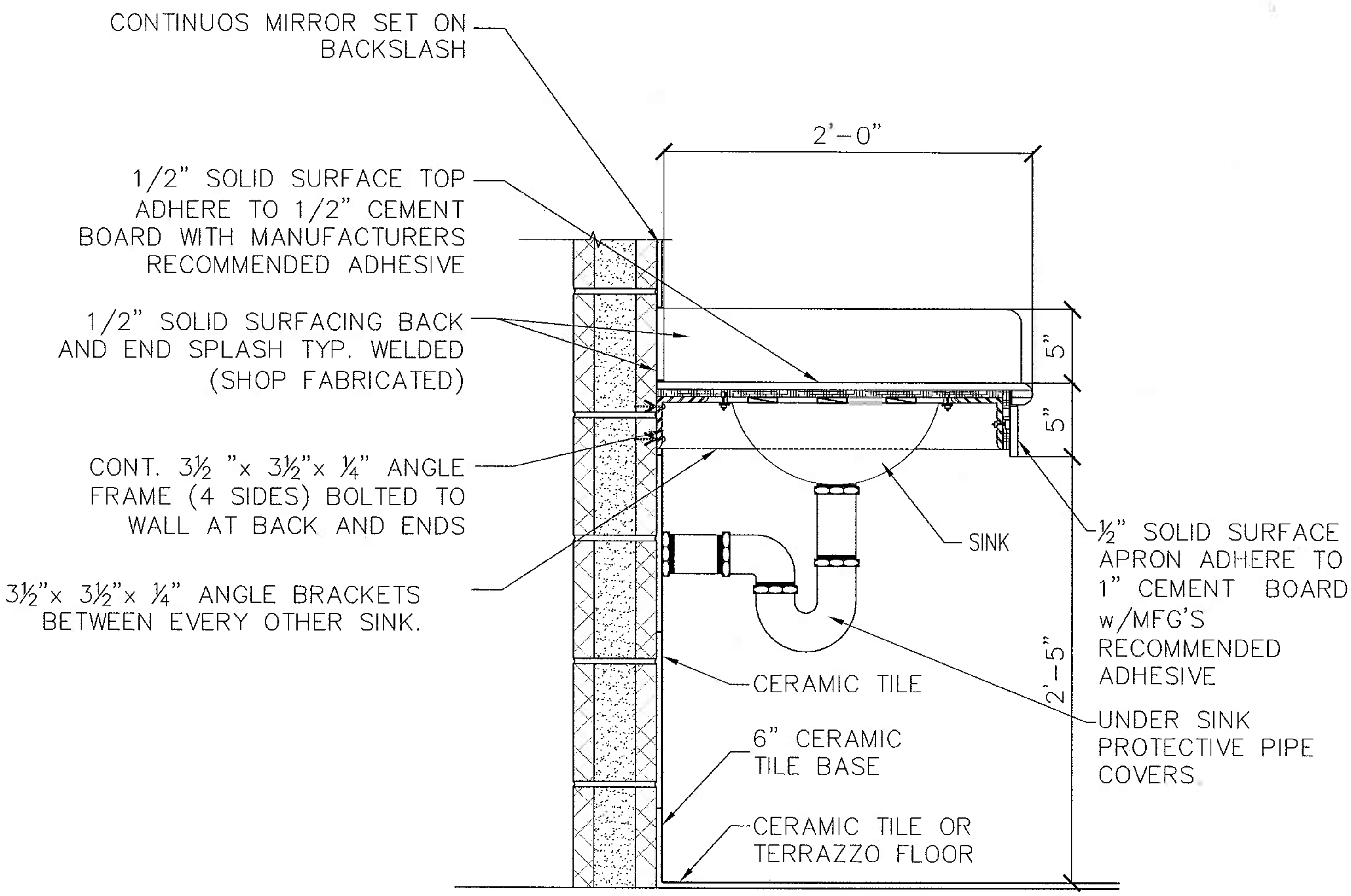
1
A-6

SECTION THROUGH URINAL SHELF

NOT TO SCALE

SHEET TITLE: SECTION THROUGH URINAL SHELF

DATE: MAY 2004



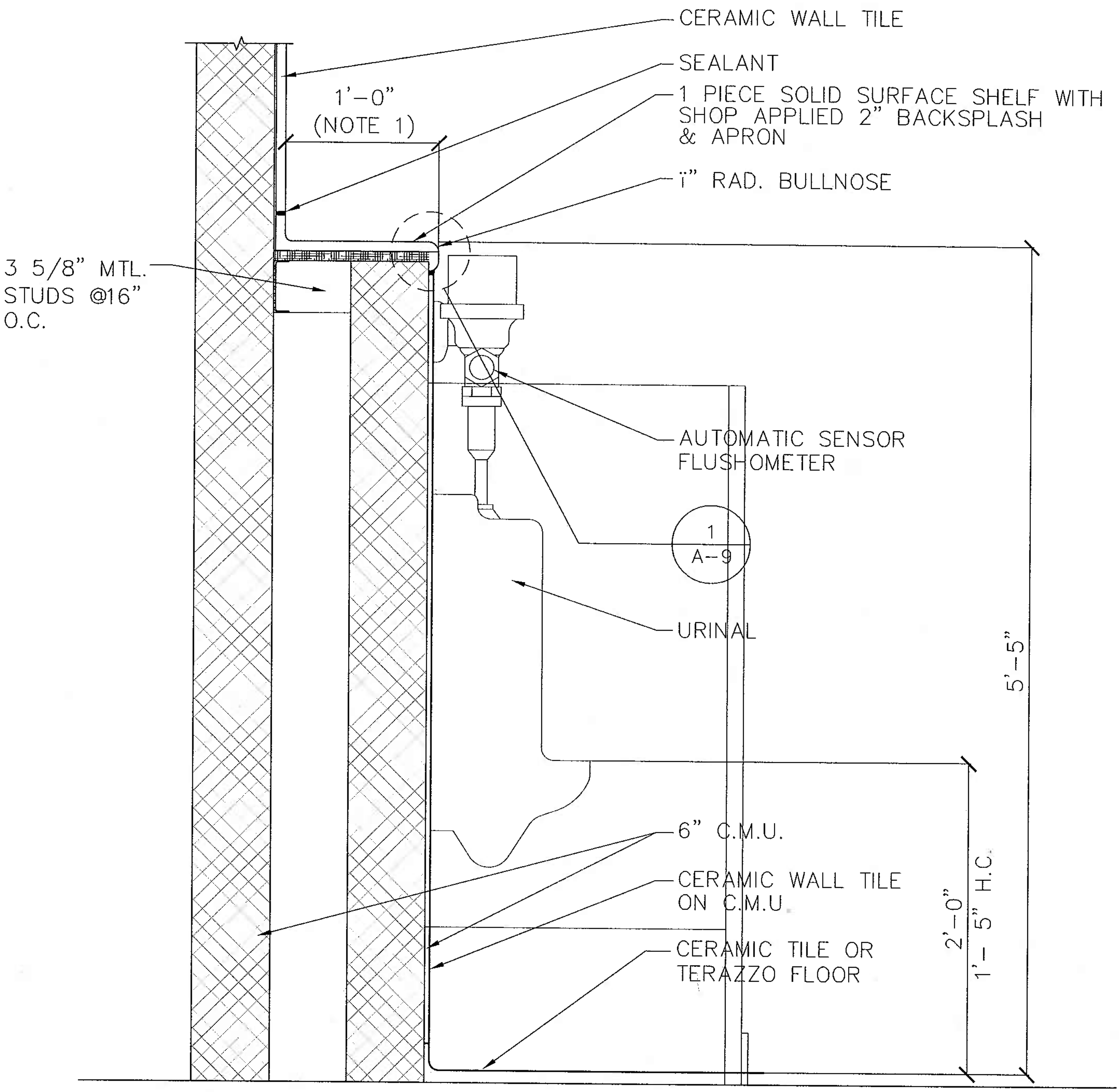
NOTE: FINAL COUNTER STRUCTURE REQUIREMENTS TO BE VERIFIED BASED ON WALL CONSTRUCTION, ANCHORING & LENGTH OF VANITY COUNTER.

1
A-7

LAVATORY COUNTERTOP

NOT TO SCALE

SHEET TITLE: LAVATORY COUNTERTOP	DATE: MAY 2004



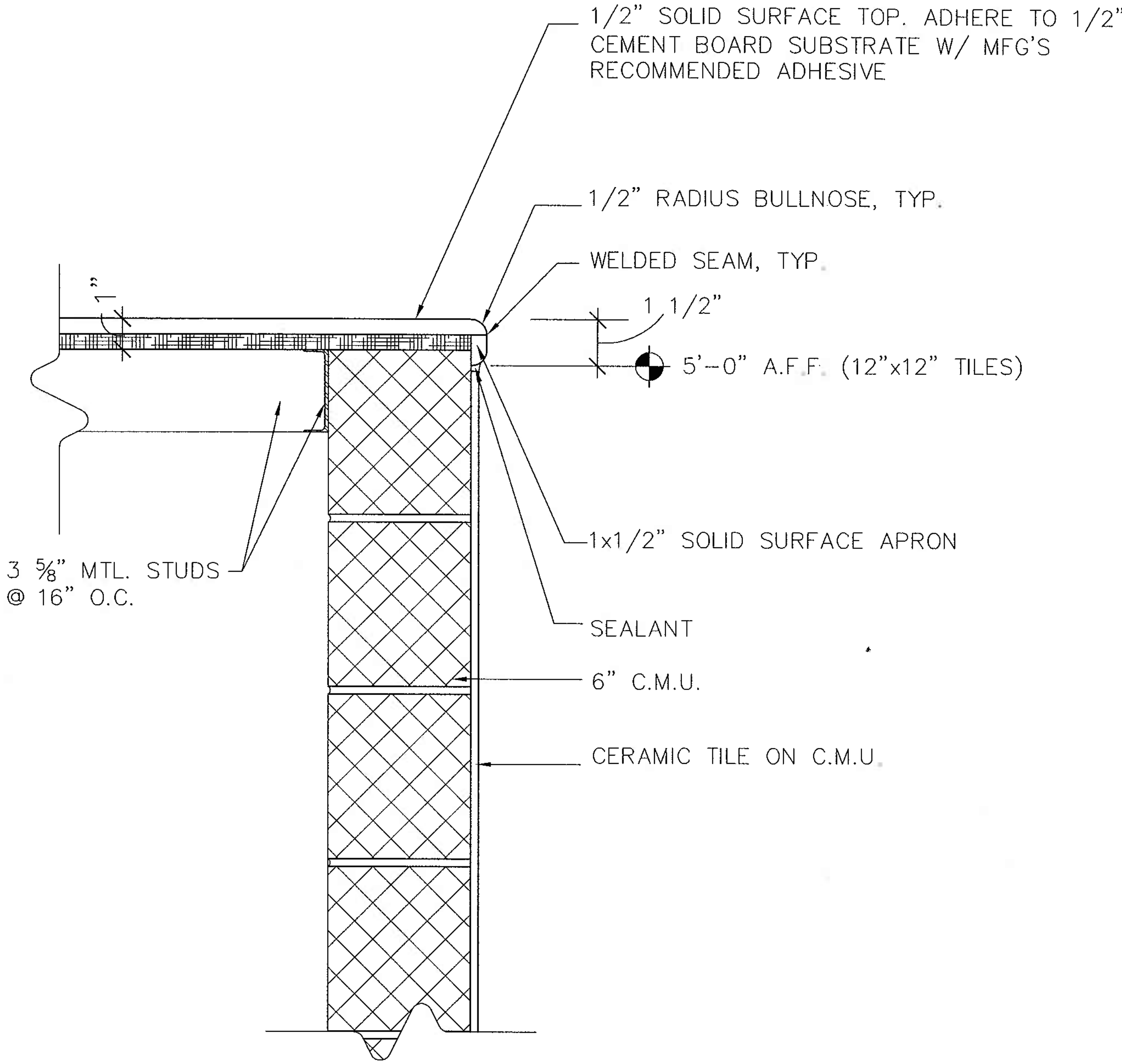
NOTE 1: COORDINATE FINAL DIMENSION REQUIREMENTS WITH URINAL CARRIAGE.

1 / A–8 URINAL WALL & SHELF

NOT TO SCALE

SHEET TITLE: URINAL WALL & SHELF

DATE: MAY 2004



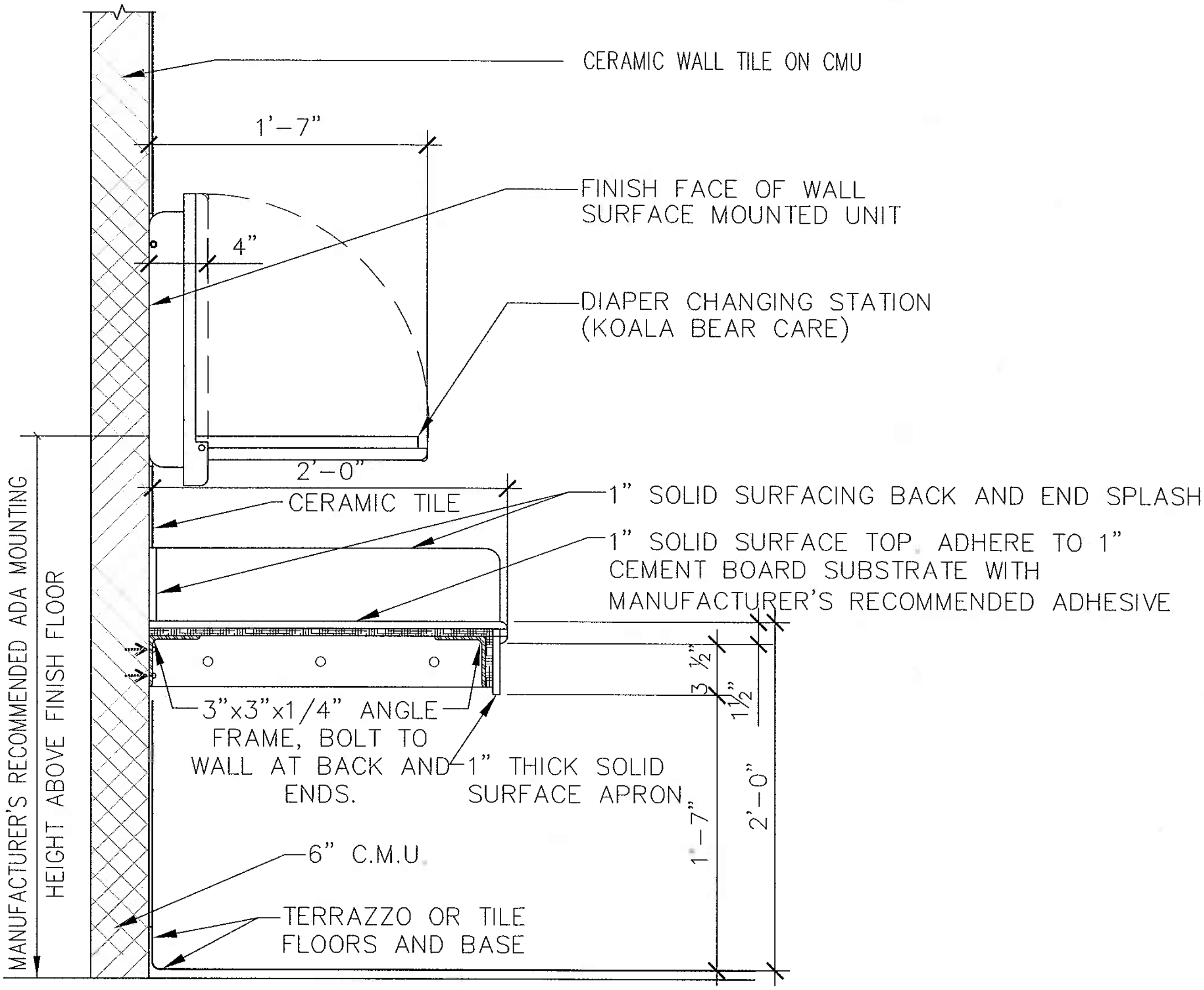
1
A-9

URINAL SHELF BULLNOSE DETAIL

NOT TO SCALE

SHEET TITLE: URINAL SHELF BULLNOSE DETAIL

DATE: MAY 2004

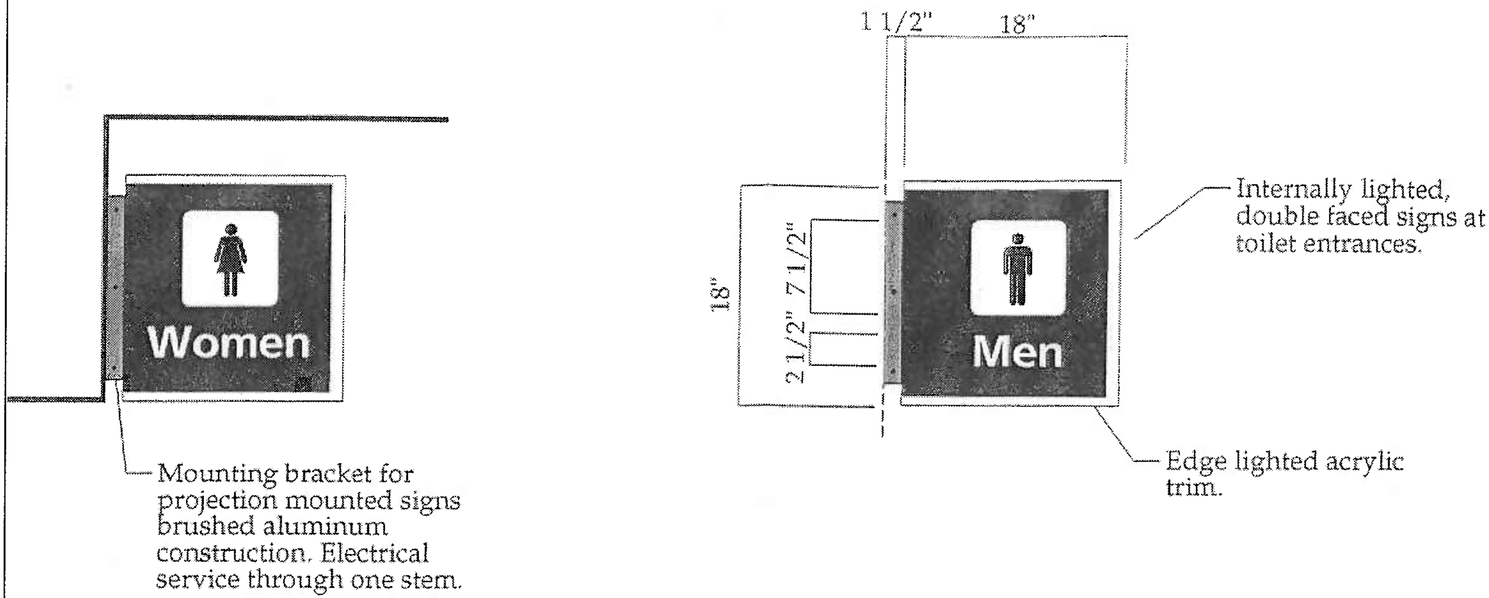


1
A–10

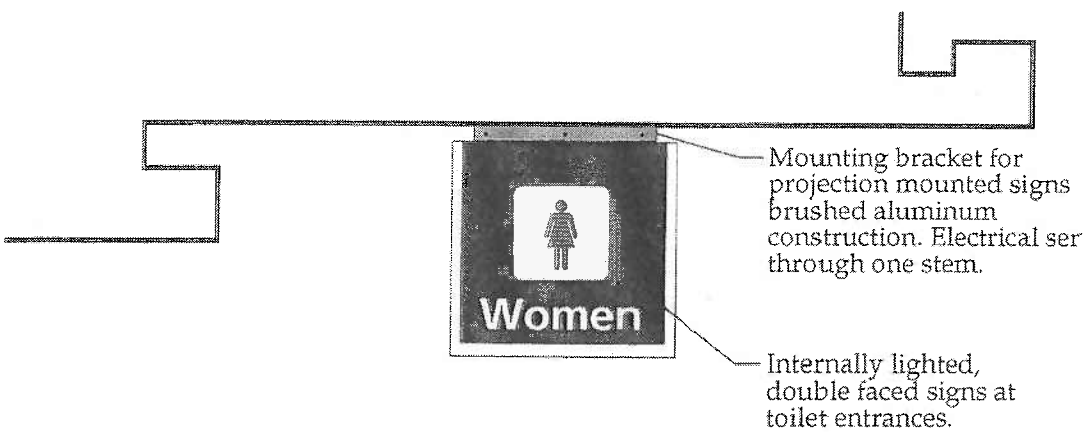
TOILET ROOM SHELF – DIAPER CHANGING

NOT TO SCALE

SHEET TITLE: TOILET ROOM SHELF - DIAPER CHANGING	DATE: MAY 2004



Sign Type 8 - Restroom Identification - Flag Mount



Sign Type 8.1 - Restroom Identification - Ceiling Mount

1
A–11

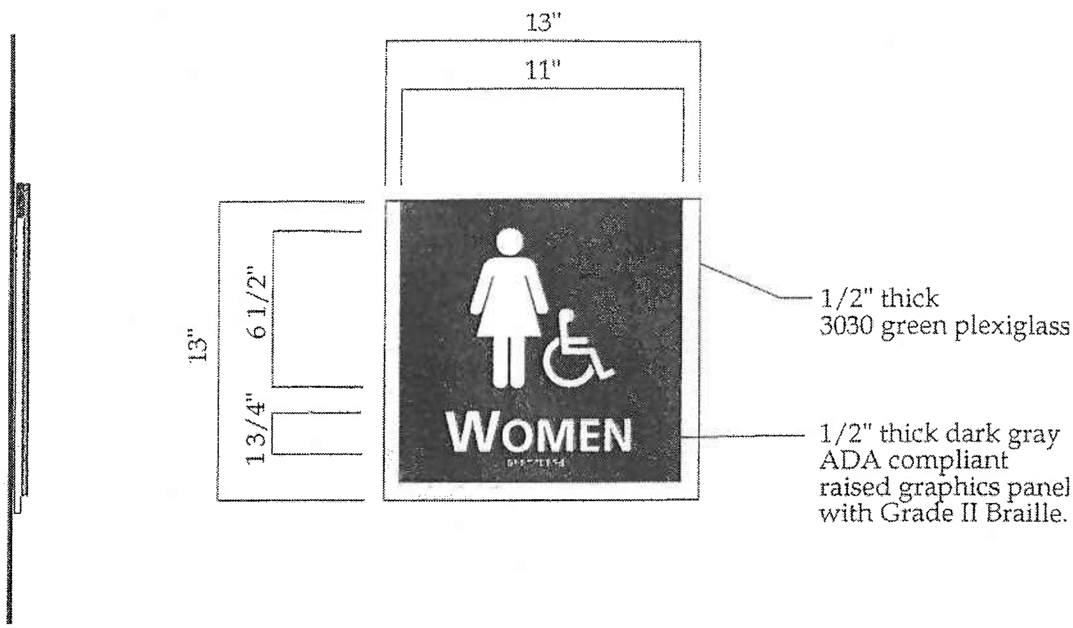
SIGNAGE

NOT TO SCALE

SHEET TITLE: SIGNAGE 1

DATE: MAY 2004

Typical Layouts



Sign Type 13 - Restroom/Stair ID in Terminal

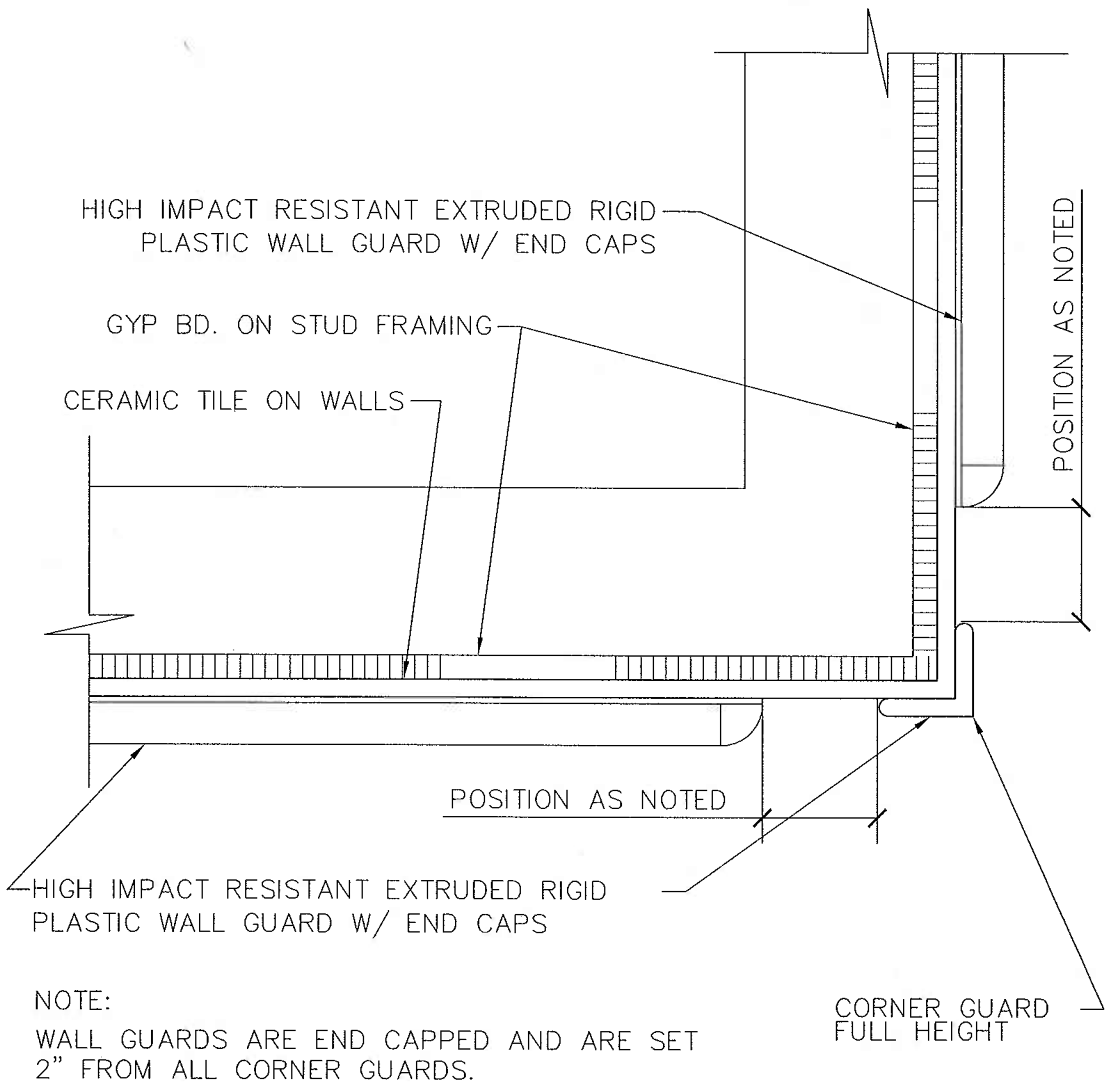
1
A–12

SIGNAGE

NOT TO SCALE

SHEET TITLE: SIGNAGE 2

DATE: MAY 2004

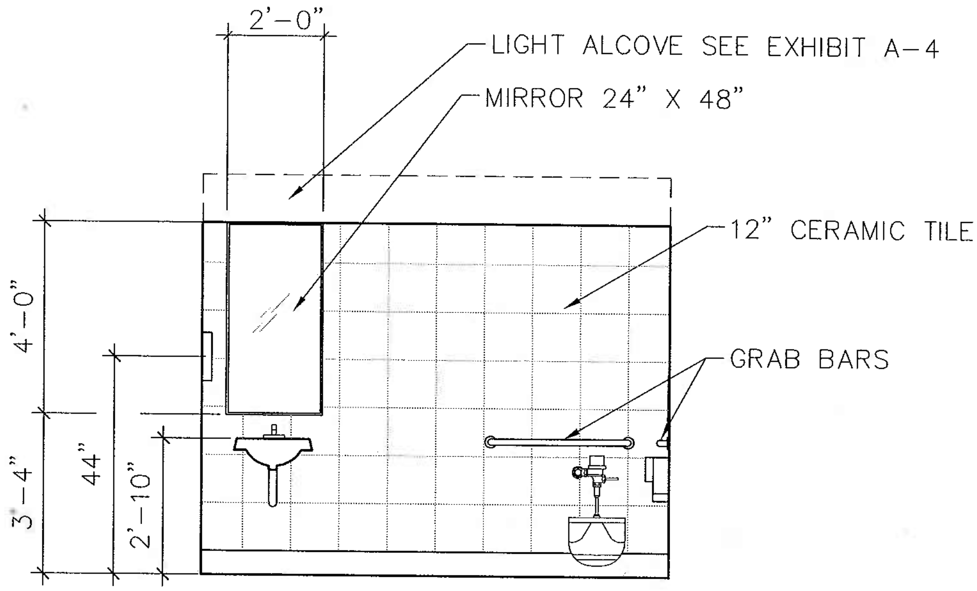


1
A–13

CORNER GUARD / WALL GUARD DETAIL

NOT TO SCALE

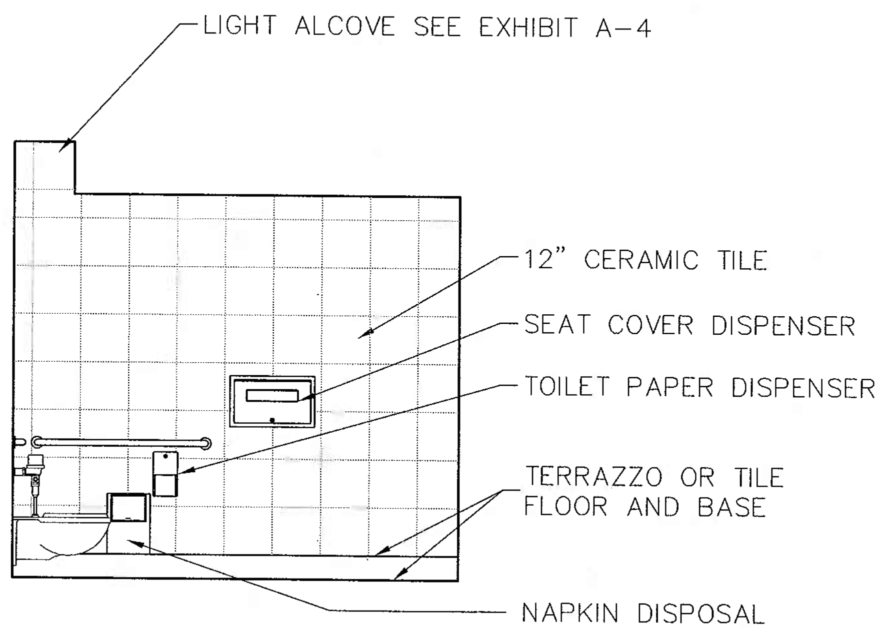
SHEET TITLE: CORNER GUARD / WALL GUARD DETAIL	DATE: MAY 2004



2
A–14

FAMILY ASSIST RESTROOM

NOT TO SCALE



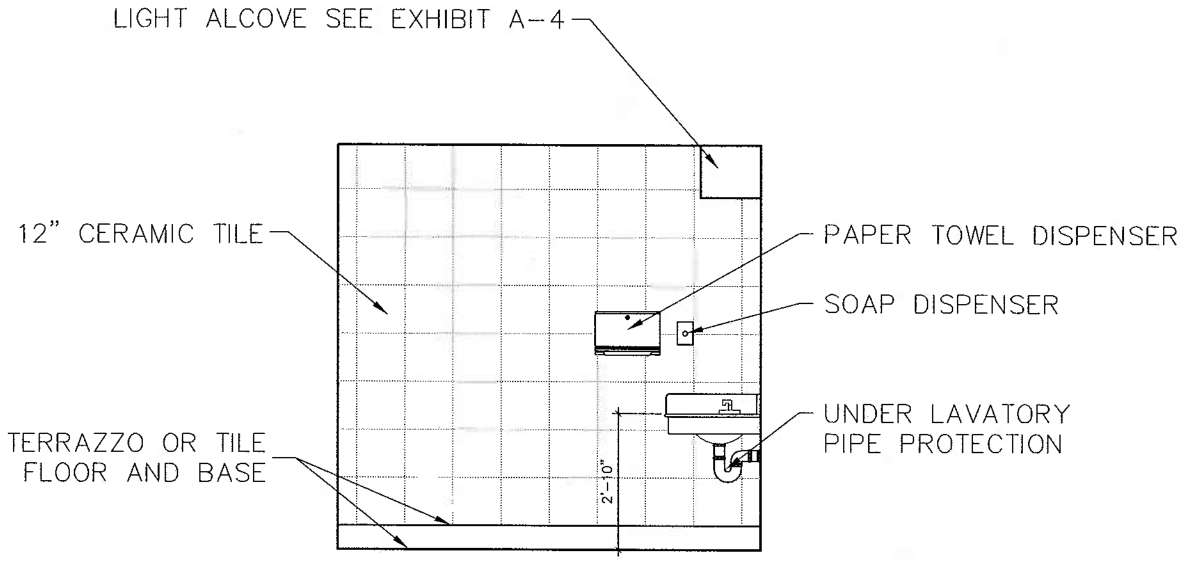
1
A–14

FAMILY ASSIST RESTROOM

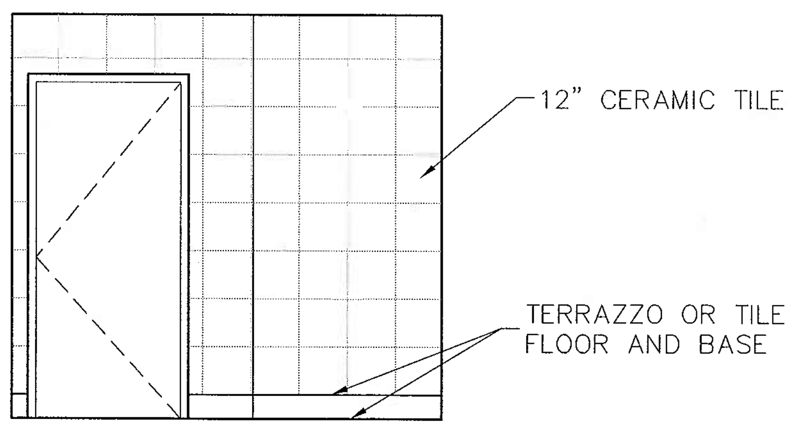
NOT TO SCALE

SHEET TITLE: TOILET ROOM ELEVATIONS 1

DATE: MAY 2004



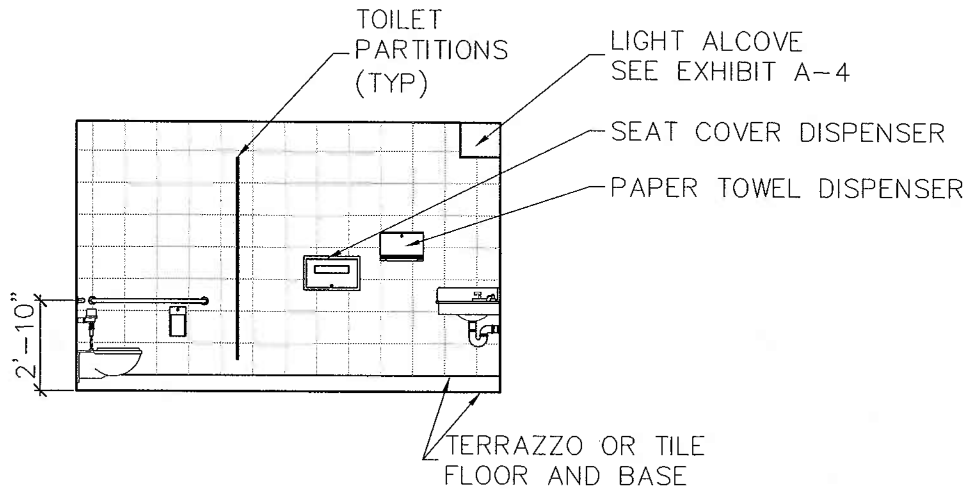
2
A-15
FAMILY ASSIST RESTROOM
NOT TO SCALE



1
A-15
FAMILY ASSIST RESTROOM
NOT TO SCALE

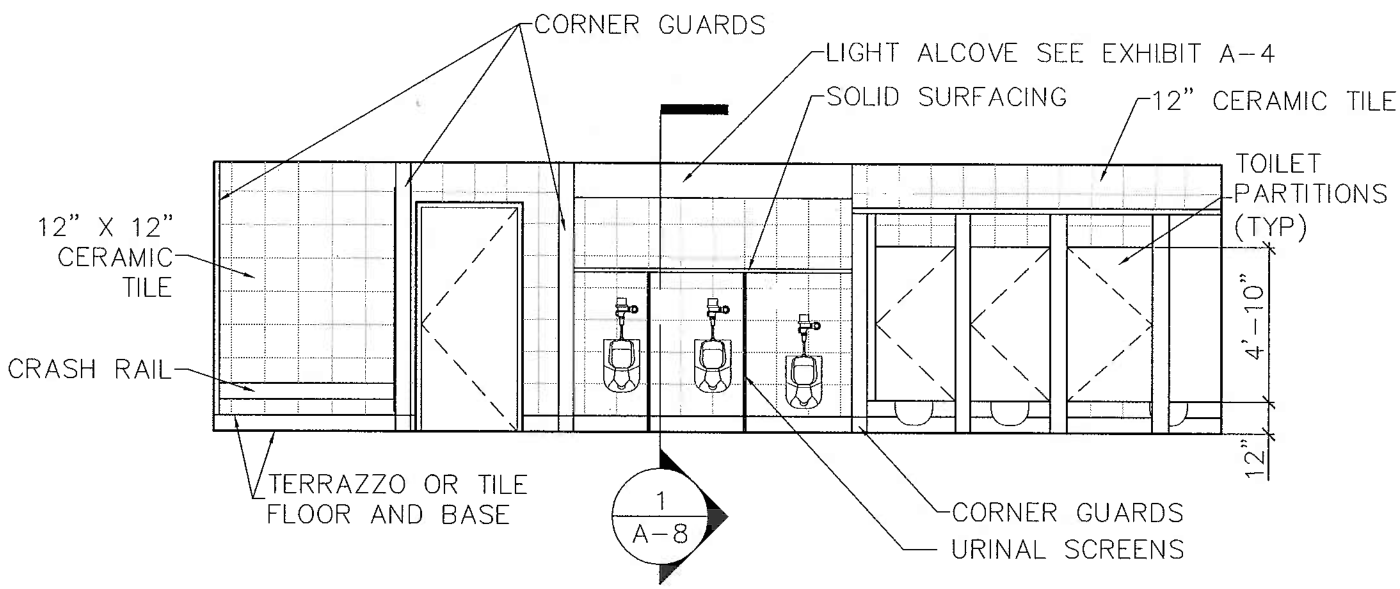
SHEET TITLE: TOILET ROOM ELEVATIONS 2

DATE: MAY 2004



2 A-16 MEN'S RESTROOM

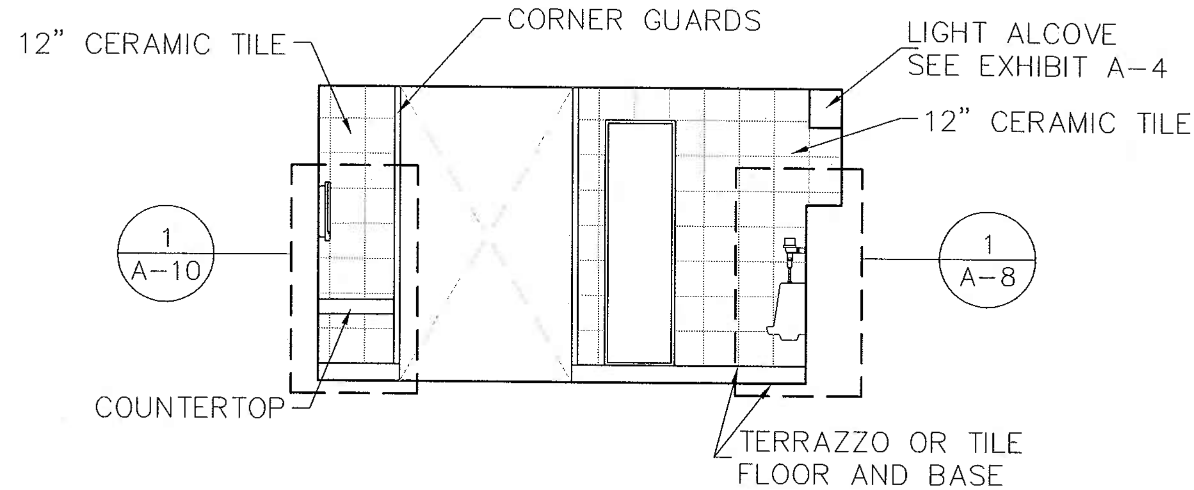
NOT TO SCALE



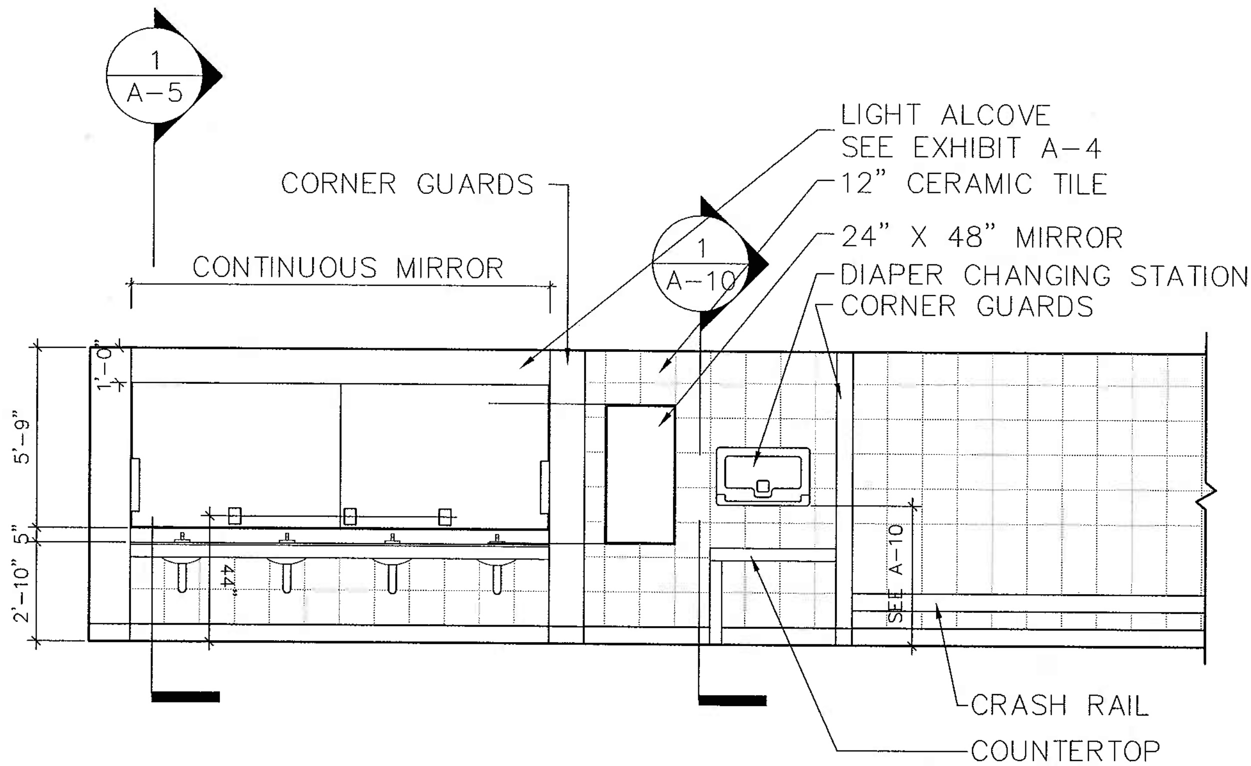
1 A-16 MEN'S REST ROOM

NOT TO SCALE

SHEET TITLE: TOILET ROOM ELEVATIONS 3 | DATE: MAY 2004



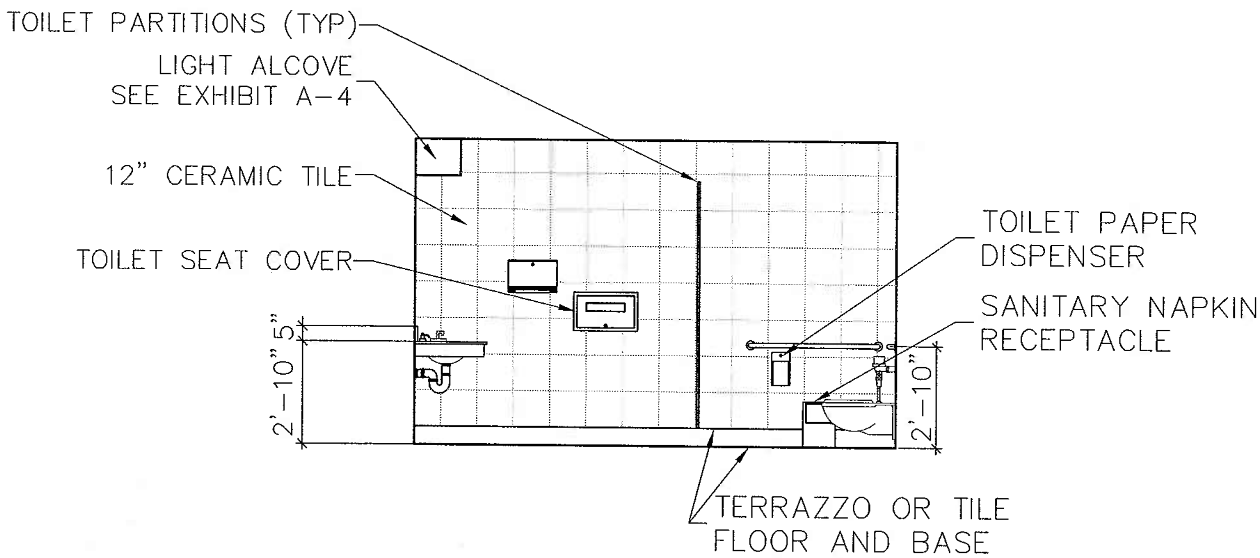
2
A-17
MEN'S RESTROOM
NOT TO SCALE



1
A-17
MEN'S RESTROOM
NOT TO SCALE

SHEET TITLE: TOILET ROOM ELEVATIONS 4

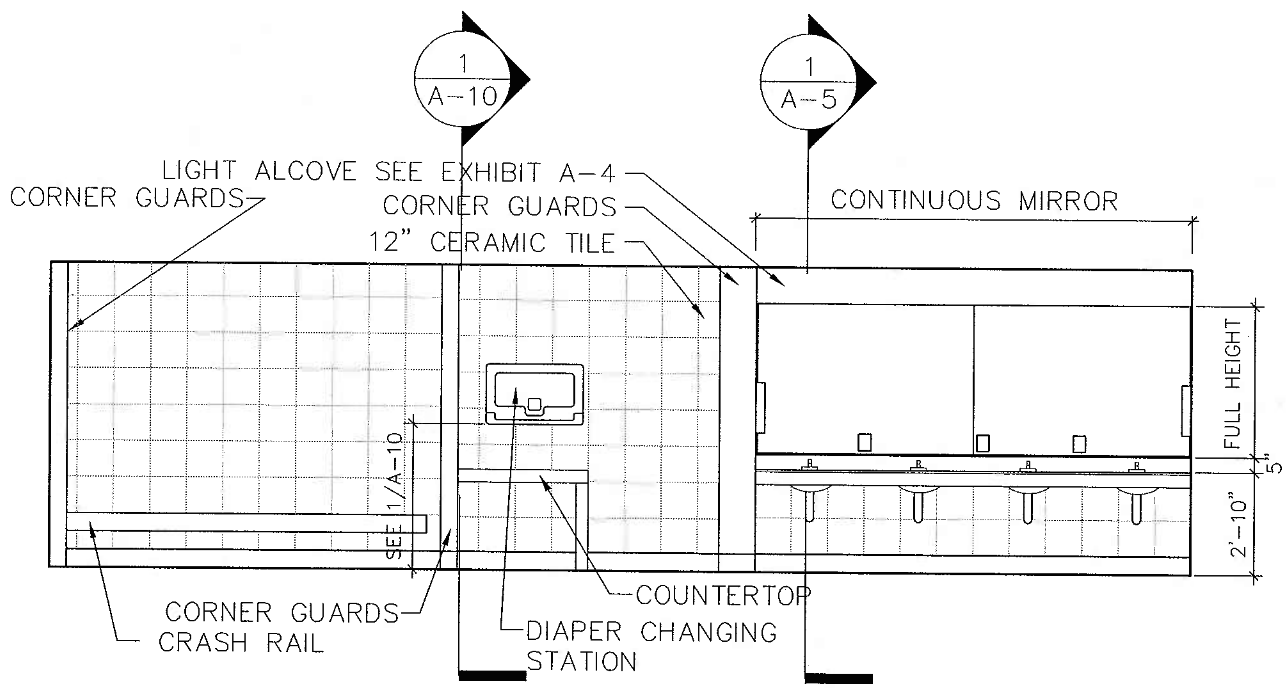
DATE: MAY 2004



2
A-18

WOMEN'S RESTROOM

NOT TO SCALE

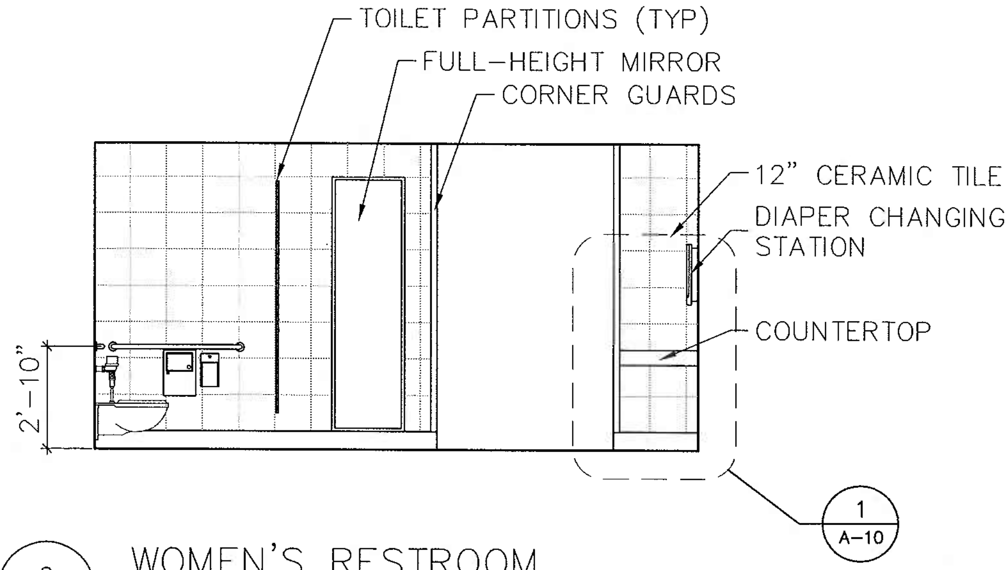


1
A-18

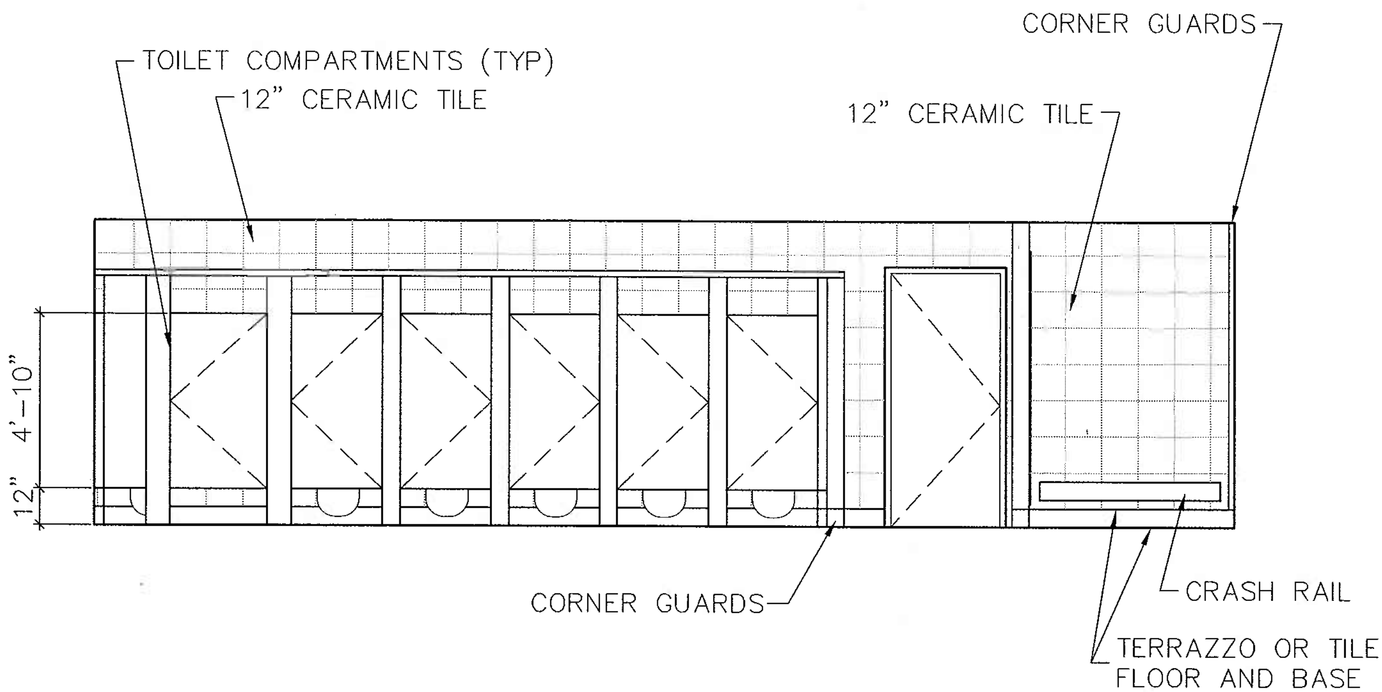
WOMEN'S RESTROOM

NOT TO SCALE

SHEET TITLE: TOILET ROOM ELEVATIONS 5	DATE: MAY 2004



2
A-19
WOMEN'S RESTROOM
NOT TO SCALE



1
A-19
WOMEN'S RESTROOM
NOT TO SCALE

SHEET TITLE: TOILET ROOM ELEVATIONS 6

DATE: MAY 2004

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:

<u>Terminal A/B (Where Exterior Wall Panel or Spandrel Glass is WHITE)</u>

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.

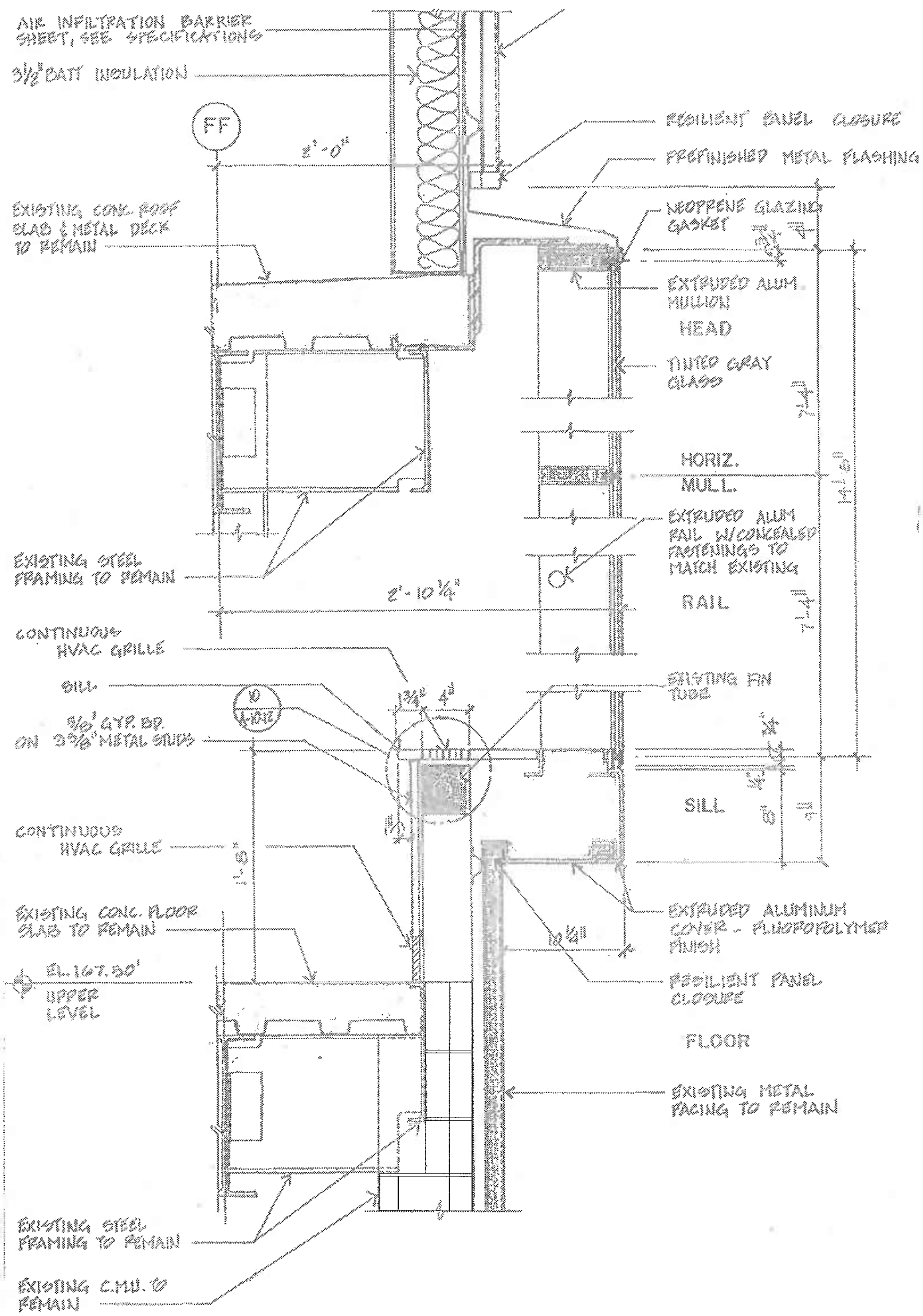
      iv. Manufacturer's standard white smooth finish on interior side of panels.

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 Detain @ 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.

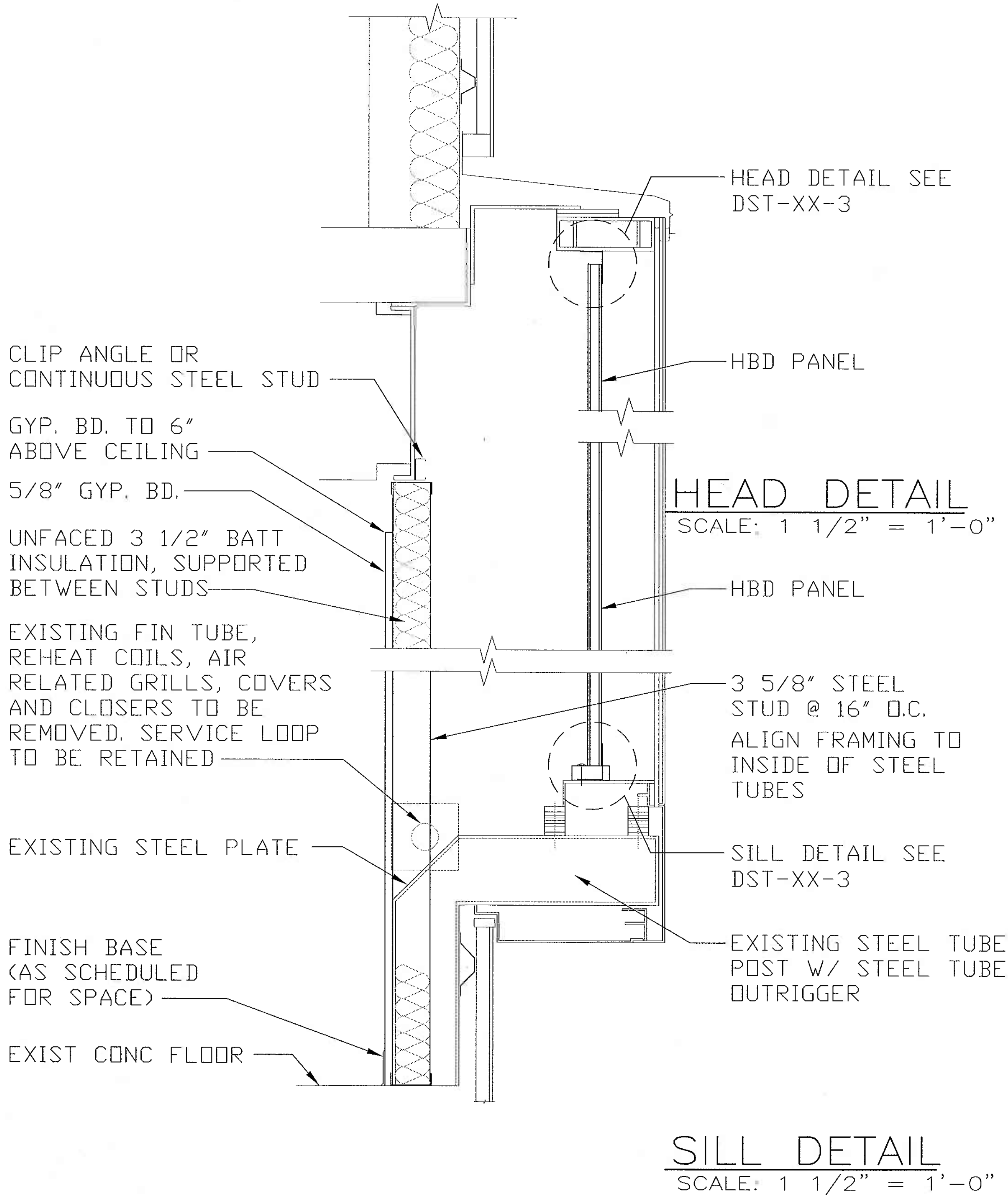


EXISTING WALL SECTION

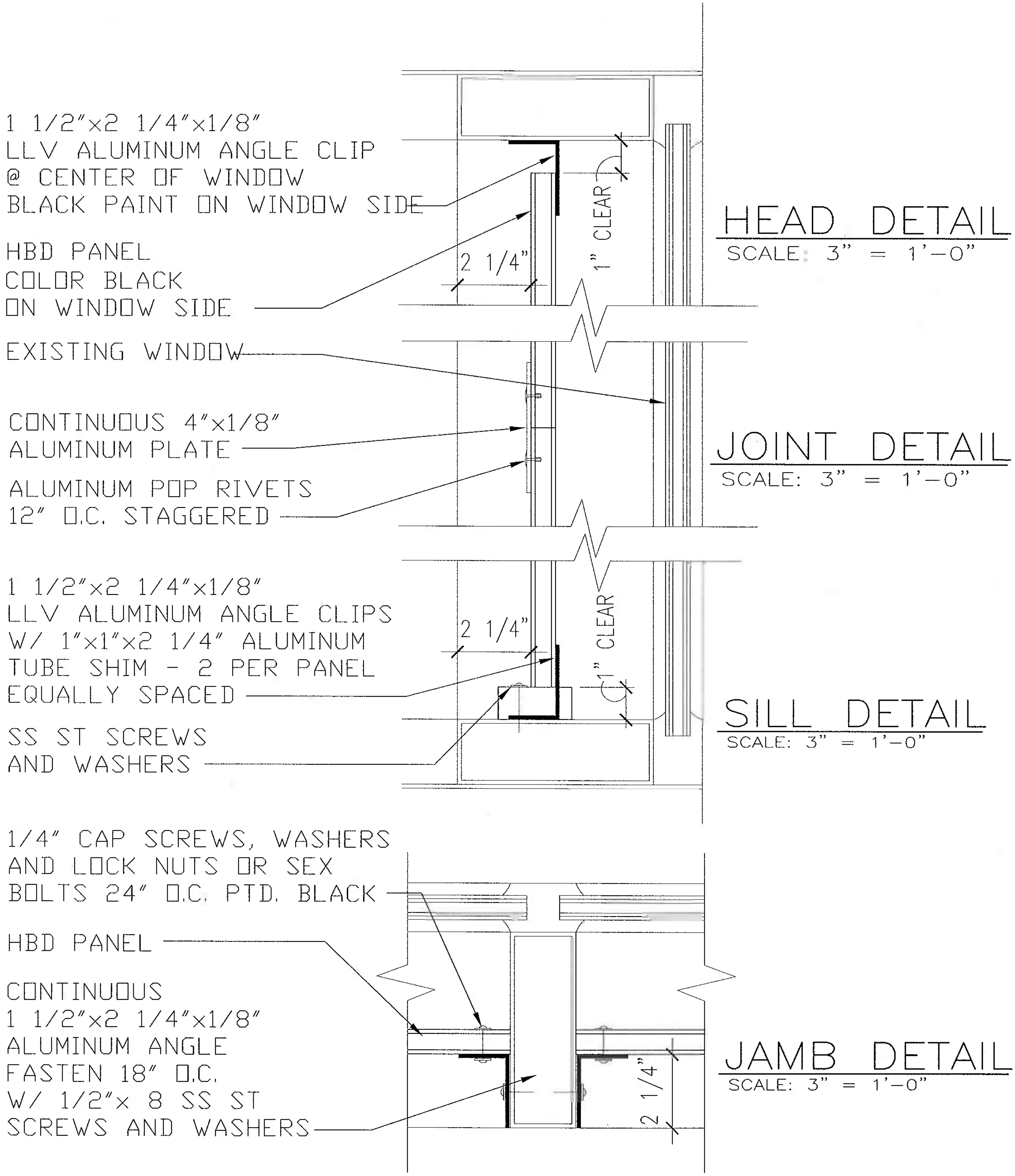
SCALE: N.T.S.

NOTE:
THIS DETAIL IS TAKEN FROM ARCHIVED CONSTRUCTION DOCUMENTS AND IS PROVIDED FOR REFERENCE. ALL INFORMATION MUST BE VERIFIED IN THE FIELD.

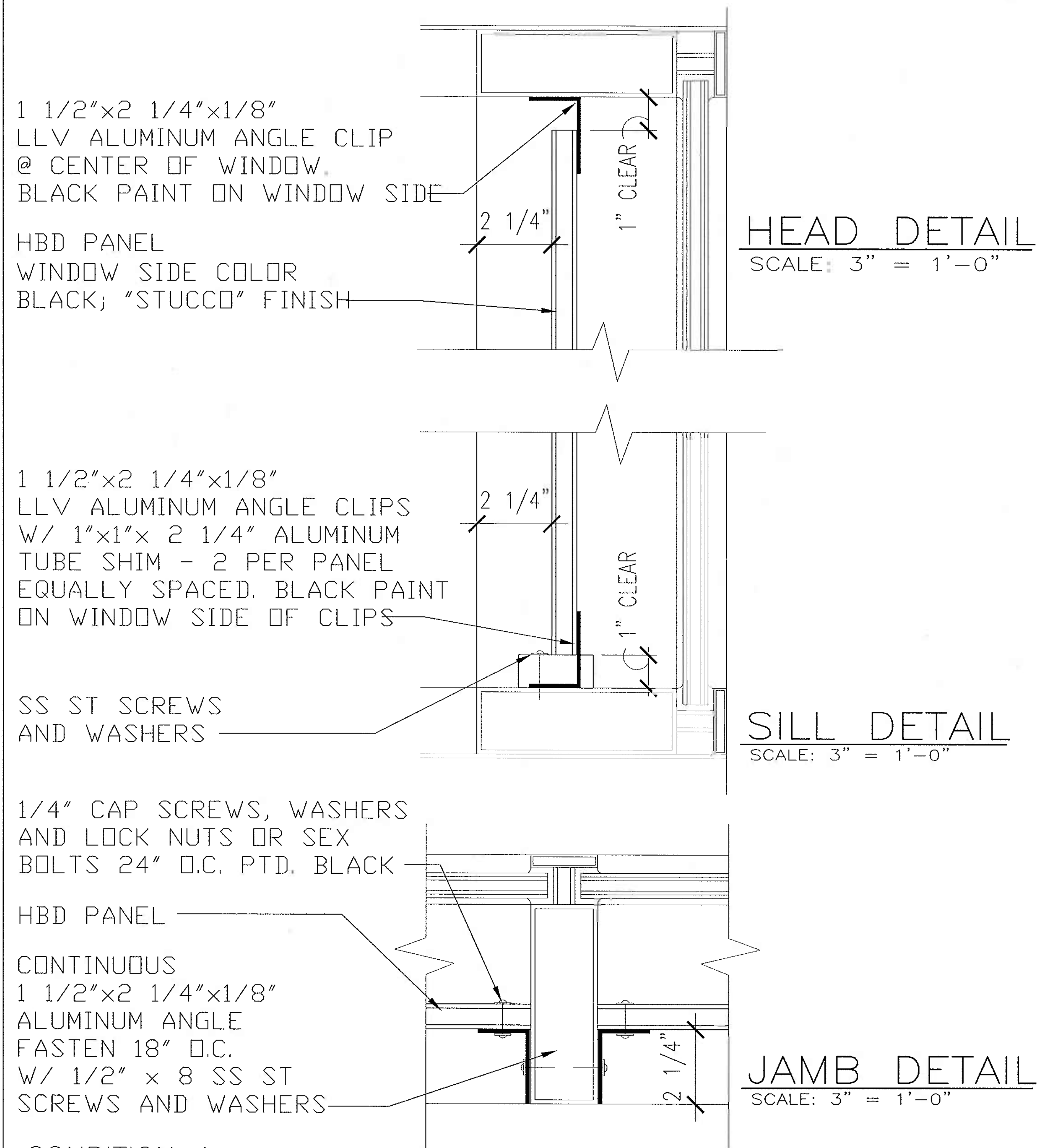
SHEET TITLE: EXISTING WALL SECTION @ DOMESTIC TERMINAL



SHEET TITLE: WALL SECTION - STANDARD DETAIL @ DOMESTIC TERMINAL



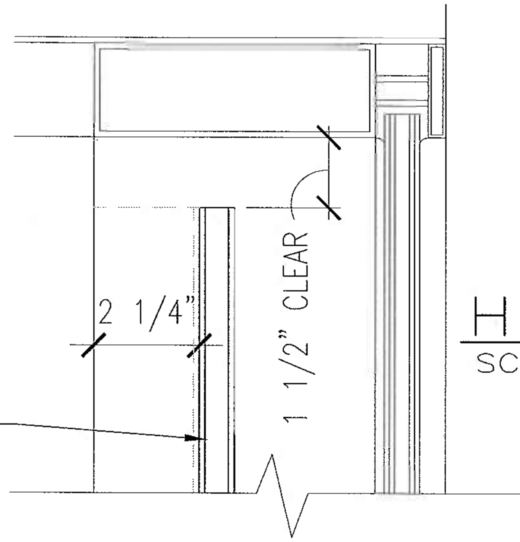
SHEET TITLE: DETAILS @ HARDBOARD PANEL



CONDITION 1 –
BEHIND GLAZED PANELS WHERE MAJOR DIMENSION IS HORIZONTAL

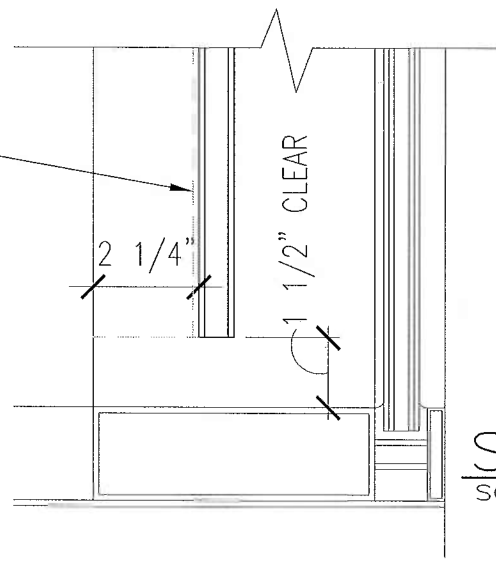
SHEET TITLE: DETAILS @ HORIZONTAL HARDBOARD PANEL, CONCOURSE A & B, AND A/B

HBD PANEL
WINDOW SIDE COLOR
BLACK; "STUCCO" FINISH



HEAD DETAIL
SCALE: 3" = 1'-0"

LINE OF
CONTINUOUS ALUM ANGLE

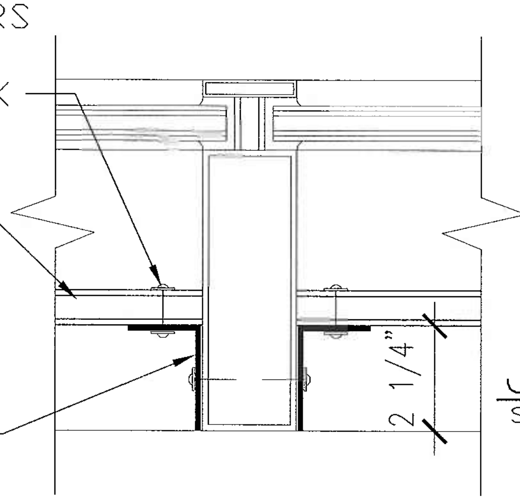


SILL DETAIL
SCALE: 3" = 1'-0"

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

SHEET TITLE: DETAILS @ VERTICAL HARDBOARD PANEL, CONCOURSE B

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.

11.12 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

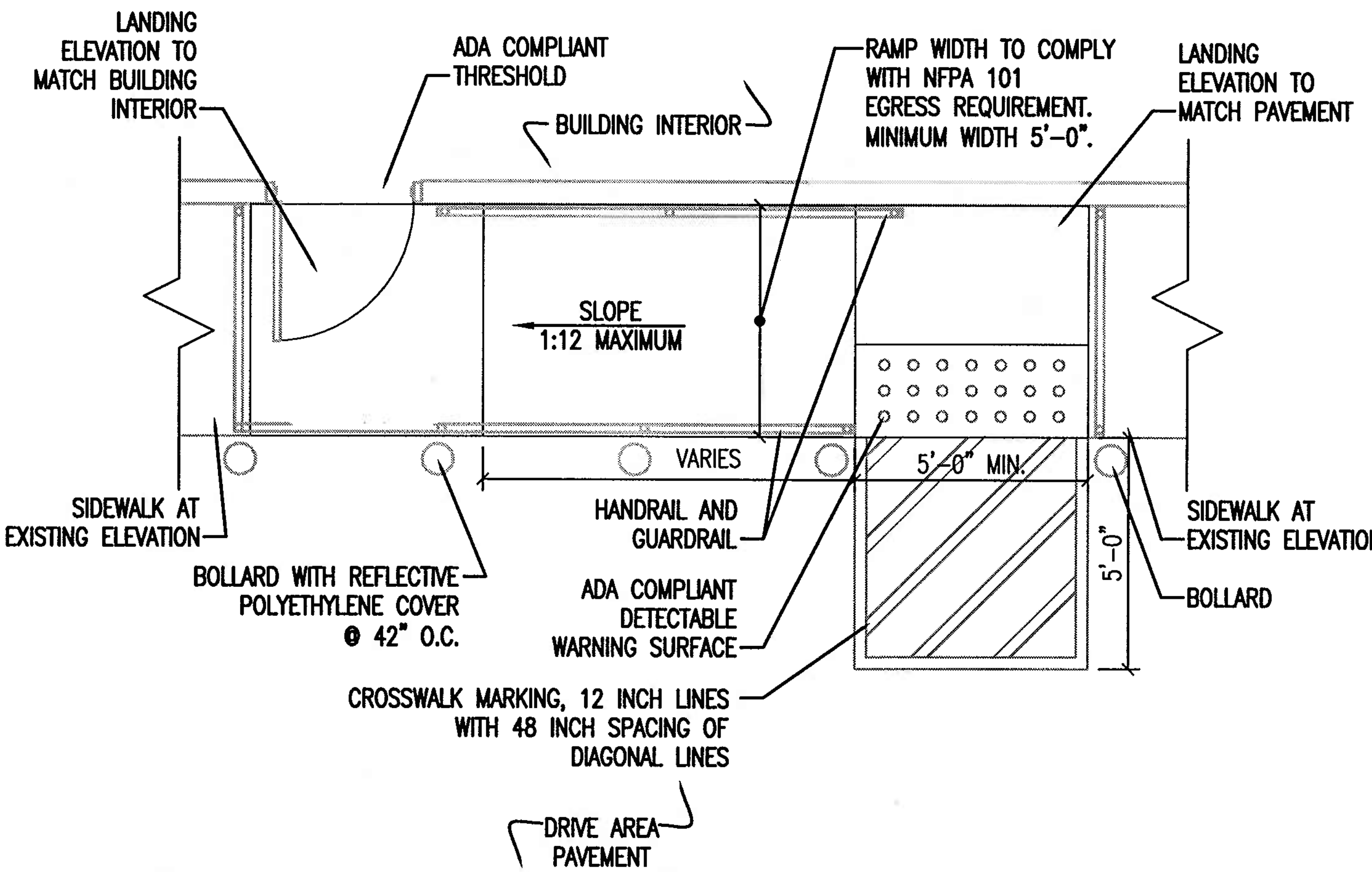
B. Apron vehicle traffic and parking

C. Aircraft traffic and parking

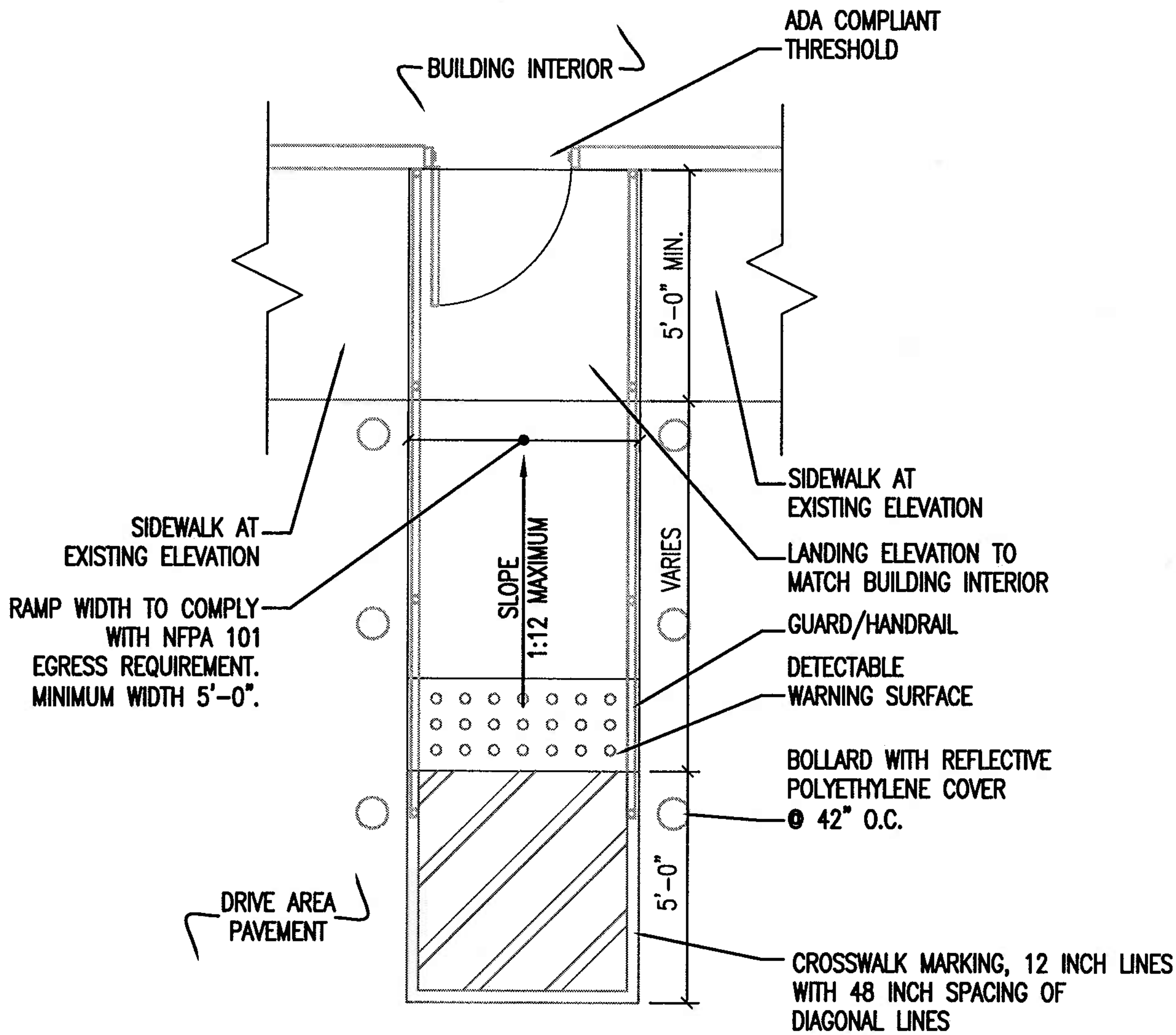
D. Ground Service Equipment (GSE) locations

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.



SHEET TITLE: EXTERIOR GATE ACCESS RAMP 1	DATE: JULY 2009



SHEET TITLE: EXTERIOR GATE ACCESS RAMP 2	DATE: JULY 2009

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. 1-½ 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 1of 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.

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 exists for the design of terminal and building facilities to mitigate a potential vehicle bomb attack at the terminal curbside. This criteria can be obtained by contacting the MAA Manager of Office of Design.

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:

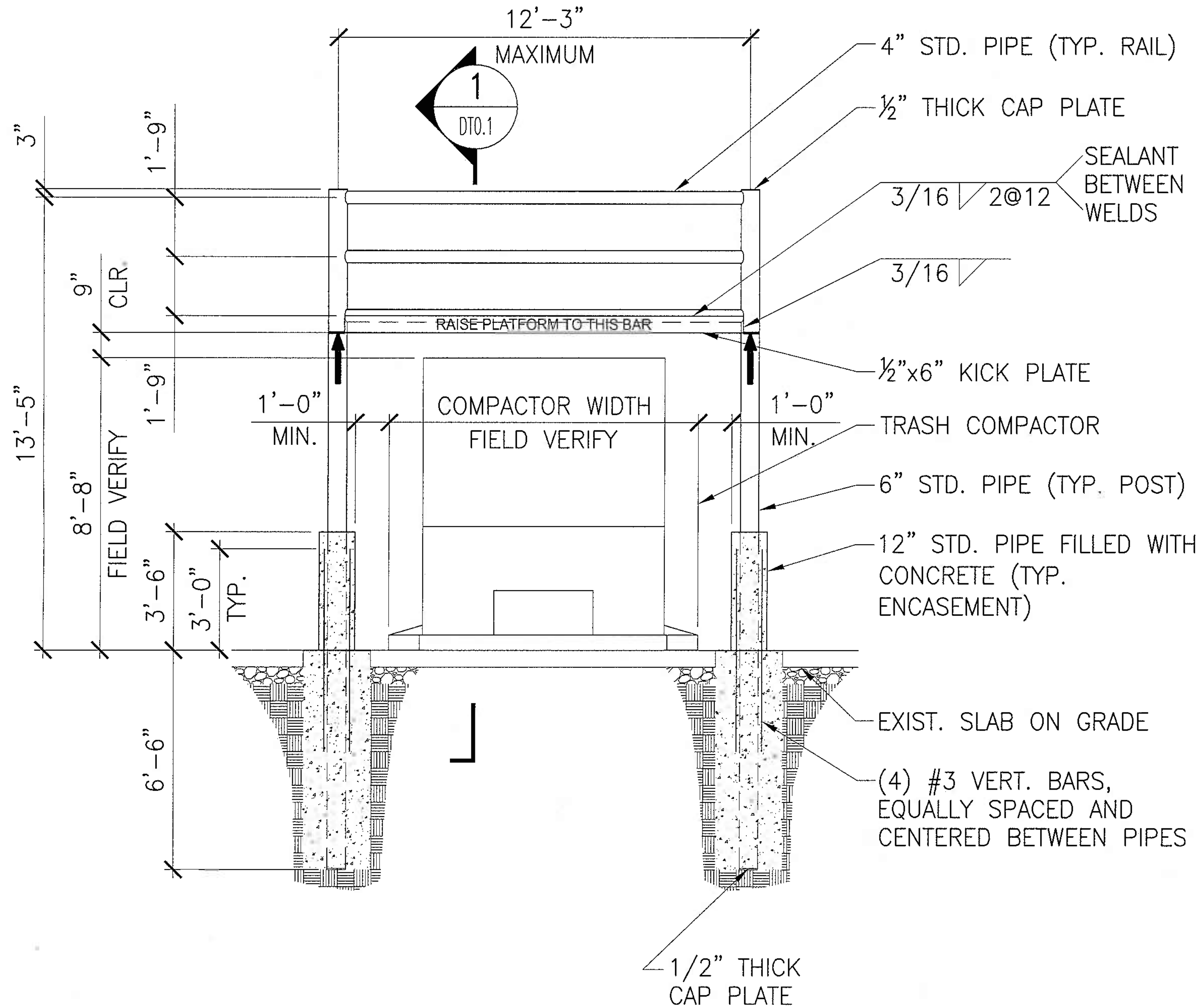
1910.23(e)(1)
A standard railing shall consist of top rail, intermediate rail, and posts, and shall have a vertical height of 42 inches nominal from upper surface to top rail. The top rail shall be smooth-surfaced throughout the length of the railing. The intermediate rail shall be approximately 21 inches 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.

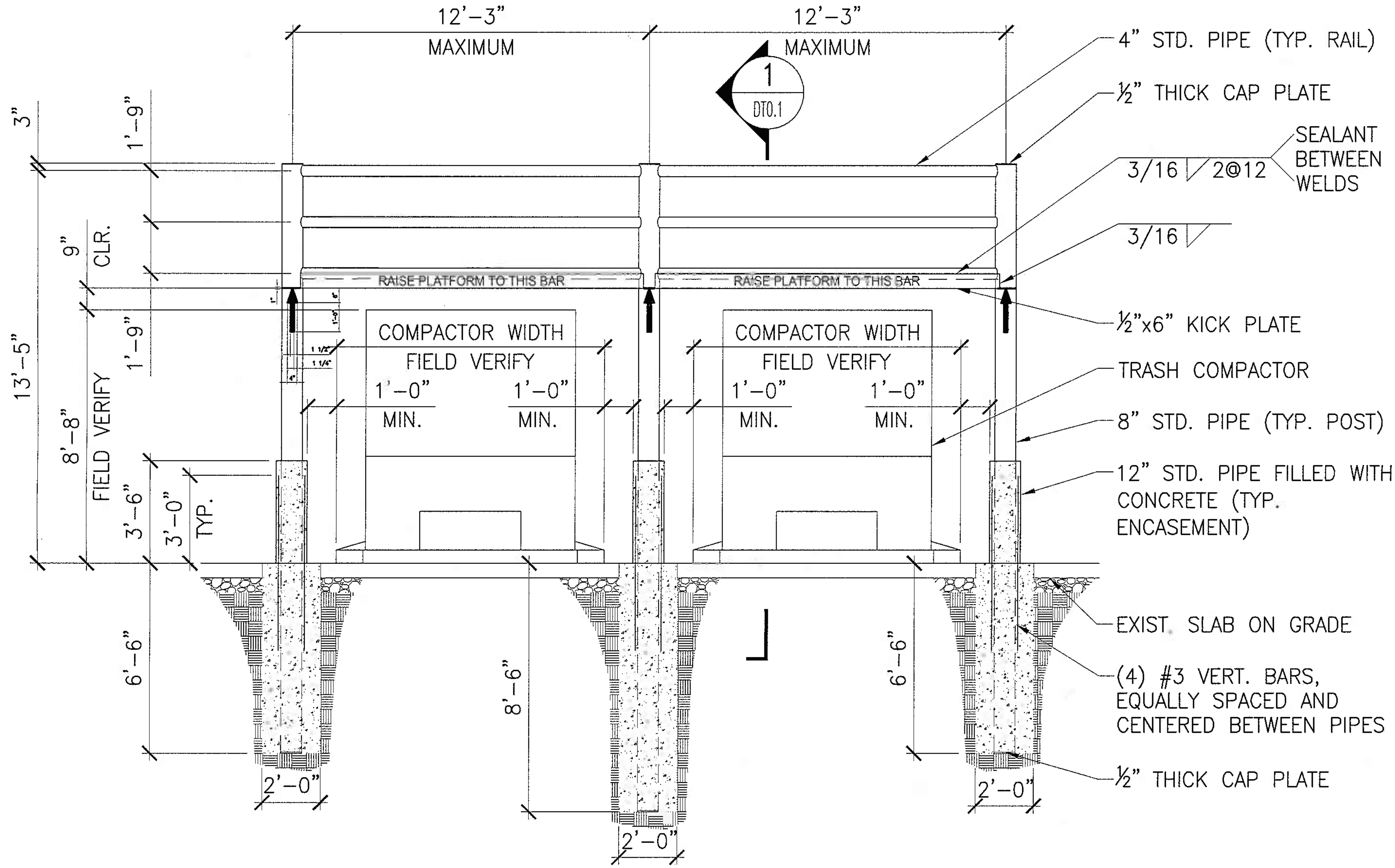
Because of the various dimensions of the trash compactors at the airport, dimensions for the safety posts will vary. Dimensions of the trash compactor requiring protection should be field verified before the design is to be submitted for construction. Any changes to these details should be submitted to the MAA Office of Design so that the changes can be incorporated into a revised notes standard.



NOTE:
CENTER PLATFORM ON COMPACTOR.

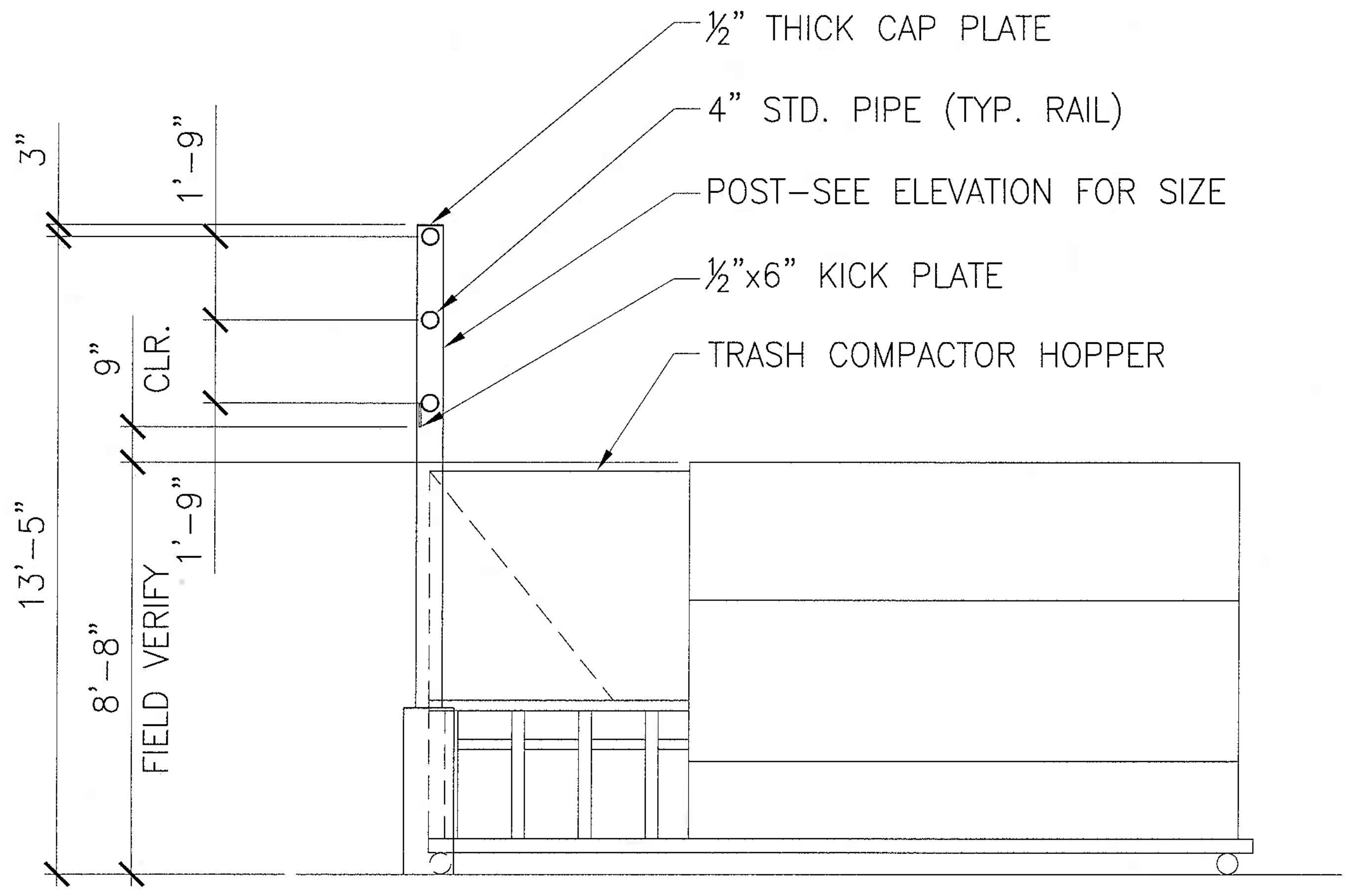
SHEET TITLE: TYPICAL SINGLE TRASH COMPACTOR

DATE: JULY 2009



NOTE:
CENTER PLATFORM ON COMPACTOR.

SHEET TITLE: TYPICAL DOUBLE TRASH COMPACTOR	DATE: JULY 2009



SECTION 1

SCALE: 1/4"=1'–0"

NOTE:
CENTERLINE OF RAILING POSTS SHALL BE ALIGNED WITH EDGE OF TRASH COMPACTOR HOPPER.

SHEET TITLE: TYPICAL TRASH COMPACTOR SECTION	DATE: JULY 2009

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.

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 CO_2 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 CO_2.

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/AirMangament Permits/Air_Permit/index.asp
Forms:	State: Notice of Installation of a Boiler or Pressure Vessel or 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 under ground) 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 0.5 PSIG or less.

4. Natural Gas Piping shall be constructed with welded joints for gas pressure higher than 0.5 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 b 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.

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 SUPRESSION 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. ~~General design guidelines are provided below but refer to Appendix D for the Standard Specification U-15/02505—FIRE HYDRANT~~.

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 Attachment).

   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 ~~4 ½" diameter steamer or pumper connection (with Baltimore City threads)~~ 5" diameter Storz pumper connection.

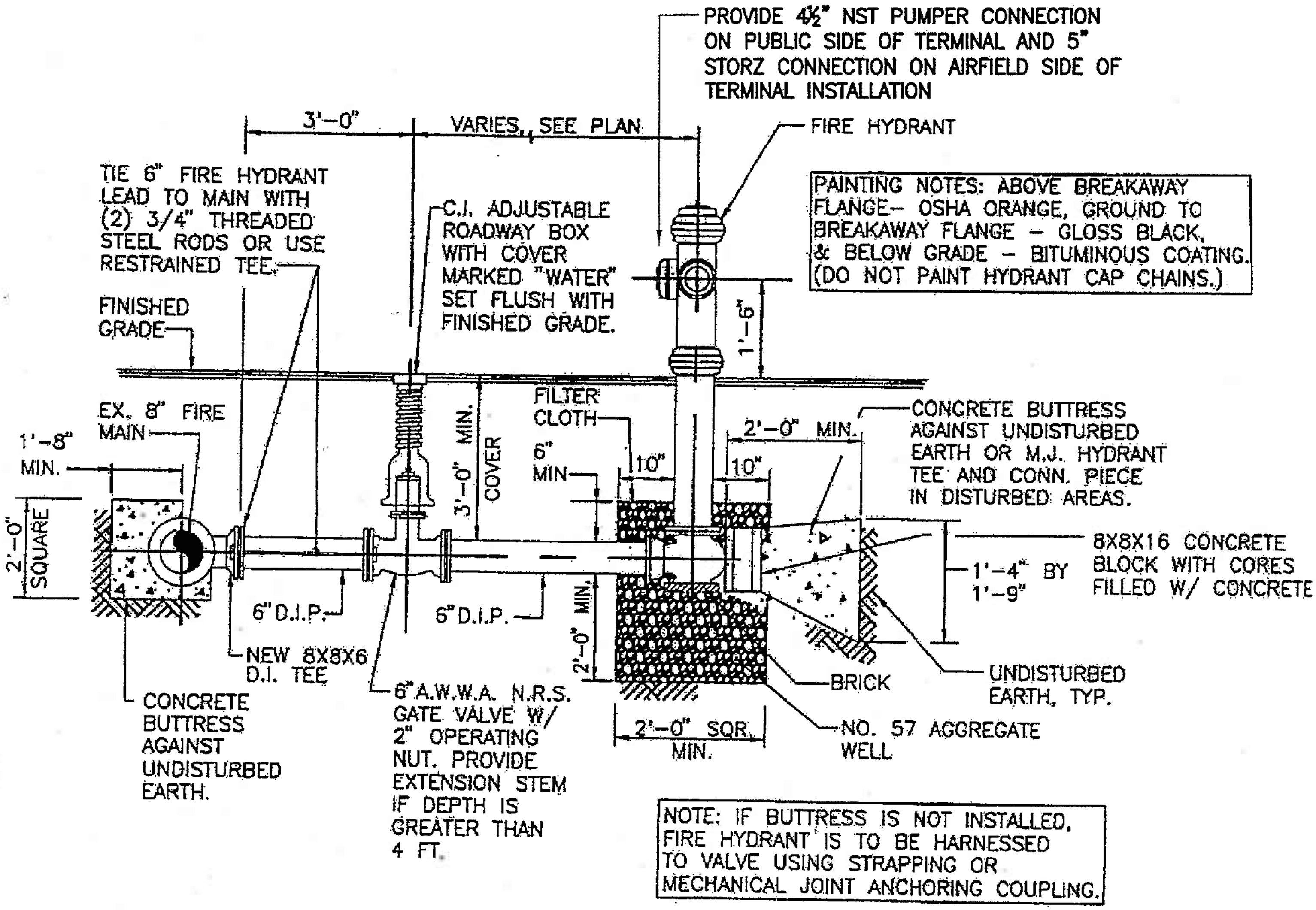
Designer shall provide details for a reinforced concrete structure around the underground fire hydrant. The cover shall be 36" x 36" Model HLC-4 by Bilco or equal, suitable for aircraft loading. Structure shall have a door with flush mounted hinges and stainless steel hardware, spring cushion operators, 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.

SHEET TITLE: ABOVE GROUND FIRE HYDRANT SETTING DETAIL

DATE: JULY 2009

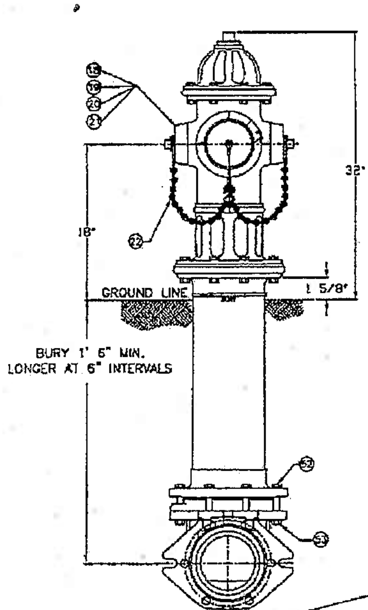


ABOVE GROUND FIRE HYDRANT SETTING DETAIL

NOT TO SCALE

SHEET TITLE: AIRFIELD SIDE ABOVE GROUND FIRE HYDRANT WITH STORZ PUMPER CONNECTION

DATE: JULY 2009

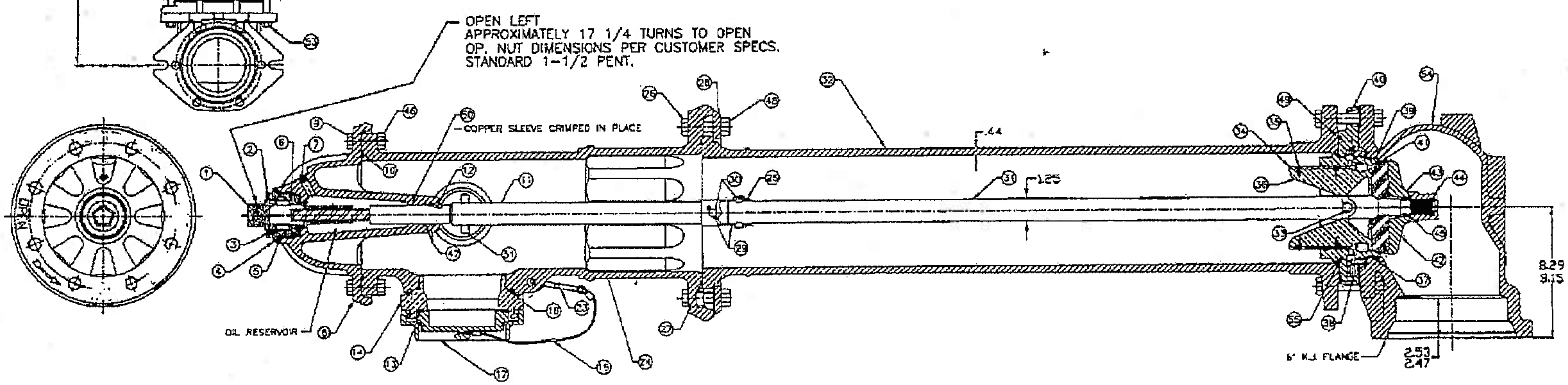


PARTS LIST

ITEM	DESCRIPTION	REQ'D	MATERIAL	A.S.T.M.	
1	OPERATING NUT	1	BRONZE	B-584	ALLOY 844
2	WIPER RING	1	RUBBER	D-2000	EPDM
3	HOLD DOWN NUT O-RING	1	RUBBER	D-2000	BUNA N
4	HOLD DOWN NUT	1	BRONZE	B-584	ALLOY 844
5	BONNET O-RING	1	RUBBER	D-2000	BUNA N
6	ANTI-FRICTION WASHER	1	CELCON		GRADE M90-04
7	OIL FILLER PLUG	1	BRASS	B-16	ALLOY 360
8	BONNET	1	CAST IRON	A-126	CLASS B
9	HEX BOLT	8	STEEL	A-307	ELECTROGALV. GR. B
10	TOP UPPER BARREL O-RING	1	RUBBER	D-2000	BUNA N
11	UPPER STEM	1	STEEL	A-576	GR 1117
12	STEM O-RING	1	RUBBER	D-2000	BUNA N
13	GASKET	1	RUBBER	D-2000	
14	STORZ PUMPER NOZZLE	1			
15	STORZ CAP CABLE	1	STAINLESS STEEL		
16	PUMPER NOZZLE O-RING	1	RUBBER	D-2000	BUNA N
17	5" STORZ PUMPER CAP	1	ALUMINUM		
18	HOSE NOZZLE	2	BRONZE	B-584	ALLOY 844
19	HOSE NOZZLE CAP GASKET	2	RUBBER	D-2000	NEOPRENE
20	HOSE NOZZLE O-RING	2	RUBBER	D-2000	BUNA N
21	HOSE NOZZLE CAP	2	CAST IRON	A-126	CLASS B
22	CAP CHAIN	3	STEEL		ELECTRO GALV.
23	CHAIN HOOK	1	STEEL		ELECTRO GALV.
24	UPPER BARREL	1	CAST IRON	A-126	CLASS B
25	SAFETY STEM COUPLING	1	STAINLESS STEEL	A-890	1.5% SILICON MAX.
26	SAFETY FLANGE BOLT	8	STEEL	A-307	ELECTROGALV. GR. B
27	BOTTOM UPPER BARREL O-RING	1	RUBBER	D-2000	BUNA N
28	SAFETY FLANGE	1	CAST IRON	A-126	CLASS B
29	COTTER PIN	2	STAINLESS STEEL	A-276	302
30	CLEVIS PIN	2	STAINLESS STEEL	A-276	305
31	LOWER STEM	1	HOT ROLL STEEL	A-576	GRADE 1117
32	LOWER BARREL	1	CAST IRON	A-126	CLASS B
33	STEM PIN	1	STAINLESS STEEL	A-276	302
34	DRAIN VALVE FACING	2	H.D. POLYETHYLENE		LS 5660-00
35	DRAIN VALVE FACING SCREW	4	STAINLESS STEEL	A-276	302
36	UPPER VALVE PLATE	1	BRONZE	B-584	ALLOY 844
37	BOTTOM SEAT O-RING	1	RUBBER	D-2000	BUNA N
38	DRAIN RING	1	BRONZE	B-584	ALLOY 844
39	SEAT RING	1	BRONZE	B-584	ALLOY 844
40	DRAIN RING HOUSING	1	CAST IRON	A-126	CLASS B
41	MAIN VALVE	1	RUBBER	D-2000	NATURAL
42	LOWER VALVE PLATE	1	CAST IRON	A-126	CLASS B
43	LOCK WASHER	1	STAINLESS STEEL	A-276	302
44	VALVE NUT	1	CAST IRON	A-126	CLASS B
45	VALVE NUT SEAL	1	RUBBER		NITRILE
46	HEX NUT	8	STEEL		ELECTRO. GALV.
47	STEM O-RING	2	RUBBER	D-2000	BUNA N
48	SAFETY FLANGE NUT	8	STEEL		ELECTRO. GALV.
49	DRAIN RING HOUSING O-RING	1	RUBBER	D-2000	BUNA N
50	SLEEVE	1	COPPER	B-75	ALLOY 122
51	UPPER STEM PIN	1	STAINLESS STEEL	A-276	302
52	HEX BOLT	6	STEEL	A-307	ELECTROGALV. GR. B
53	HEX NUT	6	STEEL	A-307	ELECTROGALV. GR. B
54	SHOE	1	DUCTILE IRON	A536	GRADE 65-45-12

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.

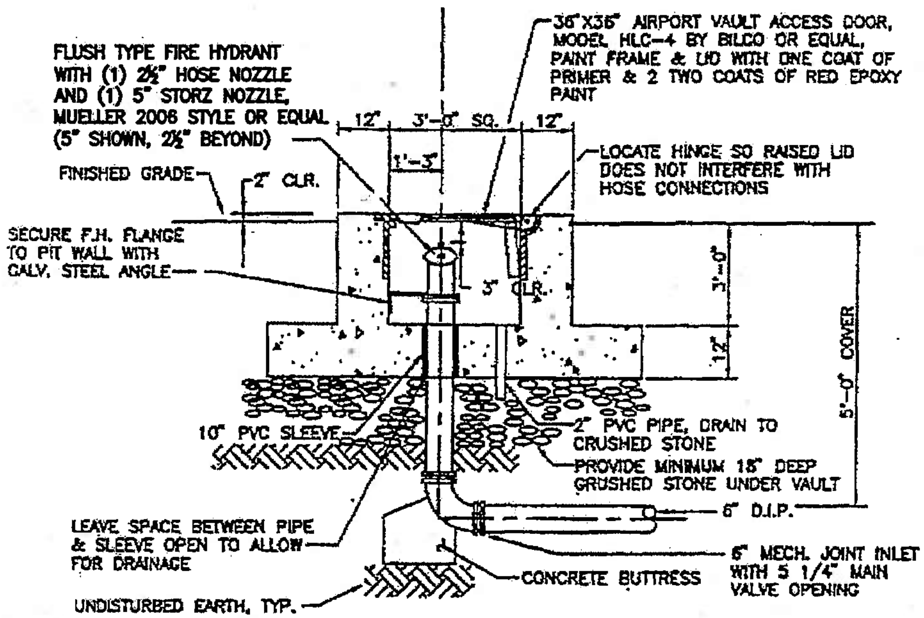


AIRFIELD SIDE ABOVE GROUND FIRE HYDRANT WITH STORZ PUMPER CONNECTION

(SAMPLE DRAWING)

SHEET TITLE: FLUSH TYPE FIRE HYDRANT DETAIL (FOR AIRCRAFT MOVEMENT AREAS ONLY)

DATE: JULY 2009



SIDE VIEW

NOTES:

1. FLUSH TYPE FIRE HYDRANTS SHALL BE FURNISHED WITHOUT THE ENCLOSURE BOX. PROVIDE TWO WRENCHES PER FIRE HYDRANT. WRENCHES SHALL BE SUPPLIED BY THE HYDRANT MANUFACTURER. PRIOR TO INSTALLATION, THE CONTRACTROR SHALL VERFIY THAT THE APPROVED HYDRANT AND WRENCHES WILL FUNCTION PROPERLY INSIDE THE PROPOSED VAULT. ADJUST VAULT DIMENSIONS AS REQUIRED SO OPERATION OF WRENCHES WILL NOT INTERFERE WITH THE SIDES OF THE VAULT AND THE HINGES/ LIFTING MECHANISM OF THE COVER HATCH.

2. THE 36"X36" COVER SHALL BE SUITABLE FOR AIRCRAFT LOADING TO WITHSTAND A LIVE LOAD OF 200 POUNDS PER SQUARE INCH PLUS 30% IMPACT. COVER SHALL BE MADE OF STEEL PLATE, WITH STEEL CHANNEL FRAME AND ANCHOR FLANGES. PROVIDE DOOR WITH FLUSH MOUNTED HINGES & STAINLESS STEEL HARDWARE, SPRING CUSHION OPERATORS, & HOLD OPEN ARM.

3. PROVIDE NATIONAL STANDARD THREADS ON THE 2-1/2" HOSE CONNECTION AND 5" STORZ PUMPER CONNECTION.

4. ON THE ACCESS DOOR, OVER THE RED PAINT, PROVIDE A WHITE FIRE HYDRANT SYMBOL WHICH IS A MINIMUM OF 2 FEET LONG, PAINTED TO MATCH THE NFPA 170 FIGURE 4-2.5.

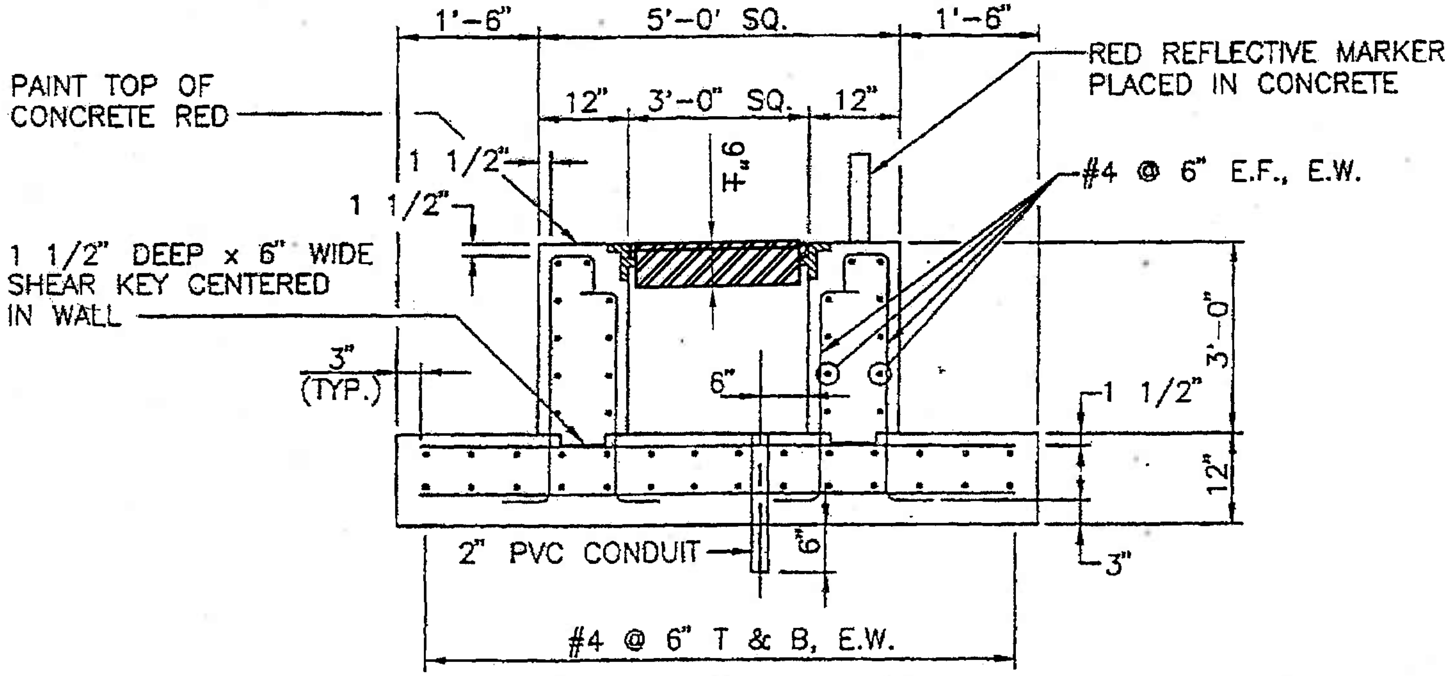
FLUSH TYPE FIRE HYDRANT DETAIL (FOR AIRCRAFT MOVEMENT AREAS ONLY)

NOT TO SCALE

SHEET TITLE: FLUSH TYPE FIRE HYDRANT VAULT DETAIL (FOR AIRCRAFT MOVEMENT AREAS ONLY)

DATE: JULY 2009

NOTES: 1. RED REFLECTIVE MARKER SHALL COMPLY WITH FAA AC 150/5345-39: L-853, MODEL TRM (TAXIWAY REFLECTIVE MARKER) 853-CO-24-R-3W BY CROUSE-HINDS OR EQUAL.



STRUCTURAL SECTION

FLUSH TYPE HYDRANT VAULT DETAIL (FOR AIRCRAFT MOVEMENT AREAS ONLY)

NOT TO SCALE

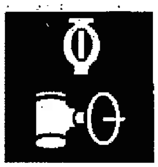
4-2.5* Fire Hydrant (All Types).

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.

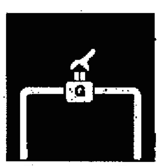
4-2.7 Electric Panel or Electric Shutoff.

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	☐ Yes	☐ No
	Equipment used is approved If no, state deviations	☐ Yes	☐ No
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	☐ Yes	☐ No
	Have copies of appropriate instructions and care and maintenance charts been left on premises? If no, explain	☐ Yes	☐ No
Location	Supplies buildings		
Underground pipes and joints	Pipe types and class / Type joint		
	Pipe conforms to ________ standard	☐ Yes	☐ No
	Fittings conform to ________ standard If no, explain	☐ Yes	☐ No
	Joints needing anchorage clamped, strapped, or blocked in accordance with ________ standard If no, explain	☐ Yes	☐ No
Test description	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 390 gpm (1476 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. 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 ± 5 psi for 2 hours. 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): $L = \frac{SD\sqrt{P}}{148{,}000}$ 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)		
Flushing tests	New underground piping flushed according to ________ standard by (company) If no, explain	☐ Yes	☐ No
	How flushing flow was obtained: ☐ Public water ☐ Tank or reservoir ☐ Fire pump	Through what type opening: ☐ Hydrant butt	☐ Open pipe
	Lead-ins flushed according to ________ standard by (company) If no, explain	☐ Yes	☐ No
	How flushing flow was obtained: ☐ Public water ☐ Tank or reservoir ☐ Fire pump	Through what type opening: ☐ Y connection to flange and spigot	☐ Open pipe

 NFPA 24 (p. 1 of 2)

FIGURE 10.10.1 Sample of Contractor's Material and Test Certificate for Underground Piping.

Hydrostatic test	All new underground piping hydrostatically tested at ______ psi for ______ hours		Joints covered ☐ Yes ☐ No
Leakage test	Total amount of leakage measured ______ gallons ______ hours		
	Allowable leakage ______ gallons ______ hours		
Hydrants	Number installed	Type and make	All operate satisfactorily ☐ Yes ☐ No
Control valves	Water control valves left wide open If no, state reason		☐ Yes ☐ No
	Hose threads of fire department connections and hydrants interchangeable with those of fire department answering alarm		☐ Yes ☐ 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

 NFPA 24 (p. 2 of 2)

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 ~~Certification~~:

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 ~~and detection systems~~. 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 ~~registered professional engineer (PE)~~ 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 1, 2, and 3 ~~under "Certification"~~ above. The construction contract documents shall require the construction contractor's Fire Protection Engineer sign and seal ~~certify~~ the fire protection system(s) design and any revision, in accordance with '3' above. ~~For projects which may not require the production of contract documents, i.e. building permits, applicants shall be required to meet the certification requirements under the building/installation permit~~.

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

<u>Fire Suppression Systems</u>

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 ~~moke removal systems, and stair pressurization systems~~.

A ~~certification~~ 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.

<u>Fire Detection Systems</u>

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 ~~under "Certification"~~ 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 ~~certification~~ 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 ~~certification~~

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 ~~certification~~ 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. ~~or smoke removal 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. 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 Design.

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.

> ***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, 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 Consolidated Dispatch Center (CDC) and the "watch room" at the Aircraft Rescue and Firefighting Station (ARFF).

15.3.1.2 Existing Controlled Access Security System (CASS)

A microprocessor based security system is in operation and is currently maintained by ADT. The objective of this system is to prevent unauthorized personnel entry into designated secured areas.

- Access to a secured area through a CASS equipped door is done by swiping a properly coded card badge through a card reader or by entering an approved numeric code at the card reader's keypad. 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 key pad) but is held open for more than the allowed preset time, an alarm is issued and the policing authority and CDC personnel are alerted. If the door is opened without approval (forced open) an alarm is issued and the policing authority and CDC personnel are alerted.

- Equipment configurations on secured doors vary somewhat throughout the Airport. with the standard configuration for a single door used for emergency egress as follows:
  - A combination card reader keypad, crash bar (panic hardware), magnetic lock, door status contacts and a white audio/visual alarm device on the non-secured side of the door.
  - A green “Push to Enter" pushbutton on the secured side of the door.
  - At present, all of the public areas in the Domestic and International terminal buildings (except Concourse C) have crash bars (panic hardware). Concourse C doors are equipped with door lever actuated hardware or push plates. On these doors, the magnetic lock is released by pulling down on a hinged Lexan cover mounted adjacent to the door. The Lexan cover is clearly labeled, stating "Pull Down for Emergency Egress".

- Secured doors are divided into groups of 6 to 8 and each group is connected to an Access Control Unit (ACU) which is typically located in the nearest telephone closet. In the Domestic Terminal the ACUs are connected via fiber optic link to the master server located in the Information Systems Room (ISR) in Concourse C adjacent to the CDC. A remote workstation in the CDC and in the Security Office are interfaced with the master server in the ISR for the Domestic Terminal. In the International Terminal and E Concourse, the ACUs are connected to a sub-host server located in E Concourse. This sub-host server is in turn connected to the master server in the ISR via fiber optic link. There is also a remote workstation in the CDC for the International Terminal and E Concourse portion of CASS.

CASS Interface at Emergency Egress Doors

Emergency egress doors equipped with CASS in the International Terminal, E Concourse, A/B Terminal, A Concourse and B Concourse, are configured as follows:

- Doors are equipped with delayed egress locks having 3 seconds to initiate the magnetic lock (mag-lock) release countdown, with a total release time of 15 seconds. During an emergency egress situation, the crashbar (panic hardware) is engaged, the local alarm is activated, and the magnetic lock is released, thereby allowing the door to open. CASS reports to CDC 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, mag-lock, etc., and all other doors are equipped only with door position contacts and a sign stating "For Emergency Exit Only". This allows large volumes of people to exit quickly. When one of these doors is opened, the local alarm will sound and the MDTA Police and CDC personnel will be alerted.

CASS Interface with Fire Alarm System

The CASS system is totally segregated from the fire alarm system. No interface exists. If fire alarm condition exists in an area, personnel will use the emergency egress doors as described above with release of the door's magnetic lock by the CASS system alone. If power to the CASS system is lost, battery backup will allow for continued operation. If the outage is long enough to discharge the back-up batteries, the CASS system will fail with all doors being released.

15.3.1.3 Existing 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).

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 CDC. 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.

<u>Emergency Operations</u>

During emergency situations in the domestic terminal OFM personnel can communicate with CDC 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.

<u>Voice Evacuation System Requirements</u>

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 CDC 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

<u>Fire Alarm Codes and Standards</u>

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 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°Cl194°P.
  - 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 FACPs 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 Consolidated Dispatch Center (CDC).

    - 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 CDC. All devices in this zone, horns and strobes, shall be activated separately via manual control from the CDC.

  - 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 Consolidated Dispatch Center uses color floor plans displayed on a Personal Computer to display alarmed device information to the CDC 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 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.

  - No interface between the building automation system and the fire alarm system will be provided.

- 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 Consolidated Dispatch Center 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 FACPs, 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- 6.4.2.1 (2002) and the International Mechanical Code (IMC), 606 (2006). 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—Waterflow Switch
VTS—Valve Tamper Switch
AHU—Air Handling Unit
Cntrl—Control
UL—Upper Level
LL—Lower Level
Mezz—Mezzine
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 (2006) and NFPA 101-7.9 (2006). Where not otherwise required by code, provide a dedicated emergency white lighting fixture installed at each emergency exit door. The intent is to light the crash bar (panic hardware) 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 Appendix C. 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 72-7.5.2, “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 72-4.5.2.1 (2006), 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 72-4.5.2.1.1 through 4.5.2.1.3 (2006).

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 crash bar (panic hardware) with door strike (this is not an electric door strike) and integral contacts to indicate when the crash bar (panic hardware) has been depressed.
- 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.

- Any time the crash bar (panic hardware) is depressed; a local alarm (piezzo buzzer) will sound. This is intended to discourage accidental/nuisance use of the system. This local alarm will sound until the system is reset.

- The mag-lock will not release until a preset delay has expired. Depressing the crash bar (panic hardware) starts the delay countdown.

- In the event of an emergency, personnel will depress the crash bar (panic hardware), the local alarm will immediately sound and the delay countdown will begin. When the delay has expired, the audio/visual device will sound, the mag-lock will be defeated and the CASS will alert the police and the CDC 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, 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.

- Utilize three wire power transfer hinges for electric connection to electronic crash bars (panic hardware), and emergency door release devices mounted on doors.

- All door status contacts are 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 should 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 crash bars (panic hardware) are to be directly wired to the magnetic lock, not through the door control microprocessor 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

- 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, 6.9.10.4.2. 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 ADT as part of the base contract. ADT 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 Maintenance Contractors. Washington Professional Systems is the MAA Maintenance Contractor for the Domestic Terminal. Washington Professional Systems is the MAA Maintenance Contractor for the International Terminal and E Pier. 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.

15.3.4 Request for Variance

If the designer wishes to request an exception to the standards as applied to a specific project, he/she should submit the attached "Request for Variance" form for approval. Every effort should be made to meet the standards outlined and requests for variances will only be considered for instances where sufficient technical, budgetary and code merit exists. It is recommended that the designer contact the OFM to informally discuss the circumstances of a possible request for variance prior to submission. Variances require OFM, MAA Operations and MAA Director of Design approval. The Request for Variance should identify if and when a variance to the Standard is requested. It shall provide for an equivalent level of service or rating per NFPA 101-1.4 (2006), Equivalency.

15.3.5 Changes to this Section

Changes to this standard can be requested by submitting the attached "Change Request" (Appendix B). Sufficient technical and/or budgetary and/or code merit must be proven. Changes will be reviewed and approved by the parties noted on the Change Request Form.

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 as they relate to Chapter 23:

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).

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. Refer to Table 20.4 for clarification.

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. <u>All travel distances from the Concourses must be taken to the non-secure side of the Security Checkpoint or to the nearest stairwell.</u>

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 Concourse C, Concourse D, DX, DY, and the Commuter Concourse and in the North Terminal Extension, North Terminal, South Terminal and Central Terminal, the following shall apply: (a.) Smoke barriers are required between tenant spaces and the commercial corridors, and (b.) In non-storefront areas, 1-hour rated doors and walls are required between tenant spaces and between tenant spaces and service corridors.

    a. ASTM 685 compliant plastics are required to be applied to storefront grilles for smoke control in Concourses C, D, DX, DY, and the Commuter Concourse and in the North Terminal Extension, North Terminal, South Terminal, and Central Terminal only.

8. Sliding doors are not considered compliant as smoke doors unless provisions are made for gap coverage to prevent smoke migration. Rolling doors are permitted to be used as smoke doors. All gaps must be sealed "smoke-tight".

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

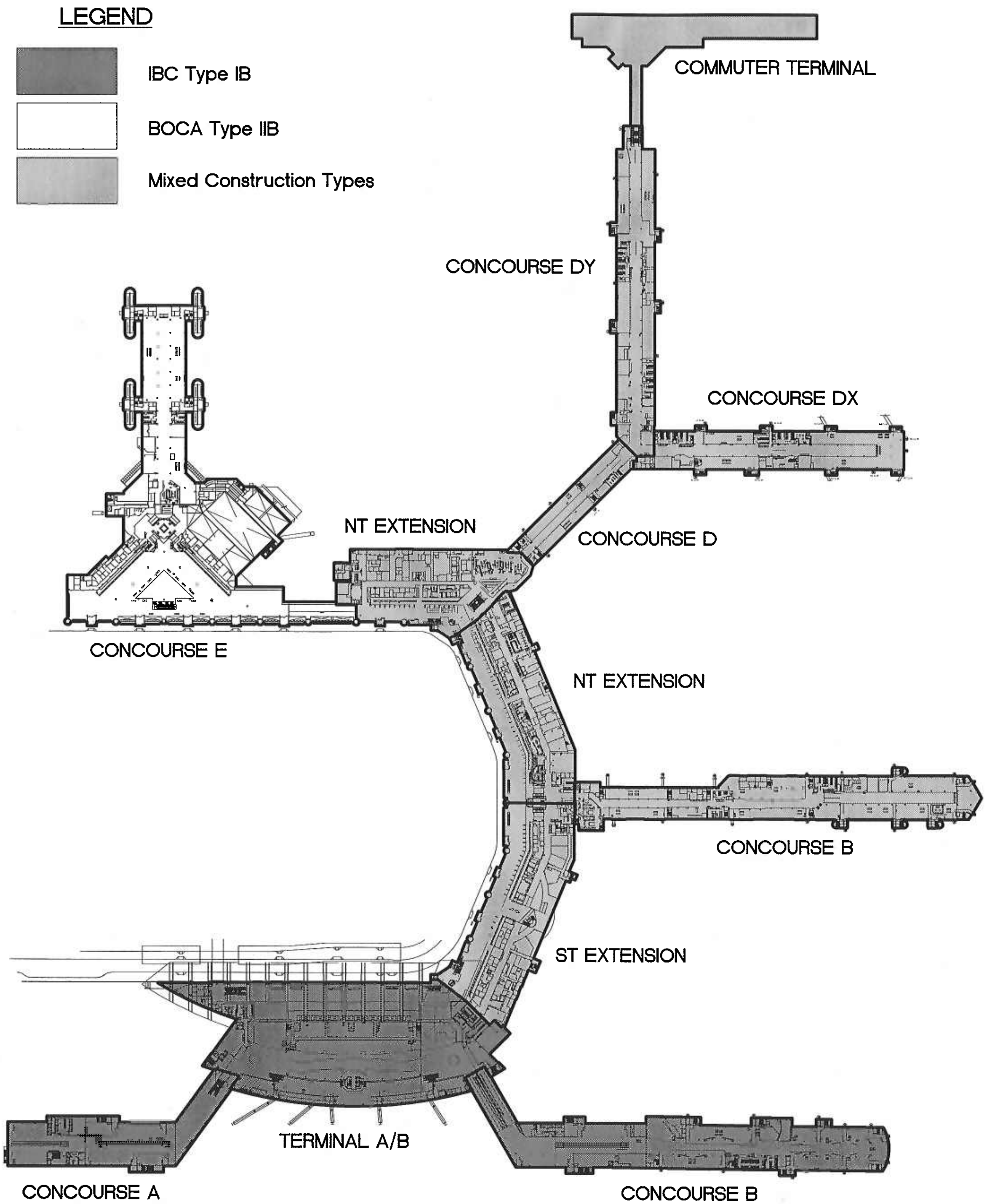
Locations	Emergency Power
A Concourse	Existing Emergency Power (Generator)
B Concourse	Existing Emergency Power (Generator)
A/B Terminal	Existing Emergency Power (Generator)
C Concourse	Existing Emergency Power (Generator) – CDC and MAA Communications Room Only
C Concourse Tunnel	MER-2 Fire Pump, 3rd 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 Table

EXISTING CONSTRUCTION TYPES AND USE CLASSIFICATIONS

Locations	Use Groups, Separations	Construction Type	Built/Renovated Under
A Concourse	Mixed Occupancy, Non-Separated Uses (A-2, A-3, B, M, S-1)	IBC Type IB	IBC, 2000 NFPA 101, 2000
B Concourse	Mixed Occupancy, Non-Separated Uses (A-2, A-3, B, M, S-1)	IBC Type IB	IBC, 2000 NFPA 101, 2000
A/B Terminal	Mixed Occupancy, Non-Separated Uses (A-2, A-3, B, M, S-1)	IBC Type IB	IBC, 2000 NFPA 101, 2000
C Concourse	Separated Uses A-3, M, B (Smoke barrier security grills)	Mixed Construction Types	Unknown
D DX DY and Commuter Concourses	Separated Uses A-3, M, B (Smoke barrier security grills)	Mixed Construction Types	Unknown
North Terminal Extension, Between D/E	Separated Uses A-3, M, B (Smoke barrier security grills)	Mixed Construction Types	Unknown
Center Terminal	Separated Uses A-3, M, B (Smoke barrier security grills)	Mixed Construction Types	Unknown
E Concourse	Covered Mall [1] A-3, M, B Separated Tenants, (Open security grills between tenants and Mall)	Type IIB (?) Protected Columns, Unprotected Roof	BOCA 1993
North Terminal	Separated Uses A-3, M, B (Smoke barrier security grills)	IBC Type IB	Unknown
South Terminal	Separated Uses A-3, M, B (Smoke barrier security grills)	IBC Type IB	Unknown

[1] E Terminal and E Concourse have automatic smoke control systems as components of the Covered Mall provisions. All other public portions have "Modified Smoke Control" features.



SHEET TITLE: EXISTING CONSTRUCTION TYPES

DATE: JULY 2009

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 (CDC)
- 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 II". Water density of 0.2 GPM/SF. The maximum coverage per sprinkler head shall be 100 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 100 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 (CDC). All FACPs 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, <u>no aircraft fueling is permitted within aircraft hangars</u>. 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, ADT, Simplex). Contact the OFM to in advance to coordinate any work involving replacement, modifications, or extensions to any existing fire alarm equipment.

15.4.9 Procedures For Egress Calculations From Concourses

A new Design Standard for Egress and Holdroom sizing is currently under development. Please refer to the OFM for guidelines on egress calculations.

15.4.10 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 document contains Sensitive Security Information that is controlled under 49 CFR 1520. No part of this document may be released to persons without a need to know, as defined by 49 CFR 1520, except with the written permission of the TSA Administrator, Washington D.C. Unauthorized release may result in civil penalty or other action. For U.S. Government agencies, public release is governed by 5 U.S.C. 522."

CHAPTER 17: AIRPORT INFORMATION TECHNOLOGY (IT) SYSTEMS

17.1 INTRODUCTION

The purpose of this section is to establish a Design Standard and Uniform Specifications for equipping the Maryland Aviation Administration (MAA), Division of Airport Technology's (OAT) communication facilities, providing distribution pathways, and infrastructure, both within (Inside Plant) and between buildings (Outside Plant) at Baltimore/Washington International Thurgood Marshall Airport (BWI) and Martin State Airport

The Design Standard will provide the Architect/Engineer with the design parameters, details and features that the Division of Airport Technology will require to be incorporated into projects. This will provide consistency and compatibility between new and existing equipment/infrastructure.

The Design Standard also provides the standards for the maintenance and restoration of facilities.

The intent of the Uniform Specifications is to provide the Architect/Engineer with technical guidance.

> *Purpose*: To document and provide consistent and current guidance to all personnel performing design, construction, installation, inspection, maintenance, and field certifying design systems and assembly components.
>
> *Objective*: Publish the criteria that 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 and Martin State Airports as it pertains to Communications.
>
> *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 and Martin State Airports.

NOTE: It is very important that the Office of Airport Technology (OAT) be consulted as early in the design process as possible. Only OAT can assign communications facilities and access to facilities.

17.2 DESIGN CRITERIA

17.2.1 General

The Communications System (Fiber and Copper) shall be designed and installed in strict conformance with all applicable Federal, State and Local codes and laws. The following list of Codes is provided for reference only and is not all inclusive:

Maryland Building Performance Standards (MBPS)
National Fire Protection Association (NFPA) - National Electrical Code (NEC)
Code of Maryland Regulations (COMAR) - Maryland Accessibility Code
American with Disabilities Act and Accessibility Guidelines - (ADA/ADAAG)

The following list of Standards is provided for reference only and is not all inclusive:

American National Standards Institute/Telecommunication Industry Association/Electronic Industries Alliance (ANSI/TIA/EIA)
Institute of Electrical and Electronic Engineers (IEEE)
National Electrical Installation Standards (NEIS)
National Electrical Safety Code (NESC)
NFPA-13: Pre-Action Sprinkler System
NFPA-2001: Clean Agent Fire Extinguishing System

17.2.2 Design Consultant Qualifications

Company Experience: It is recommended that the Design Consultant for a particular project's communications system submit documentation demonstrating that the company has successfully designed a minimum of (3) projects of similar size, complexity and scope within the last 3-years.

Staff Experience: It is recommended that detailed information be provided regarding the certification, training and experience of all key members of the project team. It is further recommended that the project team include at least one Registered Communication Distribution Designer (RCDD) certified by BICSI. The project team must be identified and resumes provided for the project team. The resumes must include copies of all certifications and licenses required.

17.2.3 Project Planning Considerations

All Information Technology related projects shall be initially coordinated with MAA OAT. The Architect/Engineer shall contact a MAA OAT Engineer to arrange a meeting prior to the initial submittal of the project. The project coordination shall include all MAA projects as well as all Tenant related projects. Depending on the magnitude of the project, "Break-Out Session" meetings may also be necessary. The Architect/Engineer shall also coordinate this with MAA OAT Engineer.

17.2.4 Testing and Acceptance

All facilities must be terminated and tested and certified to comply with the OAT standards. Requirements included in this document and or as part of the final contract documents as approved by the OAT Engineer.

The OAT Engineer reserves the right to witness the testing for verification of testing methods. If the OAT Engineer does not witness the testing, The OAT Engineer reserves the right to have a 10% retest done at no cost.

Termination point(s) will be specified by the OAT Engineer. ONLY OAT will terminate connections to live communications system(s)

17.2.5 Installation of Data Circuits

A. Copper Plant
MAA/OAT cannot guarantee clean data circuits on the MAA copper plant. It is highly recommended any data circuits be extended past the DMARC (NT109) to final location of data equipment. Contact OAT Engineer 72 hours prior to installation of the circuit for assignment of cable pairs and communication IDF/MDF access

B. Fiber Plant
MAA/OAT cannot guarantee performance of the fiber optic plant unless the network is designed and engineered by MAA/OAT. It is highly recommended that users of the fiber optic plant perform testing of the facilities prior to use.

C. Service Loops
A service loop will be required for future MAC work at all access points of communications infrastructure. Contact the OAT Engineer for design specifications.

17.2.6 Permits

If the work performed requires a MAA building or installation permit the work performed must comply with the permit. The permit process is considered part of the work to be performed.

17.2.7 As Built Drawings

Comprehensive AS BUILT documentation (Red line revisions will not be acceptable) must be provided for all facilities installed within the scope of this document prior to final acceptance and project or contract closure. As-built documentation shall be presented in electronic format, consistent with the nature of the installation (i.e. CAD for in-building facilities and rack face/equipment layout) format for OSP civils facilities, electronic schematics for cables, etc. They shall be compatible with the record system being maintained by MAA/OAT at the time of installation.

17.2.8 General Requirements

A. Emergency Tenant Paging

Emergency Tenant Paging (E-Paging) is considered a life safety system and must remain operational during any construction project unless written permission is obtained from the Fire Marshal and the OAT Engineer.

B. Main Distribution Room (MDR) and Intermediate Distribution Room (IDR) Main Distribution Frame/Intermediate Distribution Frame (MDF/IDF):

Definition:

Main Distribution Frame Room (MDF) is defined as the primary serving/distribution point for communications services to a major facility or grouping of facilities.
Intermediate Distribution Frame Room (IDF) is defined as a local distribution point for communication services to a locally confined area.

These rooms are for the exclusive use of MAA/OAT. No tenant or MAA contractor is to install equipment, frames or electronics in these rooms without written permission from an OAT Engineer.

All cabling to these rooms should be kept to a minimum to conserve space.

Room layout indicating equipment locations, conduit entrance points, intra room cable/conduit runs, cable termination locations, power receptacle locations and the associated power panel number, breaker number, rating and location, in addition to the panel number and location that is feeding the sub-panel if applicable and all other structural items as may be required by MAA.

All communications facilities are to be labeled in accordance with MAA/OAT Standards. General notes shall reflect the conduit marking in accordance with MAA/OAT facilities marking standard

Power receptacles are to be labeled with circuit number and receptacle type. Bay faces of all racks, cabinets, protector fields, terminals etc shall be included regardless of the installation contractor or system; examples of a system that may be beyond the installation scope of this document, but required as a part of the as built, would be security CCTV, CASS systems. Detail will also include sufficient information to determine excess capacity for future use.

C. MDF/IDF Planning Considerations:

The following factors shall be considered when designing an area to be occupied by a Main Distribution Frame (MDF) or an Intermediate Distribution Frame (IDF) Room: (1) the room shall have a minimum dimension of 8' x 10', and a floor to ceiling clearance of 10-feet. The final size of the room will depend on the quantity of racks/cabinets and other equipment associated with systems such as public address and controlled access, (2) future growth shall also be factored into the final size of the room without the need for moving existing equipment, (3) the door shall be a metal hollow door fire-rated for 2-hours and sized at 36" wide for an IDF and double 36" wide for an MDF, (4) door hardware shall be standard MAA hardware with a magnetic lock and transfer hinge, (5) the walls shall be constructed of Concrete Masonry Unit (CMU) and a minimum of two walls shall be provided with 3/4" AC grade plywood, painted with 2 coats of light colored fire retardant intumescent paint, (6) no windows, (7) the flooring shall have electrostatic-safe vinyl tile and with a minimum floor loading capacity of 150 lbs/sq-ft, (8) exposed to structural ceiling, (9) locate the room to avoid any potential water damage sources from above (i.e., rest rooms), (10) space IDF's so that the furthest workstation cabling does not exceed 90-meters in total length.

D. Manhole/Conduit:
Civil drawings shall detail routing and structure (tied to GPS points) and other significant elements such as other utilities, structures etc. Drawings of manholes shall be "butter flied" to provide detail of windows and conduit termination points. Racking detail and including intra manhole cable routing and splice closures locations shall be included. Provide digital photographs of the manhole interior. Provide digital photographs of exterior topographical surrounding of manhole. Photographs should be able to aid in locating manholes in the field.

Include details of building entrances.

E. Outside Plant Cables:
A detailed schematic shall be provided for all outside plant cables both copper and fiber. The schematic shall show cable type, size and count, splice/termination points, lengths and other details/call offs, as may be required. Include references to manholes, buildings, rooms etc. Provide digital photographs showing the cable routing, from window to window, within the manhole. Locater cable must be identified on drawings. Detail will also include sufficient information to determine excess capacity for future use. General notes shall reflect the conduit marking in accordance with MAA/OAT facilities marking standard

F. Intra-Building Cable Tray/Conduit:
CAD drawings of the inside plant facilities shall include a layer detailing the routing, size, penetration points etc of all intra-building cable tray and conduit. The layer shall include conduit size, penetration/pass through points, elevation points, pull boxes, sleeves etc. Where tray/conduit are installed in areas that are not easily assessable such as above hard ceiling, through tunnels or sterile areas, adequate detail shall be provided to allow for the accurate location for future use. Detail will also include sufficient information to determine excess capacity for future use.

All communications facilities are to be labeled in accordance with MAA/OAT Standards. General notes shall reflect the conduit marking in accordance with MAA/OAT facilities marking standard

G. Intra-Building Cable:
A detailed schematic shall be provided for all intra-building cables both copper and fiber. The schematic shall show cable type, size and count, splice/termination points, lengths and other details/call offs as may be required. Conduit size must be included. Detail will also include sufficient information to determine excess capacity for future use. Include references to manholes, buildings, rooms etc.

All communications facilities are to be labeled in accordance with MAA/OAT Standards. General notes shall reflect the conduit marking in accordance with MAA/OAT facilities marking standard

H. Horizontal Cable:
CAD drawings based on architectural as built drawings shall indicate the location of each communications receptacle (faceplate) and shall provide type and identification data. Serving IDF or MDF shall be shown or referenced on drawings. Room numbers and door numbers as well as other detail necessary to make the drawings accurate and complete shall be provided. Conduit size must be included. Detail will also include sufficient information to determine excess capacity for future use.

All communications facilities are to be labeled in accordance with MAA/OAT Standards. General notes shall reflect the conduit marking in accordance with MAA/OAT facilities marking standard

17.2.9 Outside Plant System (OPS)

A. Planning Considerations:

The following factors shall be considered when designing an underground raceway system:

(1) The overall length of the raceway from source to destination

(2) The length of raceway between pulling points

(3) The quantity of bends and offsets between pulling points

(4) The maximum pulling tension recommended by the cable manufacturer

(5) The minimum bend radius recommended by the cable manufacturer

(6) The minimum depth raceway shall be installed under runways, taxiways, apron areas, roadways, walkways, etc.,

(7) The location and quantity of manholes,

(8) Spice and break out plans

(9) The size, weight and quantity of cable reels,

(10) The impact on airport operations during installation and future maintenance.

Cable pulling calculations shall be performed and submitted during design to show that cable pulling tensions and sidewall pressure recommendations are not exceeded and that the jamming ratio meets criteria for a jam free pull. Detail will also include sufficient information to determine excess capacity for future use.

All communications facilities are to be labeled in accordance with MAA/OAT Standards. General notes shall reflect the conduit marking in accordance with MAA/OAT facilities marking standard

B. Raceways:

Fill, sizing and installation of raceways shall be in accordance with the MAA Design Standards, current edition. Raceway between manholes shall not exceed 500-feet and shall not contain more than the equivalent of two 90-degree bends between pulling points. Communication raceways shall be permitted to share the same trench as power raceways provided they maintain a 12-inch minimum separation rated at 600-Volts and below, and a 72-inch minimum separation with raceways rated above 600-Volts. Coordinate raceway routing with other underground utility lines keeping the installation perpendicular and parallel to structures above/below grade. The Designer shall encase all raceways with 3-inches of concrete using separators, reinforcement rods and ties. Provide magnetic warning tape 12-inches above concrete envelope. Use only large radius fittings. Show installation details that denote trench depth, spacing of conduit supports, backfill and compaction requirements, size and orientation of ducts, concrete encasement details, over/under crossing requirements of underground utilities, etc. Detail will also include sufficient information to determine excess capacity for future use.

All communications facilities are to be labeled in accordance with MAA/OAT Standards. General notes shall reflect the conduit marking in accordance with MAA/OAT facilities marking standard.

17.2.10 Manholes/Handholes:

Show installation details that orient the manhole(s) to the site along with site preparation details. Site preparation details shall denote the excavation requirements to safely and properly install a manhole. Provide a detail showing the interface between the duct bank and the manhole and how to seal that interface. Size and detail the installation of manhole/handholes in accordance with the MAA Design Standards, latest edition.

All communications facilities are to be labeled in accordance with MAA/OAT Standards. General notes shall reflect the conduit marking in accordance with MAA/OAT facilities marking standard

NOTE: HANDHOLES SHALL BE USED ONLY FOR SPECIAL APPLICATIONS AND WITH PRIOR DESIGN APPROVAL OF MAA OAT.

A. Other design considerations and requirements:

The manhole type, shape and size shall be determined by evaluating duct bank size, duct bank entry orientation, cable installation and routing, racking and splicing requirements, personnel entry and exit,

Include racking and splicing detail for full duct entry capacity.

Include ring and cover marking detail and permanent manhole ID within manhole.

Include grounding and bonding detail.

All conduits installed shall be proofed by pulling a flexible mandrel or cable section having a diameter no less than 90% of the diameter of the conduit between manholes and manholes and building entrances. Pulling tensions shall be monitored with a dynamiter and maximum tension recorded.

Grounding points shall be measured for resistance to ground; readings shall not exceed established standards.

Detail will also include sufficient information to determine excess capacity for future use.

All communications facilities are to be labeled in accordance with MAA/OAT Standards. General notes shall reflect the conduit marking in accordance with MAA/OAT facilities marking standard

17.2.11 Building Entrances:

Provide details of building entrances coordinated with MDF/IDF plans. Entrance detail shall include conduct layout, racking and splicing detail, 'TIP" cable routing, protection field and main distribution frame detail.

17.2.12 Other Installation Methods:

Other construction methods may be used as conditions and cable requirements dictate with written approval by the OAT Engineer.

17.2.13 Coordination Drawings:

Do not provide diagrammatic routing of underground raceways. Provide site drawings complete with baseline and offsets to enable the Contractor to accurately install the raceways. In addition, the Designer shall require the contractor to provide for on-site testing to verify existing underground utilities locations, as well as, as-built drawings that denote accurate measurements for locating the underground duct bank.

17.2.14 Communication Cabling:

A. Communication Cabling:
All Intra-Building cables installed on MAA property must be Plenum rated. Non-Plenum rated cables may be used on an exception basis with prior approval of MAA OAT and MAA Fire Marshal.

The Standardization of Communication Cabling among IDF Rooms is as follows:

1. Single Mode Fiber Optic Minimum fiber count 148 strands (Back Bone System) using "SC Connectors
2. Single Mode Fiber Optic Minimum fiber count 72 strands (Local distribution) using "SC Connectors
3. Multi Mode Fiber Optic Minimum fiber count 72 strands, using "ST Connectors
4. High Count Copper Twisted Pair up to a maximum pair count 1200, (Back Bone System)
5. Medium Count Copper Twisted Pair up to a maximum pair count 200, (Local Distribution System)
6. Backbone cabling shall be "star topology" with Homeruns to the local MDF.

7. All fiber optic cables shall include a metallic locator cable using a number 10 wire or a locator cable intergraded into the fiber cable design.

8. Other special systems cables as may be required.

9. Cables shall be sized to accommodate known requirements plus a minimum of 50 % growth. A "FILL BOX" matrix shall be developed for each cable segment showing proposed cable pair utilization.

10. All communications facilities are to be labeled in accordance with MAA/OAT Standards. General notes shall reflect the conduit marking in accordance with MAA/OAT facilities marking standard

B. Outside Plant Copper Cable:

Splice Closures: Pressure tested per manufactures specifications. In lieu of manufacture specifications closures shall remain under 10 pounds of pressure for 48 hours.

Cable Shield: End-to-end continuity isolated from ground; no connection to ground shall be present.

Cable Pairs: Each cable pair shall be tested end-to-end through all splices and protection fields for the minimum conditions:

- Sequential count
- Continuity
- Shorts
- Opens
- Transpositions
- Cross talk (NEXT, FEXT and PSNEXT)
- Longitudinal Balance

All communications facilities are to be labeled in accordance with MAA/OAT Standards. General notes shall reflect the conduit marking in accordance with MAA/OAT facilities marking standard

C. Outside Plant Fiber Optic Cables:

Splice Closures: Pressure tested per manufactures specifications. In lieu of manufacture specifications closures shall remain under 10 pounds of pressure for 48 hours.

D. Fibers Pre Installation:

All fiber optic cables shall be pre-tested prior to start of placement; results will be compared to and must be consistent with manufactures factory tests results. The test shall consist of a non terminated OTDR tracing of each fiber on the reel.

E. Fiber Post Installation:
All fibers are to be tested for light guide position confirmation, end to end attenuation (loss) and structural integrity at bandwidths consistent with the grade and type of fiber.

Light Guide Position Confirmation/Attenuation: Test each fiber with a light source and power meter from near end to far end connector position as follows:

SM using Laser source at 1310 nm and 1550 nm
MM using LED source at 850 nm and 1300 nm

Record losses of each fiber. Total loss shall be within calculated loss budget.
Confirm that each fiber is terminated at the assigned position within each of the light guide units and that terminations are consistent with the color coding of the buffer tubes and fiber strands.

F. Fiber Structural Integrity:

Perform OTDR testing end to end, bi-directional 850 - 1300 nms for multimode and 1310-1550 nms for single mode. Fiber shall be free of defects, micro bends and other defects. All loss points shall be within the specified loss parameters and total loss shall not exceed loss budget.

MM 3db/km @ 850 nms
1 db/km @ 1300 nms

SM 0.5db/km @ 1310 nms
0.4 db/km @ 1550 nms

17.2.15 Splicing

Design intent should be to avoid splices. Where possible cables shall be pulled through manholes and properly racked. Where splices are required fiber optic cables shall be fusion spliced and copper twisted pair cables shall be spliced with high density filled splicing modules.

Loss budget
0.5 db, 0.7 maximum per connector
0.2 db per splice

Splicing enclosures shall be re-enterable and filled with re-enterable flooding compound. All splice closures shall be pressure tested per manufactures recommendations.

Affix permanent labels to splice cases and to all cables within 24' of each window indicating cable size, type and count, and far end destination.

17.2.16 Testing and Documentation

The Designer shall provide a comprehensive document that includes cable tests for multimode, single-mode and copper cabling and the desired test results. The document shall include manufacturer oversight and/or certification regarding use and setup of test instruments. The contractor will submit the test results for review and approval.

17.2.17 Mechanical Systems

A. Planning Considerations

The following factors shall be considered when designing an area to be occupied by IT systems: (1) HVAC equipment, (2) humidity control, (3) dust and contaminant control, (4) HVAC redundancy, and (5) type of fire protection.

B. HVAC

The system shall be designed to function properly for 24-hour operations all year. The system shall be designed to operate under positive pressure with respect to its surrounding. Ideally, the equipment shall be sized and dedicated for the room it serves and be located outside of the room. This will reduce the possibilities of condensate water entering the racks/equipment. However, any equipment located inside the room shall be provided with drip pans and condensate pumps to shield the equipment below from potential water damage. A fire damper shall also be provided to maintain the room's 2-hour fire rating.

The general design criteria for HVAC systems shall be: Temperature shall be maintained from 72-degrees to 75-degrees F with a relative humidity from 30% to 55%. All temperature sensors and controls shall be located within the room the HVAC equipment serves and at no more than 5-feet above the finished floor. Heat rejection per rack/cabinet shall vary from 750 (BTU's) per hour to 5000 (BTU's) per hour.

For the Primary Communications Rooms/MDF, in addition to the requirements above, a dual/redundant HVAC system shall be provided.

NOTE: The above planning considerations are not to be considered the Final design. The final design shall be based on actual requirements of the space and shall take into consideration any dry agent system installed.

17.2.18 Fire Protection

Consult with MAA OAT at concept design phase to determine required level of fire protection. Generally, a Pre-Action system shall be installed serving the room. The location of the Pre-Action Fire Alarm Control Panel shall be located in a nearby room, but not within the same room it serves.

Depending on what equipment is to be located inside the Communications Room; a Clean Agent type fire suppression system may be required in lieu of a Pre-Action system. A Clean Agent system will also require a separate room to house the system. The Communications Room served by the Clean Agent system will also be required to be fire-stopped and sealed per the system requirement. The Architect/Engineer shall coordinate with MAA OAT on the need for a Clean Agent system.

17.2.19 Coordination Drawings

The Designer shall show the location of all devices associated with the Pre-Action (or Clean Agent) system within the room coordinated with structural, architectural, mechanical and electrical systems, inclusive of piping, equipment, etc.

17.2.20 Electrical System

A. Planning Considerations:

The following factors shall be initially considered when designing for a Communications Room: (1) location and quantity of equipment racks/cabinets, (2) location and space requirements for in-coming backbone raceways, and (3) location and space requirements for out-going horizontal raceways.

Restrict routing of conduit, pipes, ducts etc through MDF's and IDF's.

B. Electromagnetic Interference:

There shall be no equipment located within the Communications Rooms that can produce harmful levels of electromagnetic interference. Certification by the manufacturer shall be required.

C. Normal Power:

Normal power (a minimum of one dedicated 20A/120V circuit) shall be provided to duplex convenience receptacles serving the Communications Room (on UPS preferred). Receptacle shall be spaced at 6-foot on center along walls and at 18-inches above the finished floor. The receptacles shall be accessible at all times and not be blocked by racks, cabinets or other equipment.

D. System Power Requirements:

All systems requiring A/C power in MDF's and IDF's shall be provided with an uninterruptible power system (UPS). The UPS shall be sized to accommodate calculated load plus 200% with run time of 15 minutes. Minimum size of floor mount UPS units shall be 20 kVA, minimum size of rack mount units shall be 1400 VA. Floor units shall be equipped with a Battery Cabinet and Emergency Bypass Cabinet. Output panel board for UPS power distribution should be located in the communication room. The UPS shall be provided with a network interface card for Simple Network Management Protocol (SNMP) connection. The UPS shall also be provided with components for the Building Automation System (BAS) connection, compatible with the Johnson Controls' Metasys System.

17.2.21 Auxiliary HVAC Power Receptacle

All communication rooms shall be equipped with a 30A/208V normal power twist lock receptacle capable of supporting an emergency cooling unit.

17.2.22 Electrical Panelboards

In so far as practical, electrical panel boards shall not be located within Communications Rooms. Where necessary, panel boards shall be dedicated to loads within the Communications Room only and shall be located to minimize electromagnetic interference.

17.2.23 Transformers

In so far as practical, transformers shall not be located within Communications Rooms. Where necessary, transformers shall be dedicated to loads within the Communications Room only and shall be located to minimize electromagnetic interference. Transformer shall have a Faraday Shield installed to further improve noise immunity and be K-rated to accommodate non-linear loads. As an alternative, the transformer can use harmonic canceling techniques to mitigate the affects of harmonics.

17.2.24 Lighting

Lighting shall be limited to the use of 4-foot industrial style with 20% uplight fluorescent, two lamp fixtures minimum (with wire guards) controlled via a light switch at each exit. There shall be at least one fixture connected to the emergency circuit to serve the area in case of power failure. The design luminance shall be 50-foot-candle measured at 3-foot above the finished floor, while taking into account equipment in the room. Suspend all light fixtures from a UL listed strut-type channel raceway. Raceways shall be suspended at least 9'-6" above finished floor and attached to structural steel above and coordinated with equipment racks and cabinets. Provide one light fixture inside the Communications Room to function as a 'Nite-

Lite'. Provide one light fixture inside the Communications Room to function during a power outage (connection to generator or UPS)

17.2.25 Grounding/Bonding

Grounding and bonding shall be installed in accordance with the latest edition of the National Electrical Code, the latest edition of the IEEE Standard 142, "Emerald Book" Recommended Practice, and the latest edition of BICSI's Telecommunications Distribution Methods Manual. Where any conflict exists between the code and the standards, the code shall take precedence. A more stringent level of Grounding/Bonding may be necessitated by systems within the communication rooms, fully comply with these requirements.

17.2.26 Access Control System

All Communications Rooms shall have a Controlled Access Security System (CASS) entry system installed in accordance with MAA Standards. In general, the CASS will release a magnetic door lock having a separate power supply located on the secure side of the door along with a "Request-to-Exit" push-button release. To assure the occupant can exit the room under any circumstance, an additional "Emergency Request-to-Exit" push-button shall be located on the secure side. The emergency exit push-button shall be provided with a clear plastic hinged cover with label.

17.2.27 Voice

A wall mounted phone shall be installed 48-inches above the finished floor located near the exit.

17.2.28 Raceways and Supports

The Designer shall show details of a cable tray system around the entire perimeter of the room and routed above each equipment rack/cabinet. The mounting height shall be a minimum of 12-inches above the racks and shall be supported directly to the structural ceiling above.

17.2.29 Fire Alarm System Interface

A Honeywell monitoring module and smoke detector shall be installed at the location of the Pre-Action (or Clean Agent) Fire Alarm Control Panel that protects the Communications Room(s). The monitoring module serves as the interface between the fire protection system protecting the room and the BWI's Fire Alarm System. In general, the fire protection system will have pull stations and audio/visual devices within the Communications Room.

17.2.30 Splice Case and Supports

At the location where the outside plant cabling enters into the building, a splice case and wall support system shall be provided. Coordinate layout with 'Outside Plant System' building entry design.

17.2.31 High Density Protection Field

When exiting the splice case, the copper cabling shall be routed to a high density protector frame using stub cables. The protector frame shall be located adjacent to the splice case and coordinated with the available lengths of stub cables. Distribution stub cables shall be extended from the protector frame to the main wire distribution frame.

17.2.32 Coordination Drawings

See the Appendices for sample drawings. In general, the coordination drawings shall show all systems within the Communications Room, coordinated with each other and shown on a composite drawing. The composite drawing will have related elevations, sections and plan views to validate coordination. In addition, the composite drawing shall show all floor and wall penetrations.

A. Raceways and Supports

Cable tray is the preferred method to route cabling among Communication Rooms.
When cable trays are not feasible, metallic conduits may be used.
All conduits must be marked using the MAA/OAT facilities marking standard

Base design shall provide for 100 % growth in cable capacity.
Cable tray shall contain barriers to separate cables by type and application.
Design consideration shall consider future access to tray for maintenance and cable placement.

Tray shall be labeled as "MAA Use Only"

B. Pull Boxes

In no case shall communication cabling be routed through a pull box containing power cables or non-power limited fire alarm conductors. Pull boxes shall be sized in accordance with the latest approved edition of the National Electrical Code while maintaining the cable manufacturer's minimum bend radius requirements. The distance between pull boxes shall not exceed 150-feet having more than (3) 90-degree bends.

C. Floor/Wall Penetrations:

All wall and floor penetrations shall be made consistent with the design of the conduit/tray to be installed. Conduit penetrations must be sleeved and trays must have "tray portals". All conduits must be marked using the MAA/OAT facilities marking standard

Approved UL listed fire stopping must be specified for fire rated wall penetrations. Fire stopping shall be consistent with requirements as specified for other trades on the project.

17.2.33 Horizontal Distribution:

A. Cable Type

All communications cable must be PLENUM RATED regardless of patching method, and installed in conduit unless approved by OAT Engineer.

B. Raceways and Supports

All wiring shall be installed in accordance with the latest edition of the MAA Design Standard. All cables must be installed in either cable tray or conduit through its entire length. No free run of cable is permitted.

C. Communication Cabling

Base installation requires four Category 6 or better cables to each communication face plate. Provide one Category 6 cable to each wall phone and courtesy phone location. Specialized installations such as dispatch consoles etc. will require cabling quantities and types as necessary to support the specific applications.

D. Communications Face Plate

Shall be a quad-plex outlet. The left side shall be considered the primary circuits, the right side secondary circuits. The top row shall be Voice and the bottom row shall be data. The communications inserts shall be Grey (Voice Primary), Black (Voice secondary), Red (data Primary), Yellow (Data secondary).

E. Floor Penetrations

All floor penetrations to a work station shall use fire-rated poke through assemblies.

F. Wall Penetrations

All wall penetrations to a work station shall be recessed in the wall and terminate in a device box and have a device wall plate. Penetrations shall be sealed to match the rating of the wall construction.

G. A/C UPS Power Receptacles

A duplex 20A/120V UPS receptacle is to be installed adjacent to workstation communication faceplates to support MAA IT PC's and associated hardware. The receptacle shall be orange in color if associated with either UPS support or generator support.

H. Labeling

Permanent labeling must be affixed to near and far end termination points of all cable runs.

All communications facilities are to be labeled in accordance with MAA/OAT Standards. General notes shall reflect the conduit marking in accordance with MAA/OAT facilities marking standard

I. Coordination Documents:

The Designer shall develop and maintain a spreadsheet that quantifies each drop according to its location, application (voice/data) along with its routing distance to the IDF Room.

17.2.34 Equipment Racks/Cabinets

A. General Requirements

A minimum of two 19" open face EIA relay racks shall be provided for each MDF/IDF. One rack to house fiber optic termination, data patch panels, and MAA network hardware. The second rack shall be utilized for special systems hardware and growth. Normal clearances from walls are 36" to front and 30" to rear of equipment. Enclosed equipment racks may be required for other system applications.

B. Space Allocation & Access

Equipment racks shall be dedicated to the cabling used, i.e., multimode fibers, singlemode fibers and copper cabling. Each 19" EIA rack shall have a footprint 21-inches wide and 15-inches deep. In addition, each rack shall have a 6-inch wide cable management section that is 13-inches deep. 36-inches front clearance and rear clearance are also required for access to equipment. Equipment cabinets shall also have similar space requirement within the room.

C. Termination Shelves

Each rack/cabinet shall have the necessary quantity of termination shelves plus one spare shelf.

D. Labeling

All equipment shall be labeled IAW ANSI/TIA/EIA 606 A. Labels identifying twisted pair termination points shall clearly indicate the cable count and provide easy identification of the individual conductors. Labels for the exterior of fiber optic termination cabinets shall identify both near and far end termination points. A labeling record sheet shall be included with the cabinet that details layout and provides the identification of terminated fibers, the label shall also provide a field for recording fiber use detail. Coordinate labeling scheme with MAA OAT.

E. Splicing Shelves

Each rack/cabinet shall have the necessary quantity of splicing shelves plus one spare shelf.

F. UPS

Each rack/cabinet containing power equipment shall have an Uninterruptible Power Supply (UPS) as specified and fed from the normal/Standby Power system.

G. Power Strips

Each rack/cabinet containing power equipment shall have two power strips vertically installed, one on each side. Coordinate with MAA OAT on the need for twist-lock receptacles at the rack, utilizing 30A, 120V circuits.

H. Grounding/Bonding

Each rack/cabinet shall be grounded and bonded.

I. Anchoring

Each rack/cabinet shall be securely anchored to the floor.

17.2.35 Systems Not Permitted Within an MDF/IDF Room:

A. Flexible Response System

Raceway, conductors and/or signaling devices.

B. Lightning Protection

Down conductors or grounding components.

C. Equipment

Any Tenant or MAA hardware, electronic equipment, wiring or racks that have not been approved by the OAT Engineer

D. Electronic Noise Emitters

Any equipment that emits EMI/EMF

17.2.36 Request for Variance

If the Designer wishes to request an exception to the IT section as applied to a specific project, he/she should submit the attached "Request for Variance" form for approval (Appendix B). Every effort should be made to meet the Standard outlined and requests for variances will only be considered for instances where sufficient technical, budgetary and code merit exists. It is recommended that the Designer contact the Division of Airport Technology (OAT) to informally discuss the circumstances of a possible request for variance prior to submission. Variances require the OAT Engineer and the Director OAT approval. The request for Variance should identify if and when a "variance" to the Standard is requested.

17.2.37 Changes to this Section

Changes to this section can be requested by submitting the attached "Change Request" (Appendix B). Sufficient technical and/or budgetary and/or code merit must be proven. Changes will be reviewed and approved by the parties noted on the Change Request Form.

17.2.38 Reserving MAA Communications Resources

During the design of new projects if MAA Communications Resources are required a request a Resources allocation request must be submitted and approved by OAT.

MAA Communications Resources is defined as any object or communications requirement that will be placed in or run thru a MAA Communications room. For example

1. Request for fiber optics
2. Placement of Equipment, to include foot print of cabinets, BTU output of equipment, power requirements

17.3 EMERGENCY TENANT PAGING SYSTEM REQUIREMENTS

17.3.1 Ambient Noise in Tenant Space

Ambient noise **WILL NOT** exceed 65 decibels (Db) in tenant spaces, measured from the center of the space at a height of 60 inches. The MAA Fire Marshall or designee will perform random ambient noise measurements, if the ambient noise levels exceed 65 Db the tenant will be required to eliminate the source of the violation.

17.3.2 NFPA 101 Life Safety Code

New Assembly Occupancies

12.3.4.3 Notification. The required fire alarm system shall activate an audible and visible alarm in a constantly attended receiving station within the building when occupied for purposes of initiating emergency action.
12.3.4.3.1 Positive alarm sequence in accordance with 9.6.3.4 shall be permitted.
12.3.4.3.2 Reserved.
12.3.4.3.3 Occupant notification shall be by means of visible signals and voice announcements, live or prerecorded, initiated by the person in the constantly attended location.
12.3.4.3.4 The announcement shall be made via an approved voice communication or public address system, provided with an emergency power source, which is audible above the ambient noise level of the assembly occupancy.

Existing Assembly Occupancies

13.3.4.3 Notification. The required fire alarm system shall activate an audible alarm in a constantly attended receiving station within the building when occupied for purposes of initiating emergency action.
13.3.4.3.1 Positive alarm sequence in accordance with 9.6.3.4 shall be permitted.
13.3.4.3.2 A pre-signal system in accordance with 9.6.3.3 shall be permitted.
13.3.4.3.3 Occupant notification shall be by means of voice announcements, either live or prerecorded, initiated by the person in the constantly attended location.
13.3.4.3.4 The announcement shall be made via an approved voice communication or public address system that is audible above the ambient noise level of the assembly occupancy.

The terminal building is assembly occupancy. All public accessible areas need to be covered by the Emergency Paging system.

17.3.3 General Note

Provide conduit ¾ minimum, bushed ends, to Paging Access Point (PAP) approved by MAA Manager, Telecommunications. A pull string must remain in conduit after installation. MAA does not provide speakers, conduit or wiring. Tenants are responsible for coordination with MAA and WPS.

Contractor shall verify Emergency Tenant Paging capacity with Timothy Watson, Manager Telecommunications at these locations. If capacity is available the tenant's responsibility ends at the PAP.

If capacity is not available the Tenant is to install additional wiring per OAT Standards and Specifications using existing conduit and raceways from designated PAP to paging room.

17.3.4 Existing Spaces

If there is existing BWI Paging speakers or wiring installed and work will involve demolition, or moving the speakers. The contractor **MUST** contact the MAA Manager, Telecommunications at 410-859-7972 ten (10) business days prior to commencing work. The contractor is NOT allowed to move or disable live paging equipment.

17.3.5 Background Audio Shunt (Required if ambient noise exceeds Ambient Noise Specifications)

If an independent tenant paging, background music system, TV or the presence of ambient noise, in excess of 65 Db is installed an audio shunt capable of receiving an "open/Closed" 48 VDC, muting contact to the MAA Paging system must be provided. The shunt equipment and design must be signed and sealed by a licensed Electrical Engineer with a specialty in Life Safety Systems. Further the shunt circuit must be extended to the closest MAA approved communications room for connection to the MAA system by MAA. WPS must approve the audio shunt.

MAA will provide all equipment necessary to make the shunt operational in the MAA wiring closet. The tenant is responsible for all wiring from the tenant space to the MAA wiring closet and the actual device(s) required to shunt their equipment.

17.3.6 New Spaces

All new spaces, or spaces and applications deemed by the Fire Marshall as having the requirement for Emergency Tenant Paging. The tenant will install the speakers and other equipment or conduits as defined in this document.

NOTE: Washington Professional Systems (WPS) must be used for all work. WPS is the service provider for MAA's paging system. Emergency Tenant Paging must be 100% compatible with existing system

1. **Speaker wiring requirement**: The wire needs to be 16 gauge Stranded Twisted Pair West Penn 25225B or functional equivalent approved by MAA Office of

Airport Technology, Manager of Telecommunications. This wire is to be installed in the conduit as noted on plans.

2. **Ambient noise shunt requirement**: The wire needs to be 16 gauge Stranded Twisted Pair West Penn 25225B or functional equivalent approved by MAA Office of Airport Technology, Manager of Telecommunications. This wire is to be installed in the conduit as noted on plans. Use of the PA conduit is allowed.

3. **Speaker Requirement:** The speakers must be either surface mounted or flush mounted. The MAA preference is flush mounted. Most of the tenant spaces only need a few speakers to provide the coverage required by the Fire Marshal.

See specifications below **all speakers must be tapped at 4 Watts**

S1	Soundolier	1	FAP-62T (6 inch)	Ceiling Speaker System w/ transformer
	Soundolier	1	FAP-62TR	Speaker Suspension Kit
	Soundolier	1	FAP42T (4 inch)	Ceiling Speaker System w/ transformer
S2	Soundolier		SM52T-W	Surface Mount Speaker System
	WPS		Custom	Mounting Bracket

4. Tenant to provide WPS a copy of the ceiling plan. WPS will provide technical assistance with the proper placement of the speakers and associated wiring.

   WPS Contact
   Dave Leister
   General Manager, Engineered Systems Group
   Cell 301-370-4746

5. Tenant will provide associated electronic support devices to make the Emergency Tenant Paging System operational in their space.

   NOTE: For example if the tenant Emergency system requires additional head end equipment, the tenant will furnish this equipment.

   The MAA will provide all common equipment for the system under a different project.

6. The tenant will provide an inventory/copy of invoice from WPS along with a list of required electronic support devices (item4) to

   MAA/OAT
   Timothy Watson
   Manager, Telecommunications
   410-859-7972

7. Any equipment purchased for the head end (item 4) that is not installed must be turned into MAA, Telecommunications Manager for installation and programming by MAA paging Vendor. This statement assumes the backbone system is not installed or operational at the time of Permit.

   Conduits for system must be marked in accordance with the **Office of Airport Technology facilities Warning Label marking Standard**. These can be obtained by contacting

   MAA/OAT
   Timothy Watson
   Manager, Telecommunications
   410-859-7972

17.4 OAT WARNING LABEL MARKING

17.4.1 Purpose

The OAT Facilities Warning Label marking standard has two main goals.

a. Disaster recovery. In the event of a disaster to the physical plant, room(s) or infrastructure the standard will expedite the identification of the OAT facilities that are damaged.
b. Contractor warning. When work is being done in the area they will know not to remove or relocate OAT infrastructure.

17.4.2 Permanent Markings (Inside Plant)

Color Banding Raceways and exposed cables: Band exposed and accessible raceways of the systems listed below:

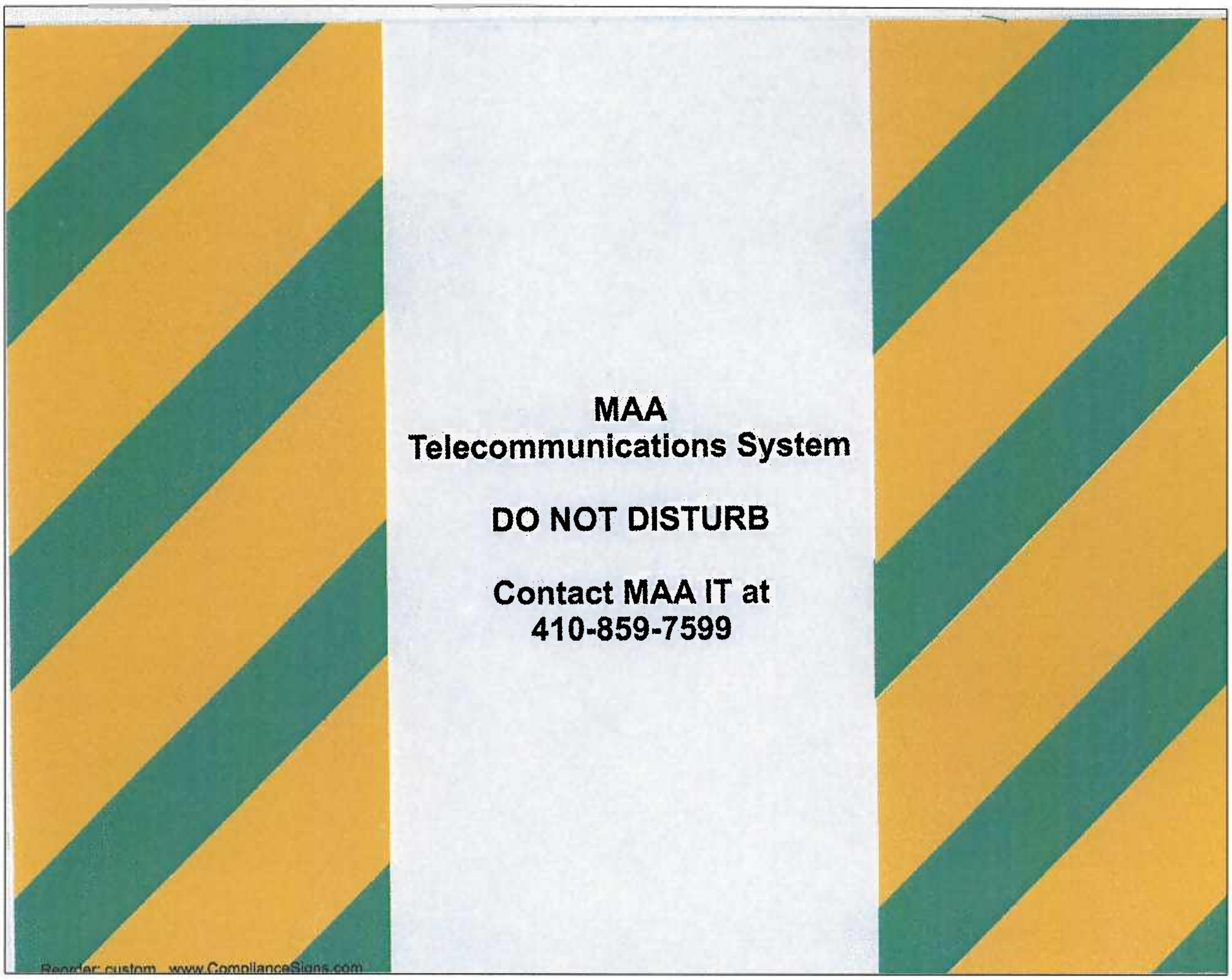
A. Bands: Pretensioned, wrap around plastic sleeves; colored adhesive tape: or a combination of both. Make each color band 2 inches wide, completely encircling conduit, and place adjacent bands of two color markings in contact, side by side.

B. Band Locations:

   a. At changes in direction,
   b. Within 5 feet of penetrations of walls, ceilings and floors.
   c. At 50 foot maximum in straight runs, and at 25 foot maximum intervals in congested areas (This requirement may be waived in public areas at the discretion of the Management of the Office of Airport Technologies).
   d. Call 410-859-7599 give type of label and you will be directed to the proper authority.

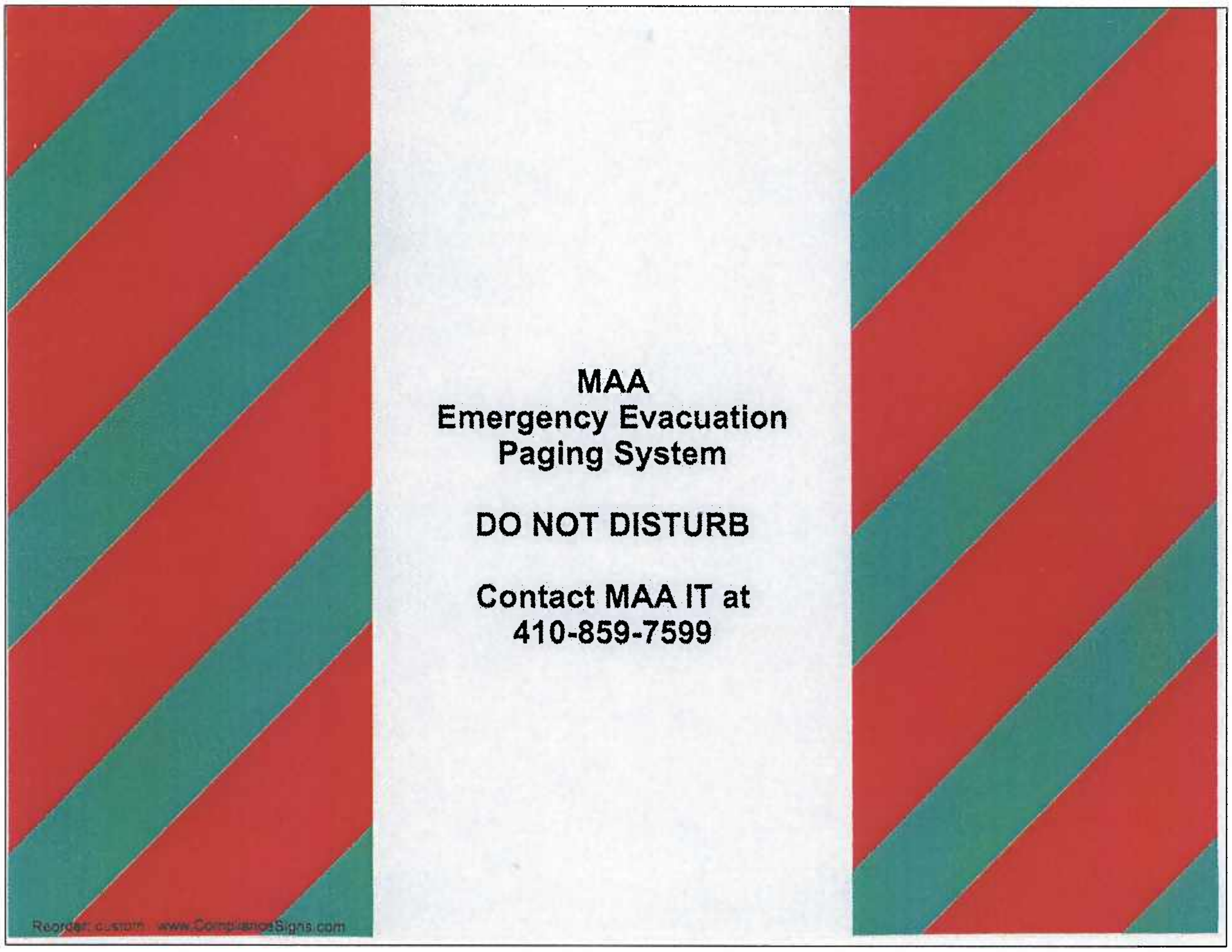
Office of Airport Technology contact list
Timothy Watson, Manager, Telecommunications (Paging and Telecommunications)
Robert Polkiewicz, Manager, IT network Engineering (Data Networks)
Neal Heaton, Manager, Enterprise Services (Fiber Optics Plant)

1. **Telecommunications System: Green and Yellow**
   There shall be a written description between the end bands. For Telecommunications System it will state "MAA Telecommunications System, **DO NOT DISTURB**, Contact MAA IT 410-859-7599"



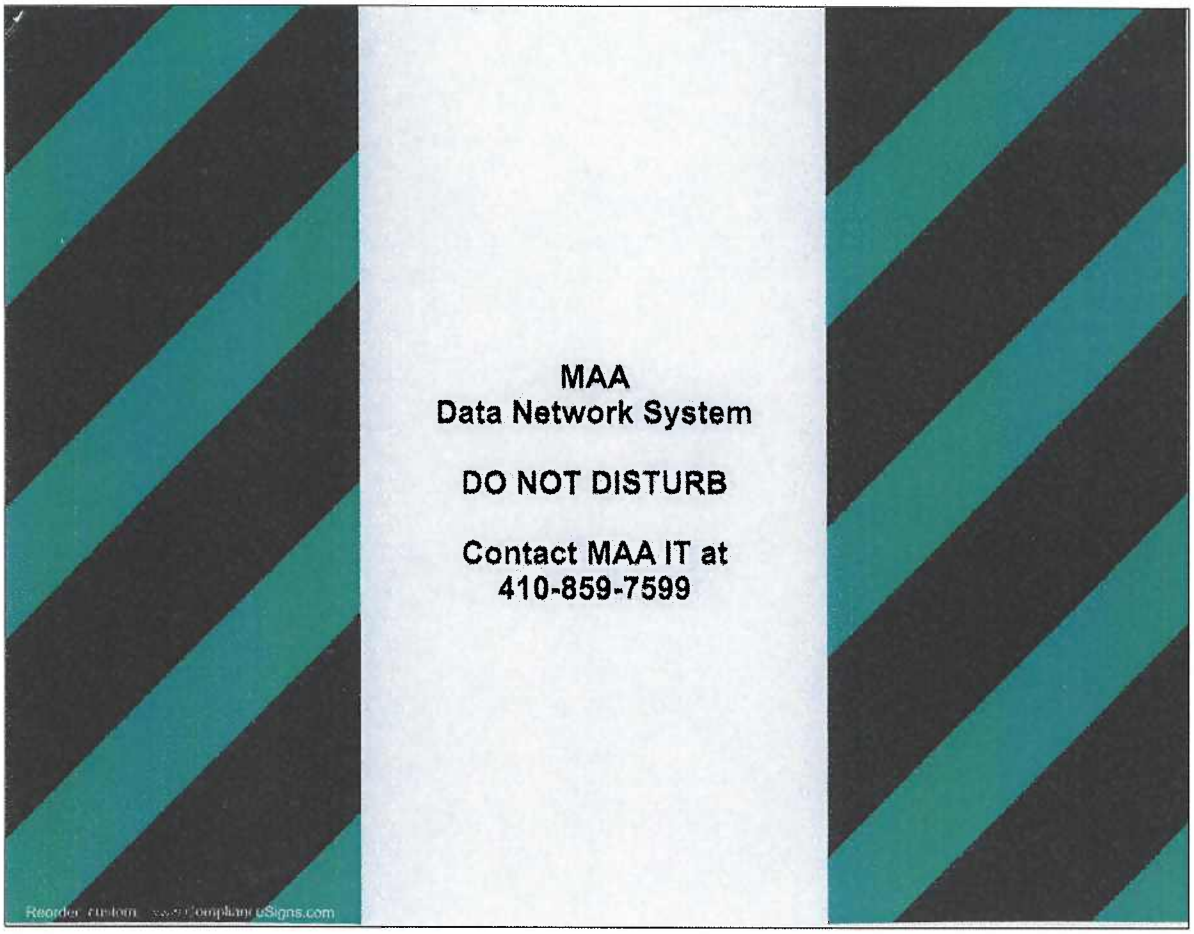
2. Emergency Paging System: Green and Red

There shall be a written description between the end bands. For Paging System it will state "MAA Emergency Evacuation Paging System, **DO NOT DISTURB**, Contact MAA IT 410-859-7599"

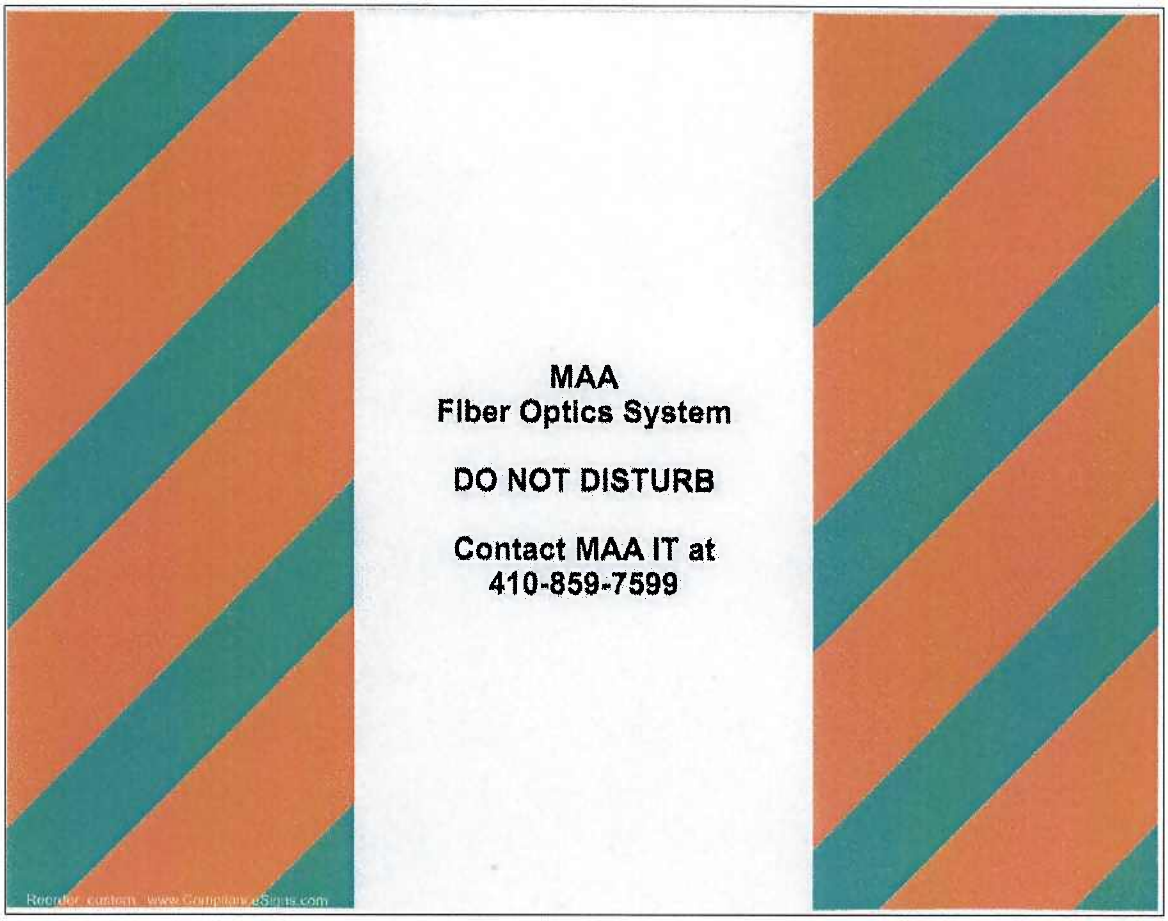


3. Data Networks: Green and Black

There shall be a written description between the end bands. For Data Network System it will state "MAA Data Network System, **DO NOT DISTURB**, Contact MAA IT 410-859-7599"



4. **Fiber Optics Plant: Green and Orange**
   There shall be a written description between the end bands. For Fiber Optics Plant System it will state "MAA Fiber Optics System, **DO NOT DISTURB**, Contact MAA IT 410-859-7599"



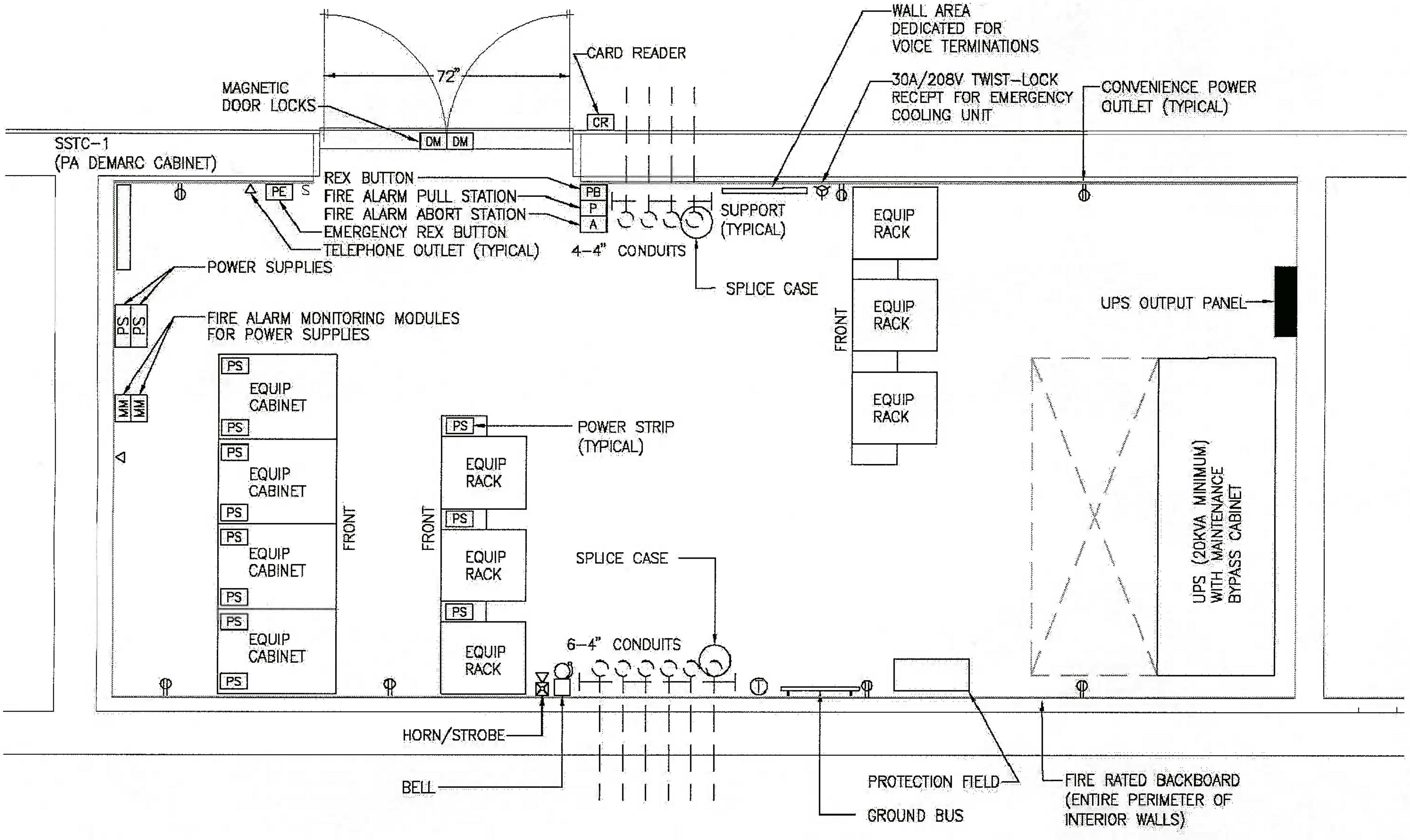
C. Installation Standard

1. The stickers will be installed so the text portion of the warning sticker is visible and readable from the ground. The user shall be able to read the warning from ground level.

2. The warning label may be trimmed to avoid overlap of the text

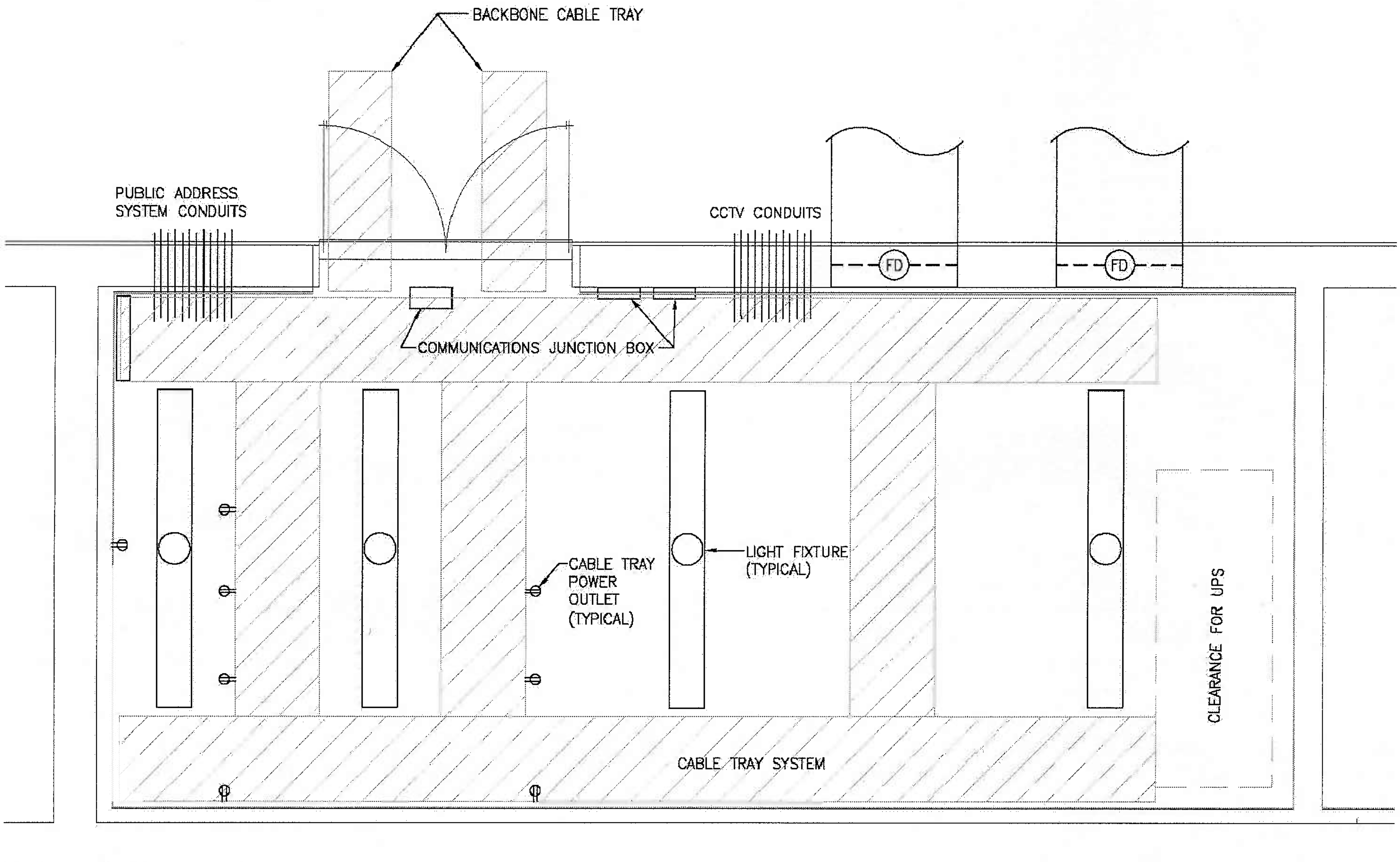
17.5 SAMPLE DRAWINGS MDF AND IDF

Refer to the following pages for sample MDF and IDF room layouts.



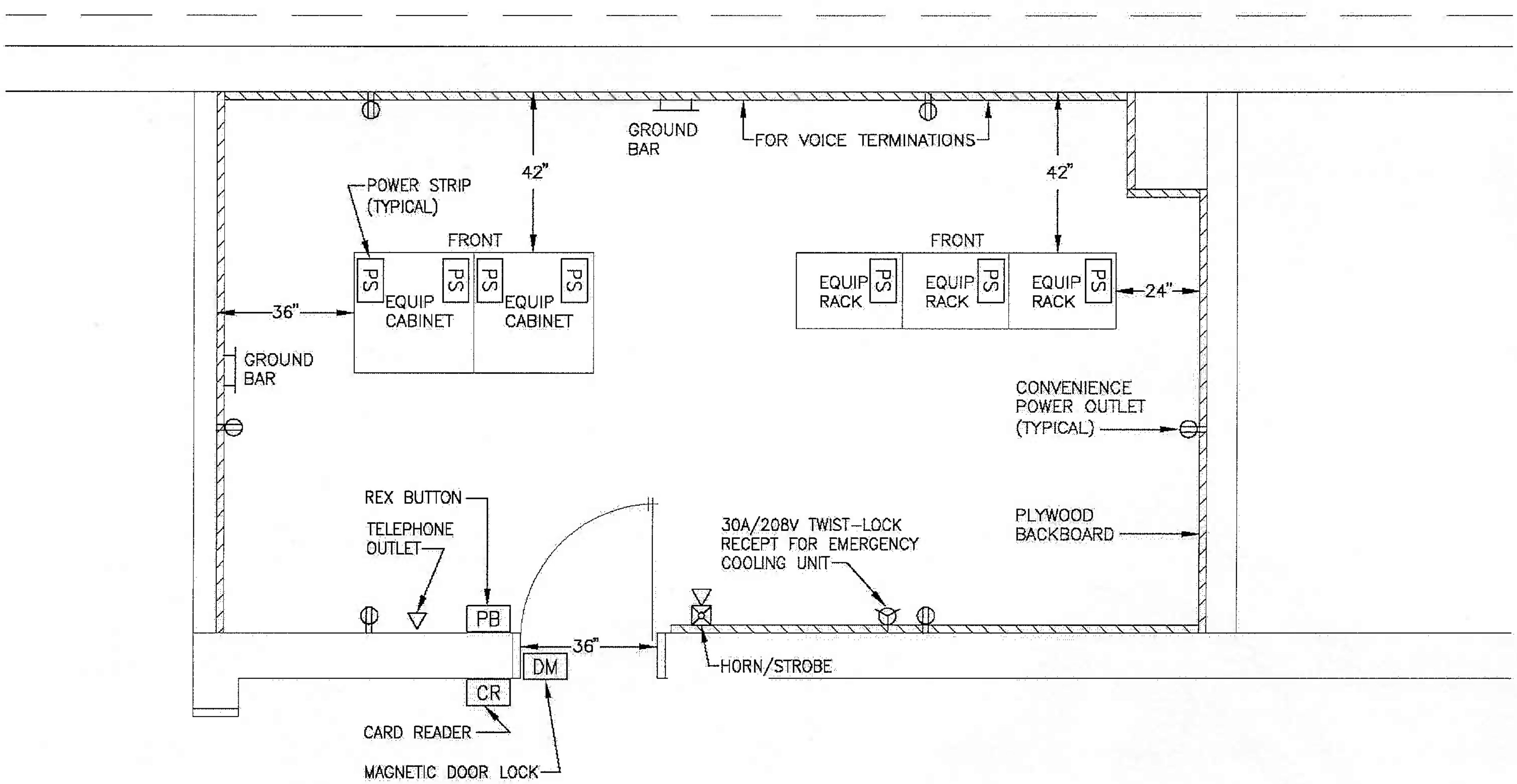
SHEET TITLE: SAMPLE MDF ROOM LAYOUT 1

DATE: AUGUST 2009



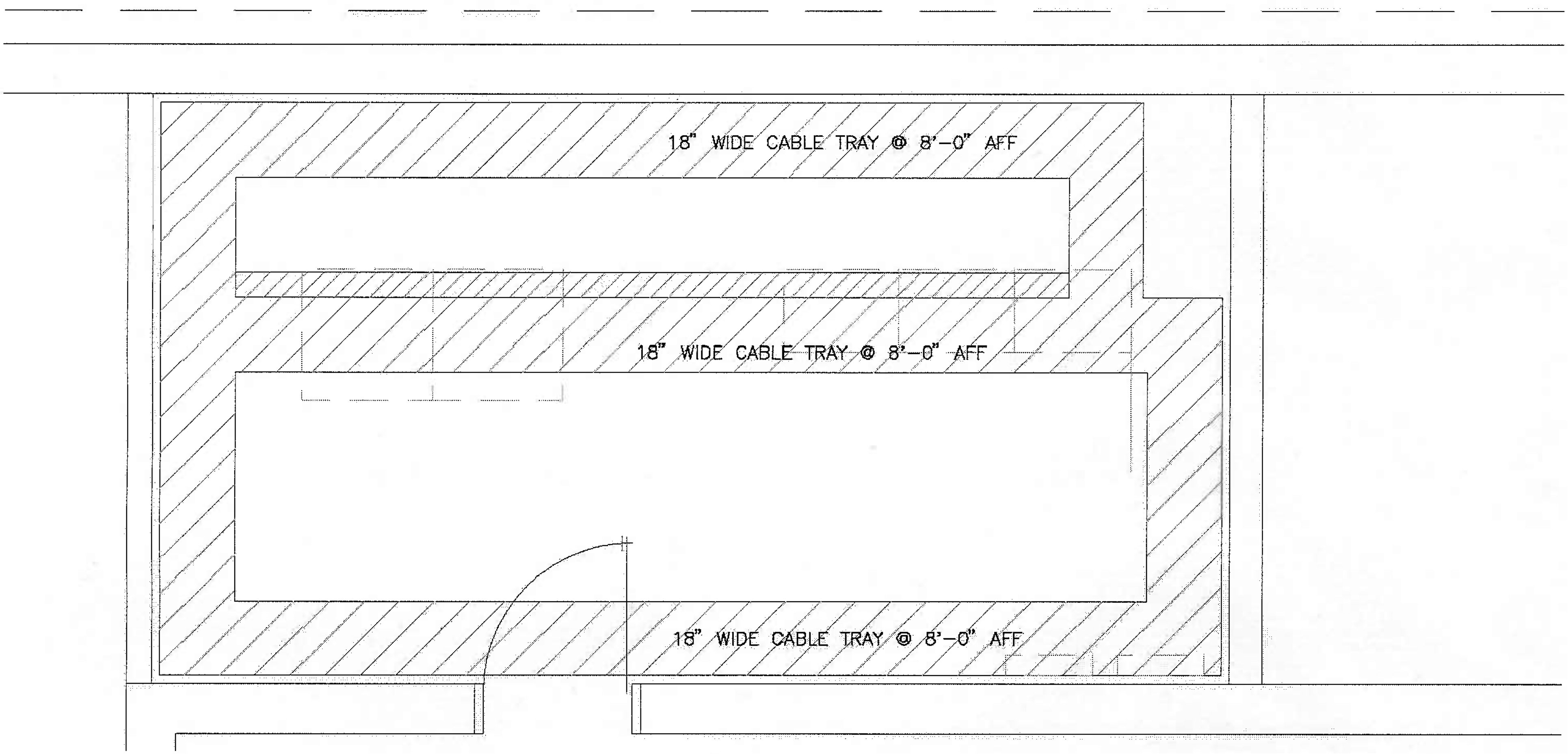
SHEET TITLE: SAMPLE MDF ROOM LAYOUT 2

DATE: AUGUST 2009



SHEET TITLE: SAMPLE IDF ROOM LAYOUT 1

DATE: AUGUST 2009



SHEET TITLE: SAMPLE IDF ROOM LAYOUT 2	DATE: AUGUST 2009

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.

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.

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.

18.2 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 ¾" 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.

<u>Protection for Data Cabling</u>

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.

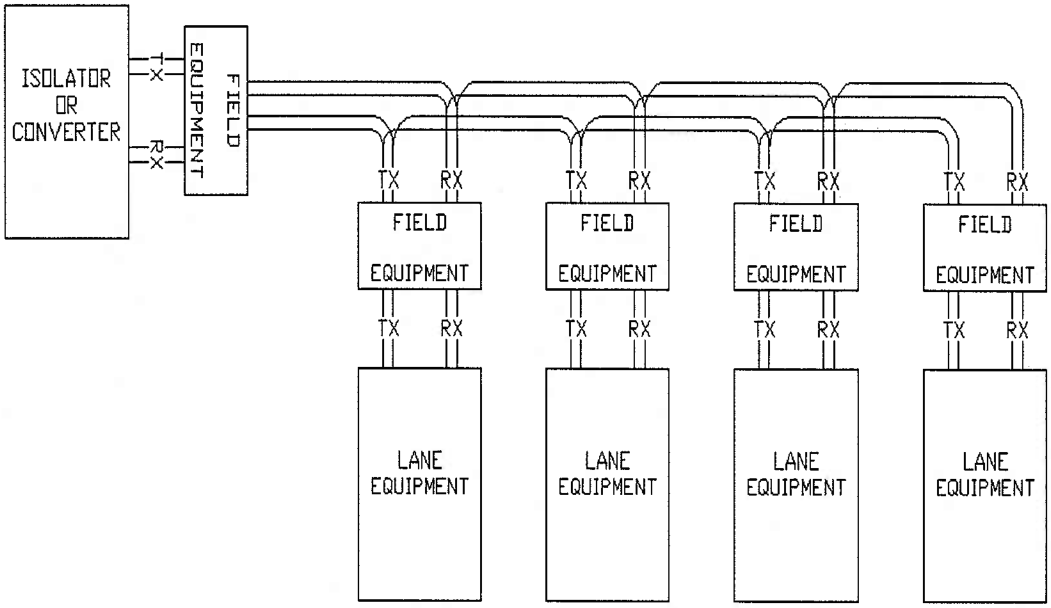


Figure 1 – Inter-Lane Cabling Configuration

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.

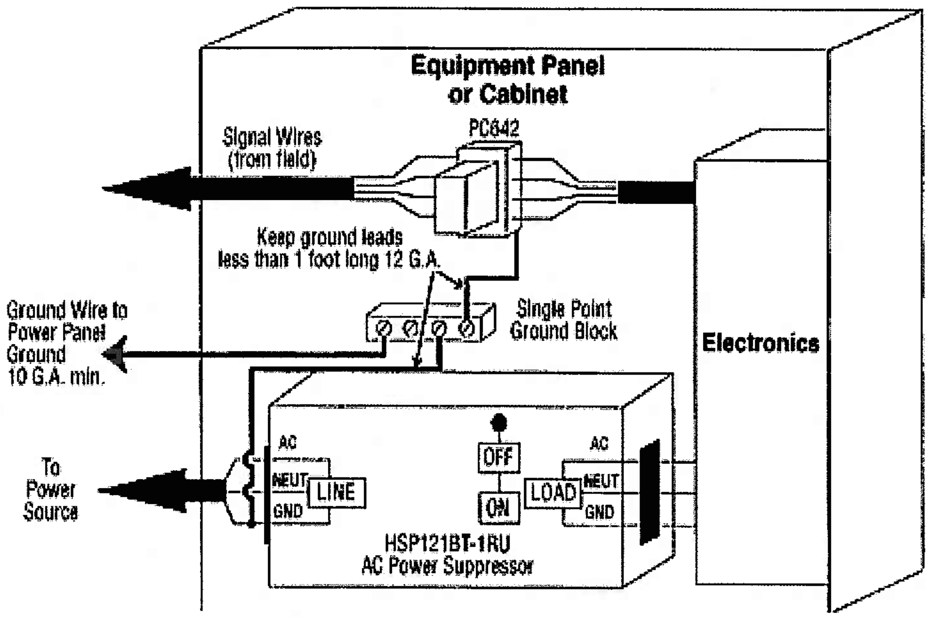


Figure 2 – Chassis Bonds for Suppressor Grounds

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.

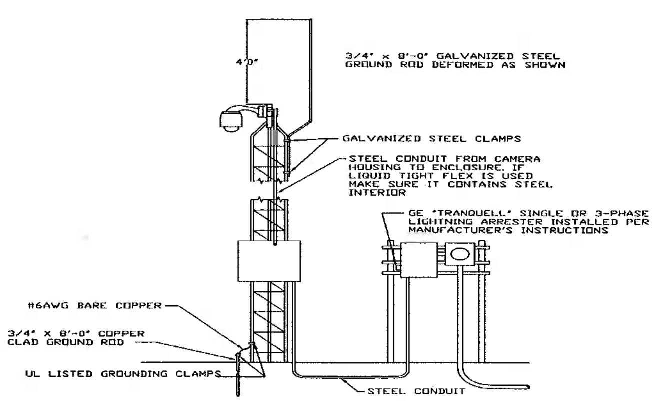


Figure 3 – CCTV Camera Tower Recommendations

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.

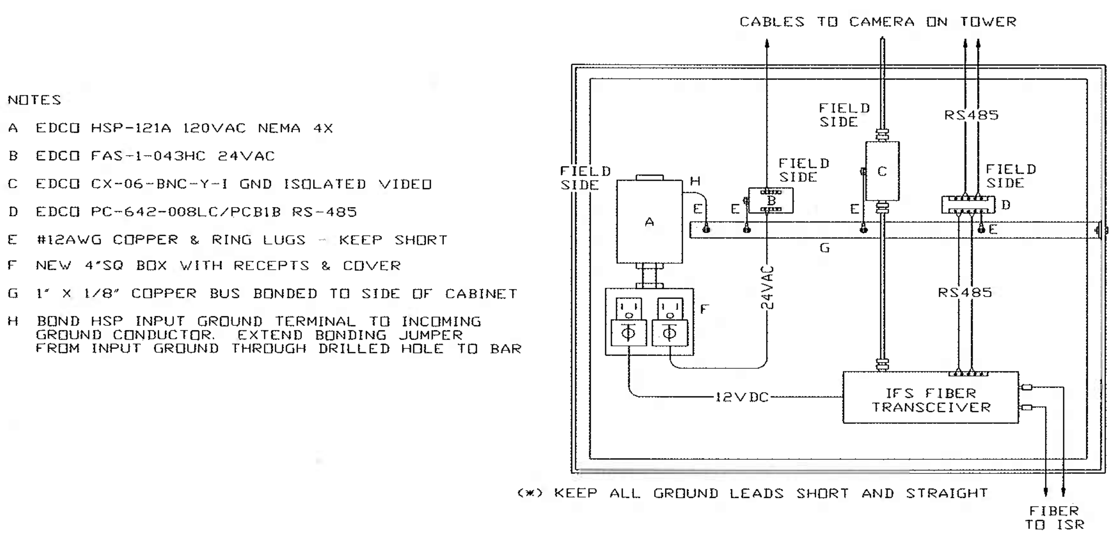


Figure 4 – CCTV Equipment Enclosure Recommended Configuration

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.

1.8.2.2.3 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.

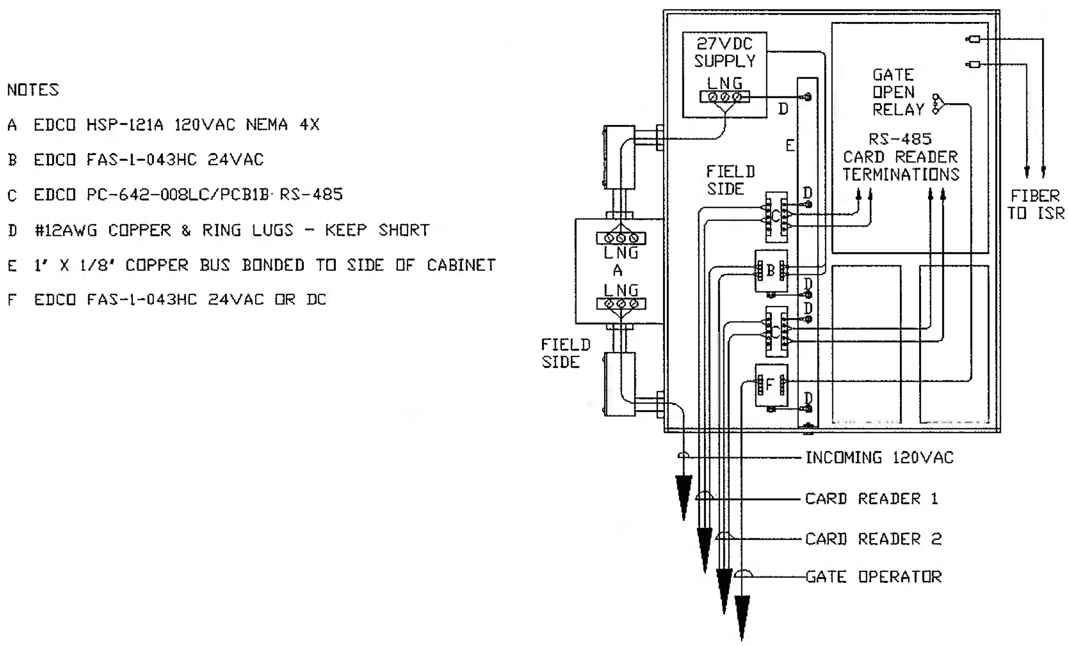


Figure 5 – Gate Access Control Recommended Configuration

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 .

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).

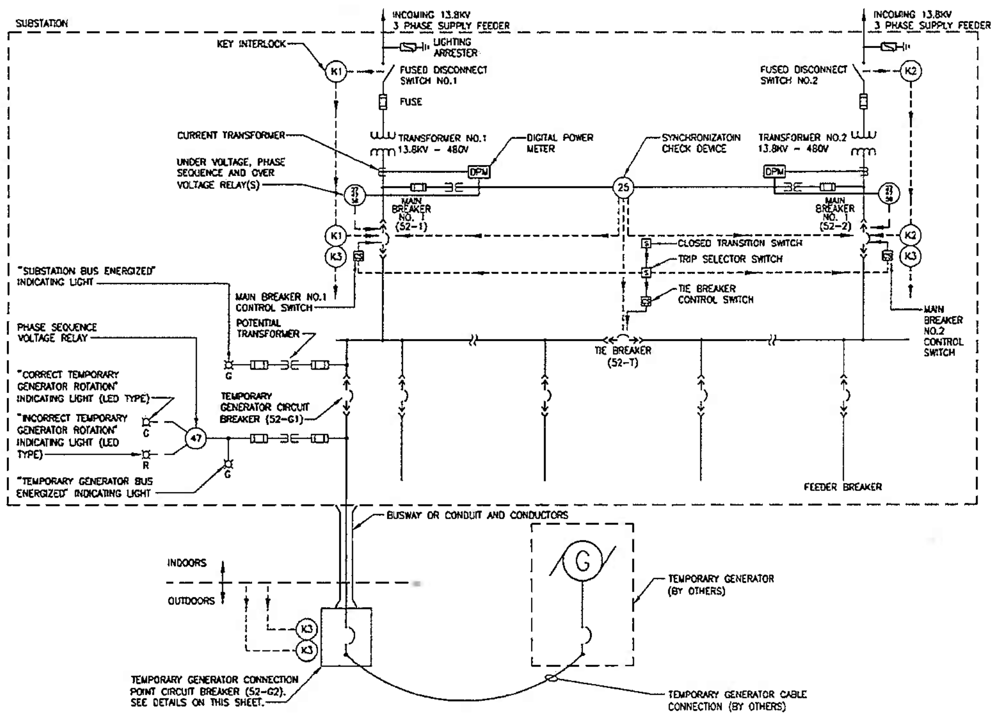
4. All substation short-circuit ratings shall be adequate for the combined available fault current contribution due to secondary closed transition switching. The available fault current shall be calculated for the moment that both secondary main breakers and the tie breaker are simultaneously closed 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) sending 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.

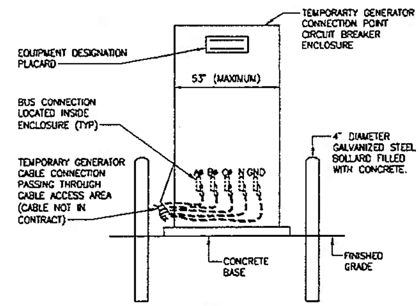
   The designer shall contact MAA maintenance personnel to see if any operating problems have occurred recently with closed transition operation at existing substations. If so, the designer shall request that BGE perform a circulating study. The designer shall make recommendations based on the results of 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.



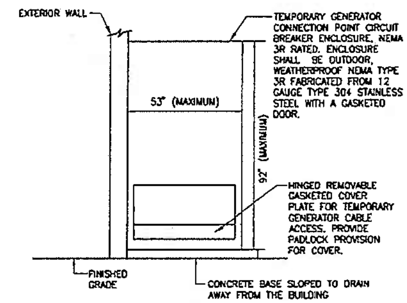
SUBSTATION ONE-LINE DIAGRAM

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

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DESIGNED	D.M.W.
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APPROVED	D.L.B.

REVISION NO.	REVISION DATE	DESCRIPTION

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

BWI

BALTIMORE/WASHINGTON INTERNATIONAL AIRPORT

PROJECT TITLE	
SHEET TITLE	SUBSTATION ONE-LINE DIAGRAM
SCALE	NONE
DATE	AUGUST, 2003
SHEET NO.	

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SUBSTATION OPERATING DESCRIPTION

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 IN 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 SECONDARY CLOSED TRANSITION SWITCHING SCHEME ALLOWING FOR MOMENTARY SIMULTANEOUS CLOSING OF BOTH SECONDARY MAIN CIRCUIT BREAKERS AND TIE 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 TIE 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 TIE 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 TIE 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 TIE 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 ACTIVATED ON ANY SECONDARY BREAKER (MAIN BREAKER NO. 1, BREAKER NO. 2 OR TIE). BELL ALARM IS INDICATION 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 WHEN 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 (52-01) 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 CONTROL ROTATION INDICATING LIGHT FUNCTIONS.

SUBSTATION SECONDARY CLOSED TRANSITION SWITCH SCHEME SEQUENCE OF OPERATION

OPERATION 1: PERFORM CLOSED TRANSITION SECONDARY SWITCHING FROM NORMAL TO ALTERNATE CONFIGURATION.

CIRCUIT BREAKER	INITIAL STATUS	STATUS AFTER SWITCHING
MAIN NO. 1 (52-1)	CLOSED	CLOSED
TIE (52-T)	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 TIE 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.

CIRCUIT BREAKER	INITIAL STATUS	STATUS AFTER SWITCHING
MAIN NO. 1 (52-1)	CLOSED	CLOSED
TIE (52-T)	CLOSED	OPEN
MAIN NO. 2 (52-2)	OPEN	CLOSED

1. CLOSED TRANSITION SWITCH TO "ON" POSITION.
2. TRIP SELECTOR SWITCH TO "TIE" POSITION.
3. CLOSE MAIN NO. 2 BREAKER VIA CONTROL SWITCH.
4. AFTER TIME-OUT PERIOD TIE BREAKER AUTOMATICALLY OPENS.

OPERATION 3: PERFORM CLOSED TRANSITION SECONDARY SWITCHING FROM NORMAL TO ALTERNATE CONFIGURATION.

CIRCUIT BREAKER	INITIAL STATUS	STATUS AFTER SWITCHING
MAIN NO. 1 (52-1)	CLOSED	OPEN
TIE (52-T)	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 TIE 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.

CIRCUIT BREAKER	INITIAL STATUS	STATUS AFTER SWITCHING
MAIN NO. 1 (52-1)	OPEN	CLOSED
TIE (52-T)	CLOSED	OPEN
MAIN NO. 2 (52-2)	CLOSED	CLOSED

1. CLOSED TRANSITION SWITCH TO "ON" POSITION.
2. TRIP SELECTOR SWITCH TO "TIE" POSITION.
3. CLOSE MAIN NO. 1 BREAKER VIA CONTROL SWITCH.
4. AFTER TIME-OUT PERIOD TIE BREAKER AUTOMATICALLY OPENS.

OPEN TRANSITION: OPEN TRANSITION SECONDARY SWITCHING CAN BE PERFORMED WHEN CLOSED TRANSITION SWITCH IS IN "OFF" POSITION.

SUBSTATION AUTOMATIC TRANSFER SCHEME SEQUENCE OF OPERATION

PROVIDE AN OPEN TRANSITION AUTOMATIC TRANSFER SCHEME WITH THE FOLLOWING FUNCTIONS:

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-T) 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-T) IN ORDER TO AUTOMATICALLY SUPPLY ENTIRE SUBSTATION LOAD.

5. WHEN INCOMING UTILITY SOURCE IS RE-ENERGIZED, 52-1, 52-2, AND 52-T 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.

SUBSTATION GENERATOR QUICK CONNECT SEQUENCE OF OPERATION

SUBSTATION DEVICE	SUBSTATION DEVICE STATUS (NORMAL SYSTEM OPERATION)	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
TIE BREAKER (52-T)	OPEN	CLOSED
TEMPORARY GENERATOR CIRCUIT BREAKER (52-G1)	CLOSED	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 TIE CIRCUIT BREAKER (52-T).

7. REMOVE KEY K3 FROM BOTH SECONDARY MAIN CIRCUIT BREAKERS. INSERT BOTH K3 KEYS INTO TEMPORARY GENERATOR CONNECTION POINT CIRCUIT BREAKER (52-G2).

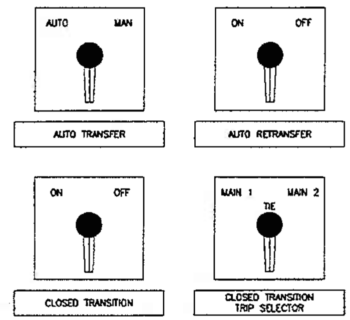
8. CONNECT TEMPORARY GENERATOR CABLE CONNECTION FROM GENERATOR TO TEMPARARY CONNECTION POINT CIRCUIT BREAKER (52-G2).

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.



SUBSTATION AUTOMATIC TRANSFER AND CLOSED TRANSITION SCHEME - CONTROL SWITCH LAYOUT

NOT TO SCALE

NOTE:

1. PROVIDE CONTROL SWITCH LAYOUT AT SWITCHGEAR TRANSFER CONTROLS SECTION.

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REVISION NO.	REVISION DATE	DESCRIPTION

BWI
MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING
BALTIMORE/WASHINGTON INTERNATIONAL AIRPORT

PROJECT TITLE
SHEET TITLE SUBSTATION SEQUENCE OF OPERATION
SCALE NONE
DATE AUGUST, 2003
SHEET NO.

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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.

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.

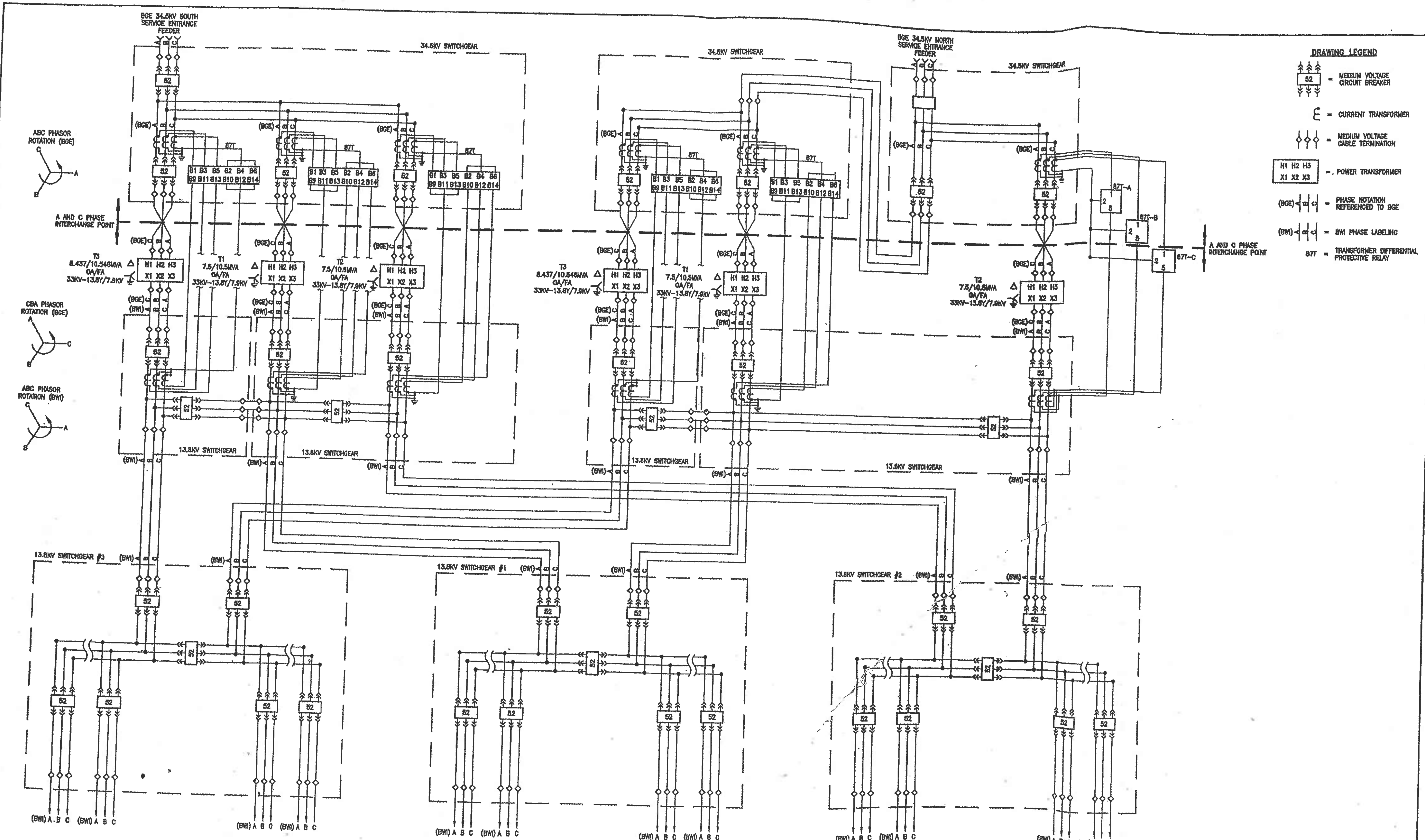
The term phasing refers to the fact that the BWI Marshall medium voltage distribution system is a three-phase system. The phases are labeled A, B and C in accordance with industry standard practices. If system phasing is correct, rotation is also correct. System phasing must be consistent throughout the medium voltage distribution system 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. System rotation must be consistent throughout the distribution system.

The existing phasing and rotation conditions for the medium voltage distribution system down to Switchgear #1, #2 and #3 are shown in the following three-line diagram, Exhibit titled "BWI Medium Voltage Distribution System Three-Line Diagram". The three-line diagram shows that A and C phases are interchanged at the primary of each power transformer located in the BWI Marshall North and South substation. This phase orientation was present when the Airport was supplied from the original North substation (now the Air Cargo substation) and the South substation. When the new BWI Marshall North substation was first installed as part of the Terminal Roadways and Utilities project (MAA-CO-94-017), A and C phases were interchanged to match the existing phasing conditions at the South substation. When the North and South substations were modified during the Substation Upgrades At BWI Marshall project (MAA-CO-01-010), A and C phases were interchanged on all new and resupplied power transformers at the North and South substations to match the existing BWI Marshall phasing conditions. Also shown on the exhibit are the associated transformer differential protection relay control wire modifications to compensation for the A and C phase interchange.

The phasing conditions shown on the exhibit are marked (BGE) when referenced to the incoming BGE phasing and are marked (BWI) to indicate BWI Marshall system labeling. The incoming BGE feeders are ABC rotation. The BWI Marshall system is ABC rotation (when referenced to BGE) down to the point that A and C phases are interchanged. This point is labeled on the exhibit. Beyond this point, the BWI Marshall system is CBA (when referenced to BGE); however, the BWI Marshall system is labeled and operated as an ABC rotation system or downstream Airport distribution equipment. As long as the existing BWI Marshall system labeling remains consistent from this point down into the distribution system, there should be no phasing or rotation discrepancies. For future projects at the Airport, the existing phase labeling should remain in use unless work is being performed at the North or South substations, in which case the phase A and C interchange should be accounted for. The designer shall contact BGE at 410-291-3156 to coordinate all work at the North and South substations.

When three-phase temporary generators are used on the Airport distribution system, it may be required to interchange the Generator A and C phase connection (i.e., connect Generator A phase to BWI Marshall C phase, B phase to B phase and C phase to A phase) to match the BWI Marshall system rotation. 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 V 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 most substations. A substation quick connect sequence of operation placard is required by the MAA Substation Design Standard 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.



BWI BALTIMORE/WASHINGTON INTERNATIONAL AIRPORT	MARYLAND DEPARTMENT OF TRANSPORTATION MARYLAND AVIATION ADMINISTRATION OFFICE OF ENGINEERING AND CONSTRUCTION MANAGEMENT	PROJECT TITLE	BWI DESIGN STANDARD DST 2005 - 01
		SHEET TITLE	BWI MEDIUM VOLTAGE DISTRIBUTION SYSTEM THREE - LINE DIAGRAM
URS CONSULTING ENGINEERING AND PLANNING 1099 Winterson Road Linthicum, MD 21090 Phone: 410-855-6160 Fax: 410-855-6163		SCALE NONE DATE FEBRUARY 2005	PROJECT NO. -- SHEET REFERENCE -- EXHIBIT NO.

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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 partion.

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 semirecessed lighting fixtures: FMC or MC. Use maximum of 6 foot length from fixture to junction box only.

7. Minimum raceway size: ¾ 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.

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.

18.4.3 Boxes and Wiring Devices

18.4.3.1 Electrical Receptacles

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. Regular power receptacles for corridors, hallways, and other areas subject to heavy use by housekeeping and cleaning machinery should be equivalent in quality to Pass & Seymour (P&S) 5362A. In other regular or normal power use areas, receptacles equivalent in quality to P&S Type 5362 should be specified. The receptacles shall be side wired.

Cover plates for receptacles shall be brushed stainless steel.

Receptacles shall be identified by color-coding the body according to type of circuit connected to per the following:

Regular Power	Brown or Ivory
Uninterruptible Power Source (UPS)	Red
Isolated Ground	Orange/or Ivory with Orange Triangle

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 ~~month~~ 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.

18.6 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. 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

All projects shall be designed to specify light fixtures that require lamps that the DOM currently keeps in stock. A list of those lamps is available from the Office of Design. Approval must be obtained from DOM to specify light fixtures that require lamps that are not listed. Neon lighting is not acceptable.

The use of dimming systems shall be limited. When applicable, the design shall be kept simple and shall be reviewed and approved by the DOM.

19.1.1 Lamp Ballasts

Effective January 1, 2008 Mercury Vapor Lamp Ballasts shall not be manufactured or imported per the Energy Policy Act of 2005. Therefore Mercury Vapor Lamp Ballasts shall not be used in design at any BWI Marshall or MTN facilities.

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. 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 ~~should make every attempt to avoid penetrating~~ 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

19.2.2.1 Lighting and Visual Aid Systems and Fixtures

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."

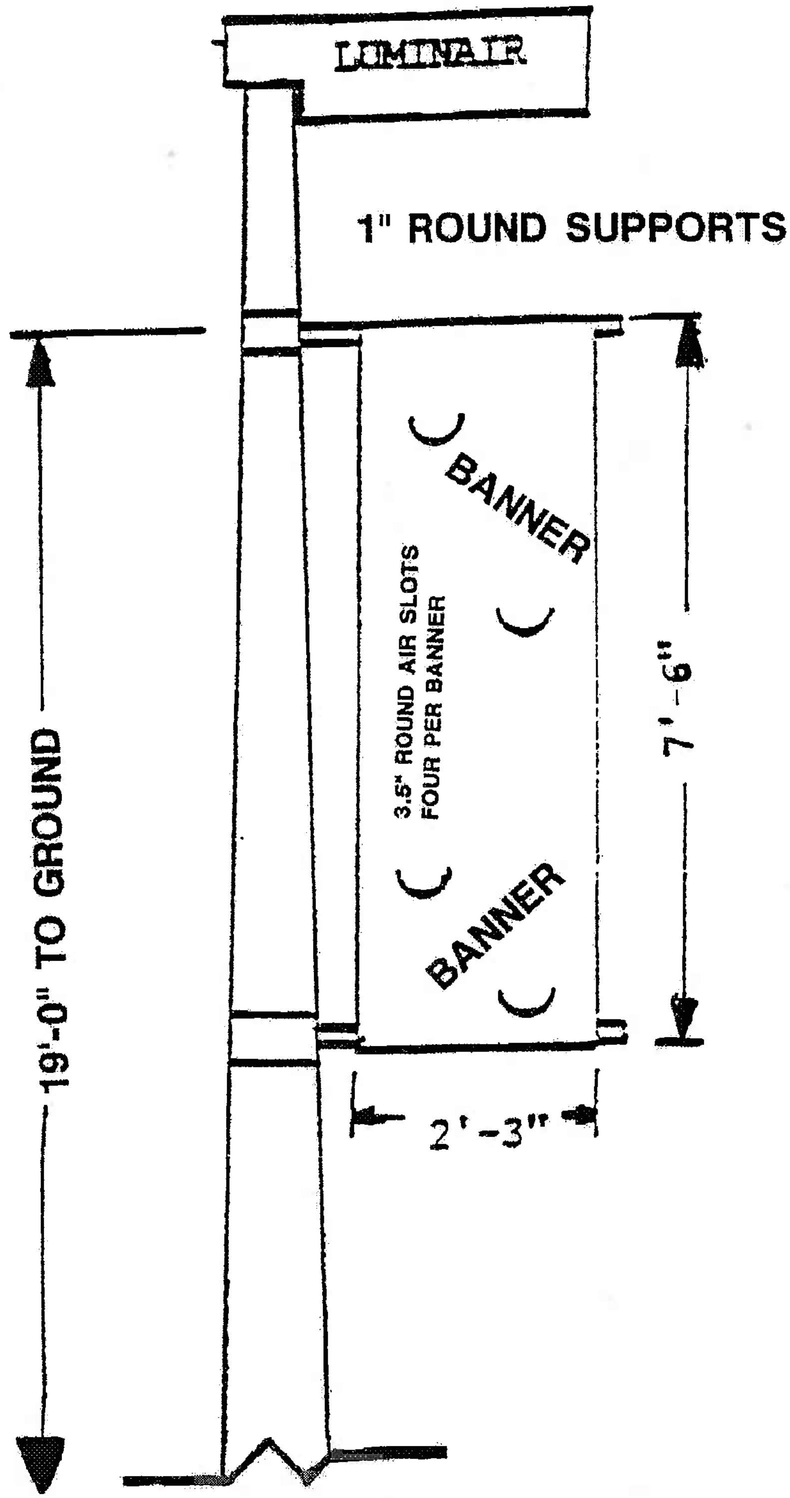
L852T, Style 3 Inpavement Lights

Reference is made to the advisory circular AC 150/5345-46B, Specification on Runway and Taxiway Light Fixtures. Effective immediately, in areas where L-852T lights are required, only Style 3 shall be specified. Any style 3 fixture that is installed at the airport must also be Federal Aviation Administration (FAA) certified prior to installation. The style designation must be reflected on the drawings, as well as noted in the technical specifications. Style designation applies to the fixture's total height above finished grade where Style 3 is less than ¼-inch to flush. This standard is intended to prevent damage to inpavement light fixtures during snowplow operations. In cases where this standard is in conflict with the requirements of the FAA, the FAA requirements shall prevail. Any deviation from this standard shall be brought immediately to the attention of the Maryland Aviation Administrations' Project Manager in writing.

19.2.2.2 Cable and Conduit

L-824 Cables for Airfield Lighting Circuits

The L-824, Type B cables shall be the standard cable used for all underground medium voltage (5,000V) cable for airport lighting circuits. The following is the specification for this cable.



SHEET TITLE: LIGHT POLE	DATE: APRIL 2005

Airfield Lighting Circuit Cable. Underground cable shall conform to the requirements of AC 150/5345-7E, Specification for L-824 Underground Electrical Cable for Airport Lighting Circuit.

All medium voltage power cable (5,000V or more) that will be used on airfield lighting shall be L-824, Type B, jacket 7-strand (19 strand is acceptable).

It should be noted that this item is a long lead item, therefore procurement time and multi-step NTP of the materials should be considered.

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. 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 ~~should make every attempt to avoid~~

~~penetrating~~ 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.

CHAPTER 20: SIGNAGE AND GRAPHICS

Refer to Appendix I for signage standards.

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.

20.2 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.

20.2.2 Identification ~~DIRECTIONAL~~ 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 red 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 red background and white reflective letters and numbers. Sign size shall be 2" x 6".

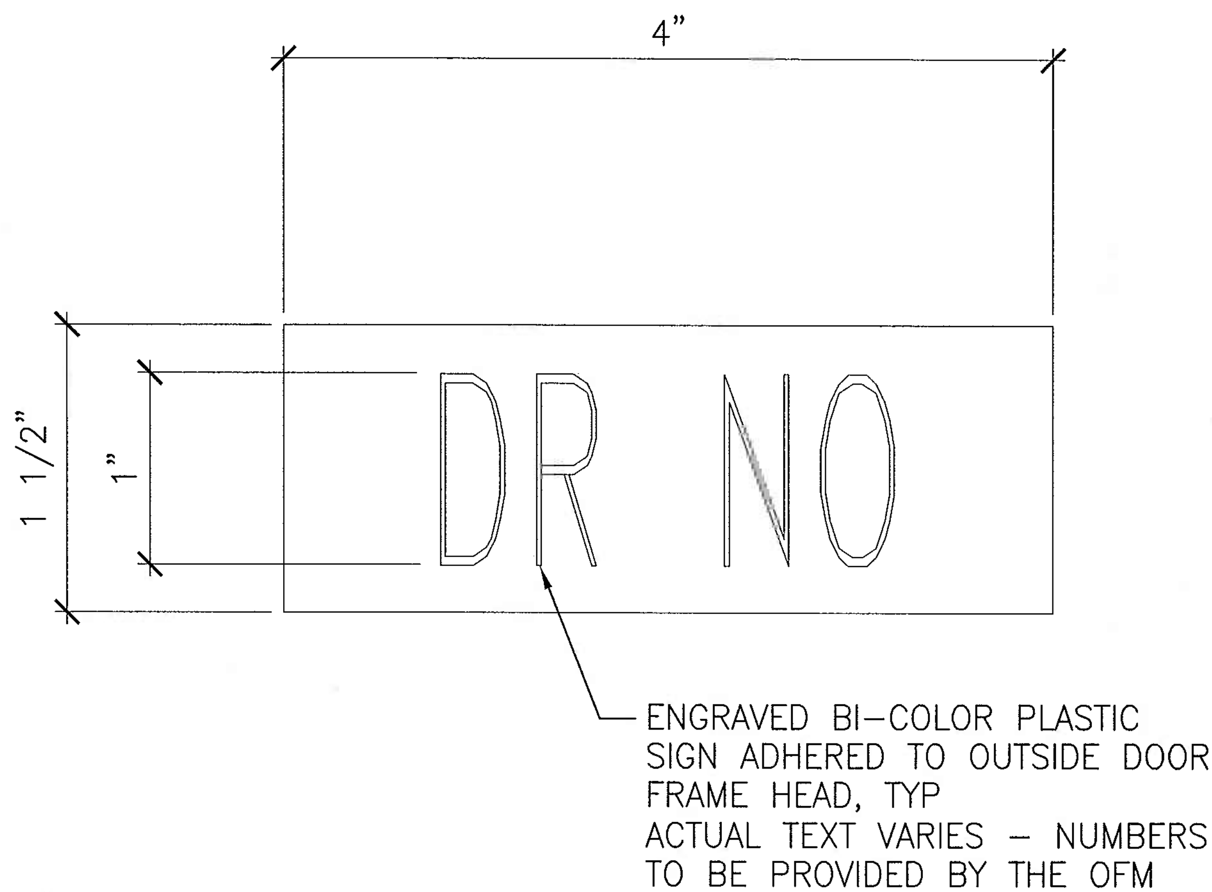
3. Electrical Substations ("WARNING ELECTRIC SUBSTATION PROTECTED BY WET SPRINKLER SYSTEM"): This sign shall be used to identify the location of Electrical Substations. Metal type sign with red background and white reflective letters shall be placed on the outside of the door. Sign size shall be 6" x 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 red 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. 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.



MAA DOOR NUMBER PLAQUE

SHEET TITLE: MAA DOOR NUMBER PLAQUE | DATE: JULY 2009

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 Manufactures Association
NFPA – National Fire Protection Association
OBB – 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.

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.