MARYLAND AVIATION
ADMINISTRATION

2008 Design Standards

Volume I of III

BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

MARTIN STATE AIRPORT

DIVISION OF FACILITIES DESIGN

February 2008

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INTRODUCTION

It is required that all Designers and Architects/Engineers (A/E) performing work that will be constructed on airport property should perform services consistent with the MAA policies, standards, procedures, and construction requirements contained in the 2008 Design Standards and its appendices. Below highlights the design standards (some previously issued) that have been added to the 2008 edition of the Design Standards. Modifications to existing sections of the Design Standard Manual are also noted:

- Update to Baltimore/Washington International Thurgood Marshall Airport – Section 1.2.1
- Safety Requirements / Confined Space Requirements for Designers – Section 2.2
- Proposal Preparation and Scope of Services – Section 4.3
- COMAR 09.23.03.10 Amendments to Titleblock Rules – Section 4.10.6 (DST 2007-07 -June 25, 2007)
- Identification and Reporting of Confined Spaces during the Design Process – Section 4.10.8
- Updates to CAD Standards Manual – Section 4.11 and Appendix C
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- New General Construction and Safety Notes - Section 4.11.2.1
- Update to MDE Standard Sheets – Section 4.11.2.3
- Stormwater Management Plans – Section 4.11.3
- Security Plan and Specification Requirements – Section 4.13 (DST 2007-10 - September 10, 2007)
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- Conformed Construction Documents – Section 5.1
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- Identification and Reporting of Confined Spaces – Section 6.3.1
- Updates to Code Requirements – Section 7.1 (DST 2007-08 - June 29, 2007)
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- Electrical Structure Drains - Section 8.1.7.1
- Updates to Pavement Design – Section 8.2.1
- Updates to Above Ground Storage Tanks – Section 10.4
- Updates to F&B Locations and Waterproofing - Section 11.6.8
- Airport Tenant Access to the Sterile Area - Section 11.9.3
- Window Opaque at Commercial Space at BWI Marshall – Section 11.9.4 (DST 2007-05 - June 29, 2007 and updates)
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- Particulate Air Filtration Section 13.2
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- IT Uniform Specifications for Construction Contracts - Section 16.4 and Appendix E
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- Cleaning of Electrical/IT/Communication Closets - Section 17.1.5
- Back-up Generator Requirements for Electrical Work at BWI Marshall – Section 17.7.1 (DST 2007-03 - February 26, 2007)
- Mercury Vapor Lamp Ballasts - Section 18.1.1
- Type B Cable Clarification Section 18.2.2.2
- Cover Sheet Revisions - CAD Standards - Appendix C

In addition, Appendix H (Airport Wide Standard for Interface of Fire Alarm, Life Safety, and Security Systems at BWI Marshall Airport) is currently being revised. Therefore, it has been deleted from this edition and will be issued once the document has been completed.

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 Manager, Division of Facilities 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 Chief of the Document Management/Technical Support section, Division of Facilities Design at 410-859-7961 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 Chief of the Document Management/Technical Support section, Division of Facilities Design at 410-859-7961 to receive the file.

CHAPTER 2: GENERAL DESIGN AND CONSTRUCTION POLICIES

2.1 SECURITY 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.

2.2 SAFETY REQUIREMENTS

2.2.1 Confined Space Requirements for Designers

2.2.1.1 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.

2.2.1.2 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.

2.2.1.3 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.

2.2.1.4 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.

2.2.1.5 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.

2.2.1.6 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**

2.2.2 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, Division of Facilities Design has created an Airport Construction Project Checklist. All MAA, Division of Facilities 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. 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 Facilities 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, 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 following. 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 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 develop a:

1. Description of the project.

2. Identify Scope of Services (Phases I, II, 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, as-built 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 DCL's, 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

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			(7)		(2)	(2)	(2)			
Conformed Specifications/Bid Forms	(7)						(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 Facilities 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) 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.

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 which 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 an 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 Reviewer 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.

4.9 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 Mr. Charles Freburger, FAA 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

- 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% Submittal

- Drawings
- Technical Provisions and Specifications
- Cost Estimate
- Extra Materials (Attic Stock) List

4.10.4 Construction Documents 100% Submittal

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

4.10.5 Bid Documents

- 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 Engineering and Construction Management 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:

- Contract or Task No MAA-CO-XX-XXX or Task XXXX.XX
- Contract/Task Title: _____
- Report/Document Title: _____
- Consultant: XXXXXXXXXXXX
- **Airport:** **BWI Marshall and/or MTN AIRPORT**
- **Submittal Date:** **MONTH, DAY, YEAR**
- No. of Documents/Sheets: XX
- 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 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 comprise 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:

- Contract/Task No. MAA-CO-XX-XXX or Task XXXX.XX
- Contract/Task Title: _____
- Consultant: XXXXXXXXXXXX
- **Airport: BWI Marshall and/or MTN AIRPORT**
- **Submittal Date: MONTH, DAY, YEAR**
- No. of Documents/Sheets: XX
- 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:

- Consultant: XXXXXXXXXXXX
- **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.

The submitted CD will include a CD cover and label with the following information:

- Contract No — MAA-CO-XX-XXX
- Contract/Task Title: — _____
- Consultant: — XXXXXXXXXXXX
- **Airport:** — **BWI Marshall and/or MTN AIRPORT**
- **Submittal Date:** — **MONTH, DAY, YEAR**
- No. of Documents/Sheets: — 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

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
14. Submitted electronic files should not be compressed (i.e. ZIP).
15. Electronic deliverables (e-mails and CDs) must be virus free.
16. A task is considered closed or complete when the task manager has closed the task and final payment has been made.
17. All CAD deliverables are as currently mandated per the MAA CADD Standards.
18. 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 C (CAD standard in Appendix C dated February 2008 ~~July 2005~~ replaces previous CAD Standard dated July 2005 ~~January 1998~~). 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 Mr. Marcus Rouhani, Chief Document Management/Technical Support Section at 410-859-7961 or mrouhani@bwiairport.com.

4.11.1 GIS Standards

For all MAA Projects, verify with the MAA Project Manager and Chief of Document Management 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 J.

4.11.2 Standard Drawings

MAA has established certain drawings that shall be incorporated within all contract documents. They are found in Appendix D. 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.

~~The majority of the information will remain consistent from contract to contract. Information to be verified or modified is shown in green on the plan sheet and is listed below:~~

- ~~General Construction Notes, number 9: Update survey information and change 'General Project Layout' to the appropriate sheet name if another sheet is used.~~
- ~~General Construction Notes, number 13: Delete if project is not federally funded.~~
- ~~Site Access, Contractor Staging, Haul Routes, and Material Storage, number 1: Change 'General Project Layout' to appropriate sheet name if another sheet is used.~~
- ~~Related Documents, items 1.b.i and 1.c.i. reference to Part 77 surfaces and OFZ surfaces appearing on "this sheet". If the sections are moved from this sheet, the references must be updated.~~

~~Because of the nature of security requirements at airports, all security notes are subject to change. The notes pertaining to security, site access, and personnel badging should be provided to the MAA Office of Airport Security for review.~~ Any changes to the notes should be submitted to the MAA Office of Engineering and Construction Management 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

Under development.

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 Office 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 of 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.
   - 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 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 to 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.

4.12 CONSTRUCTION SPECIFICATIONS

The items below shall be verified and included in all construction documents prepared for the MAA Division of Facilities 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. 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 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 E.

4.13 SECURITY PLAN AND SPECIFICATION REQUIREMENTS

4.13.1 Security Specification (X-1)

All construction projects at BWI Thurgood 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 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 averaged five (5) to 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 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 Chief of Document Management/Technical Support:

1 – One (1) half size set of drawings
2 – One (1) specification book
3 – One (1) electronic copy of the drawings (pdf files) and specifications

The following shall be submitted to the Construction Manager (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 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 Fire Marshal Comments

During construction, the Construction Manager will forward a copy of the appropriate shop drawing/submittals to the Fire Marshal at the same time as 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 (approved, approved as noted, rejected). The shop drawings/submittals will be returned to the Construction Manager at that time for further action.

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.

6.1.2 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 Design Clarification Letter (DCL) and/or 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 ~~blueline~~ prints (2 sets if AIP funding is used in the project)
- 1 set of reproducible mylar plots
- 2 CDs with electronic files

Drawings shall include:

- Revision block 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

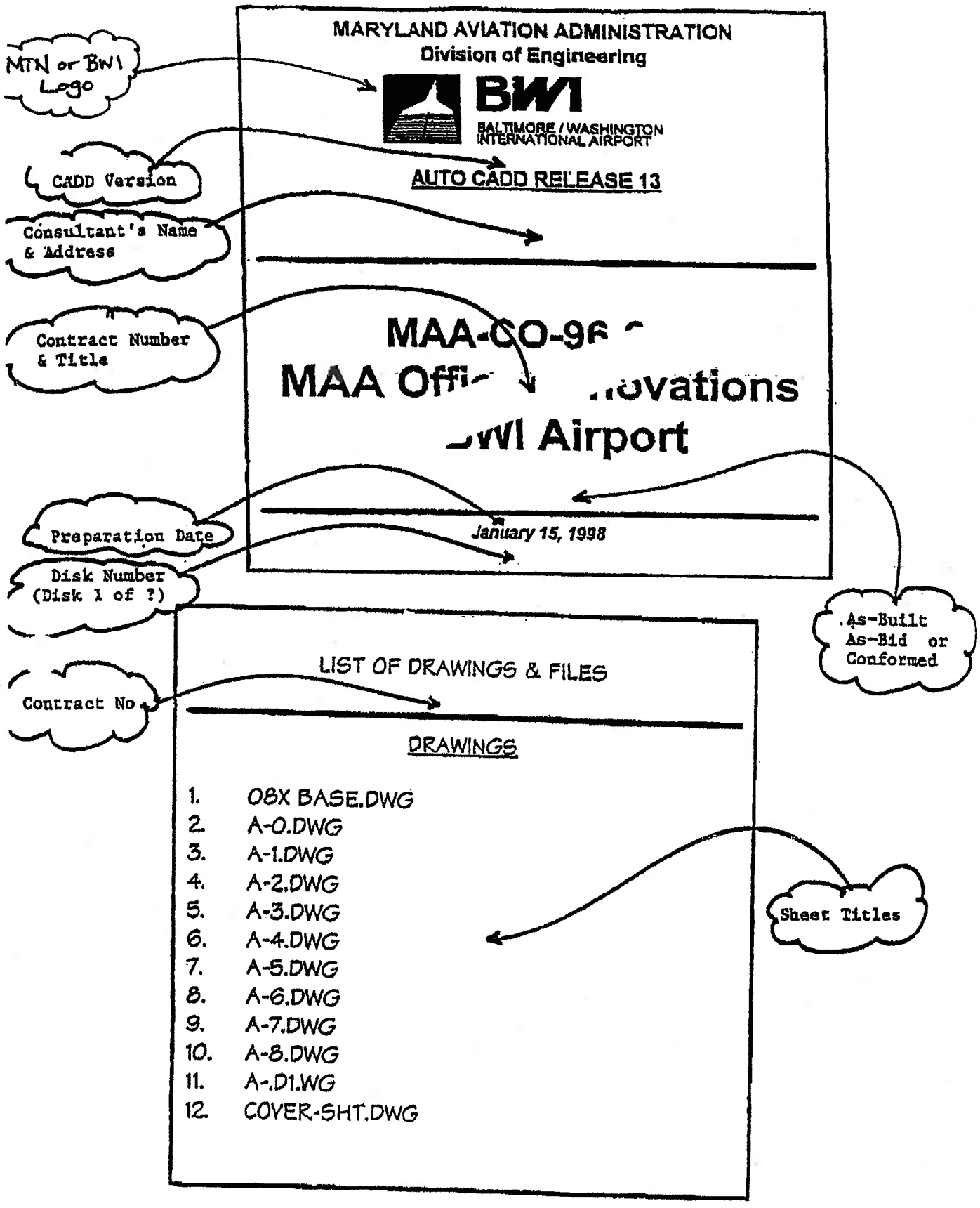
☐ RFI/FIELD CHANGES

☐ 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


MTN or BWI Logo
MARYLAND AVIATION ADMINISTRATION
Division of Engineering
BWI
BALTIMORE / WASHINGTON INTERNATIONAL AIRPORT
CADD Version
AUTO CADD RELEASE 13
Consultant's Name & Address
Contract Number & Title
MAA-CO-96
MAA Offi ovations
WI Airport
Preparation Date
January 15, 1998
Disk Number (Disk 1 of ?)
As-Built As-Bid or Conformed
Contract No
LIST OF DRAWINGS & FILES
DRAWINGS
1. 08X BASE.DWG
2. A-0.DWG
3. A-1.DWG
4. A-2.DWG
5. A-3.DWG
6. A-4.DWG
7. A-5.DWG
8. A-6.DWG
9. A-7.DWG
10. A-8.DWG
11. A-.D1.WG
12. COVER-SHT.DWG
Sheet Titles

CD INSERTS

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 in these design criteria. The Designer Statement of Work may also designate additional codes or standards applicable to the particular design.

1. APPLICABLE CODES [Code of Maryland Regulations (COMAR)]:
   - COMAR 05.02.01 Maryland Model Performance Code 4 January 2007
   - COMAR 05.02.07 Maryland Building Performance Standards (MBPS) 4 January 2007.
   - COMAR 29.06.01 State Fire Prevention Code 01 January 2007.
   - COMAR 05.02.02 Maryland Accessibility Code 19 June 2006.
   - COMAR 09.20.01 Maryland State Plumbing Regulations 9 May 2005.

The Designer shall be responsible for familiarizing themselves with all amendments and modifications to COMAR

2. Applicable Codes above incorporate by reference, and contain amendments to the following Model Codes:
   - International Building Code 2006.
   - NFPA 1 Uniform Fire Code 2006.
   - NFPA 70 National Electrical Code 2005.
   - NFPA 101 Life Safety Code 2006.
   - Americans with Disabilities Act Accessibility Guidelines 23 July 2004.
   - International Mechanical Code 2006.
   - National Standard Plumbing Code Illustrated 2000; 2001 Supplement (Maryland Building Performance Standards).
   - International Plumbing Code 2006 (Maryland Model Performance Code for industrialized buildings).
   - International Energy Conservation Code (IECC) 2003.

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 107: Airport Security
  - Part 139: Certification and Operations: Land Airports Serving Certified Air Carriers
  - Part 150: Airports
  - Part 151: Federal Aid to Airports
  - Part 152: Airport Aid Program

- 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 your 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 Egress Analysis

All contract plans should include the Fire Egress Analysis. The Fire Egress Analysis should include, at a minimum, the following information:

1. Floor plan(s) showing egress route(s) and distances.
2. General Requirement information, such as applicable codes, regulations and standards; building conditions data; and occupant load calculation(s).
3. Exit Requirement information, such as exit door requirements; exit access travel; and emergency sign and lighting.
4. Additional Requirement information, such as handicapped accessibility; and fire resistive ratings for interior finish and trim.

GENERAL REQUIREMENTS

APPLICABLE CODES, REGULATIONS, AND STANDARDS.

1. BOCA National Plumbing Code.
2. BOCA National Mechanical Code.
3. BOCA National Energy Conservation Code.
4. NFPA 70: National Electrical Code.
5. NFPA 101: Life Safety Code.
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 DATA.

1. Building occupancy.
   a. Use Group: B, Business (BOCA303.2)
   b. Classification: Business Class (NFPA 4-1.8 & 8-1.4.1)
2. Building construction.
   a. Existing structure construction type: 2A non-combustible/Protected (BOCA 603).
   b. Fire suppression: Existing automatic sprinkler system installed in accordance with BOCA Section 906.2.

OCCUPANT LOAD CALCULATION.

1. Allowance occupant load for Business Use Group (BOCA Table 1008.1.2 and NFPA 9-1.7): Business area (Business): 1175 SF x (1 Person/100 Gross SF) = 12 people.
2. Actual occupancy load: Office area: 12 people.

3. Design occupancy load.

    a. Number of occupants determined by largest number generated by either allowance or actual number method (BOCA 1008.1).

    b. Design occupancy load: 12 people.

EXIT DOOR REQUIREMENTS.

1. Minimum number of exit locations.
    a. For occupancies less than 50 with a maximum travel distance of less than 75 feet: 1 (BOCA 1010.3).

    b. Number of doors provided: 2 Exits.

2. Minimum exit width: 0.15 inches per person (BOCA 1009.2).

    a. Required width: 12 people x 0.15 inches/per person = 1.8 inches.

    b. Minimum door width required at each exit door opening: 32 inches (BOCA 1017.3 and NFPA 5-2.1.3.1)

    c. Exit width provided: 36 inches.

3. Door requirements (BOCA 1017.4 and NFPA 5-2.1.4.1, 5-2.1.4.4, and 5-2.1.5)
    a. All doors serving an occupancy 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 (BOCA Table 1006.6): 250 FT.

    b. Business Use Group with sprinkler system (NFPA 101, 27-2.6): 300 FT.

2. Actual length of access travel for assembly occupancies.

    a. From remote point A: 57 FT.

EMERGENCY SIGNS AND LIGHTING.

1. Illuminated exit signs are required throughout facility (BOCA 1023.1).
    a. 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 1 hour after loss of primary power (BOCA 10234.4).
2. All means of egress are required to be illuminated by artificial light (BOCA 1024.1).
    a. Minimum illumination level required is 1-foot candle at floor (BOCA 1024.2).
    b. Emergency power source is required to illuminate exit paths for 1 hour after loss of primary power (BOCA 1024.4).

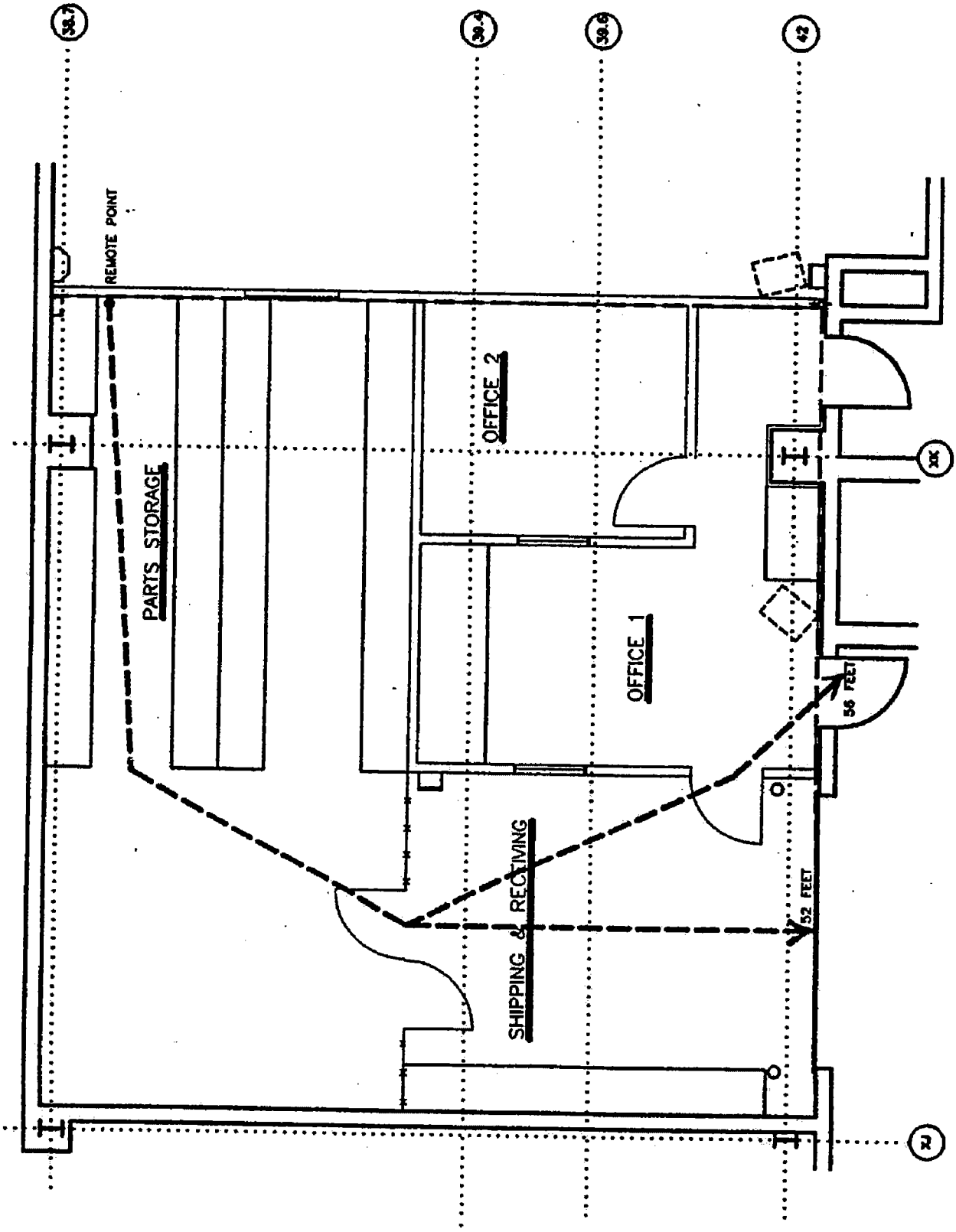
ADDITIONAL REQUIREMENTS

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 door width, nominal 36" wide 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 (927.6) where limited above.
4. Floors – Minimum requirement of DOC FF-1.



SHEET TITLE: SAMPLE FIRE EGRESS PLAN	DATE: APRIL 2005

7.1.2 Terminal Evacuation Plans

The MAA Office of Engineering and Construction Management (OECM), in coordination with 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 2.2 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 Engineering and Construction Management 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 Thurgood Marshall Airport:

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 4.11.1.1 and Appendix D 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
Under development

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 F.

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 Manager of Martin State Airport (410-859-8826) 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. This section of the ISPA has been included in Appendix G to this document.

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.

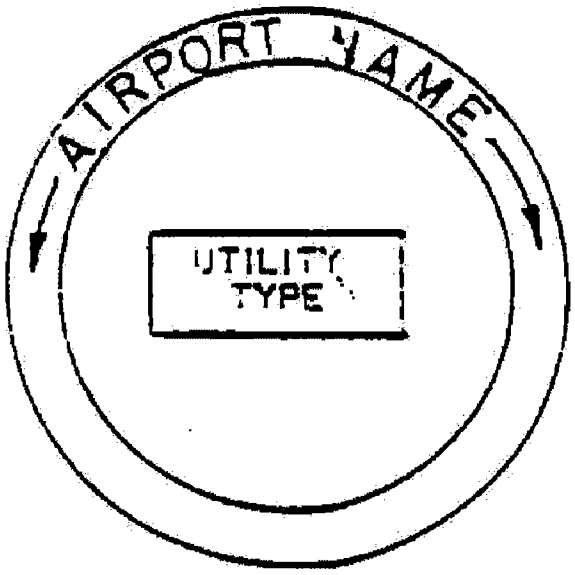
8.1.3 Underground Utility Trenches, Utility Markings, and Manhole/Handhole Covers/LIDS

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 standards.

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 Engineering and Construction Management 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 Division of Facilities Design project manager and the Division of Maintenance. Refer to the Restroom Design Standards in Appendix-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 (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.

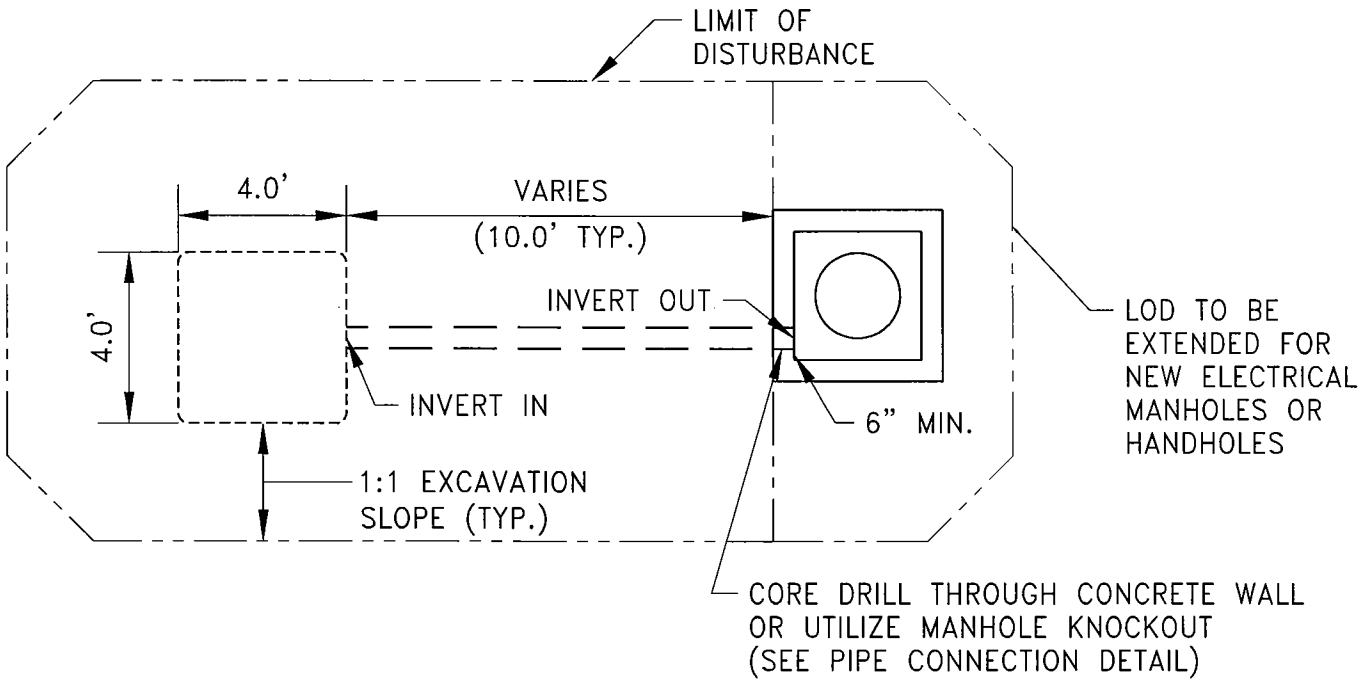
Qualifying Preferred Alternate Drainage Measures are the following:

- 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.

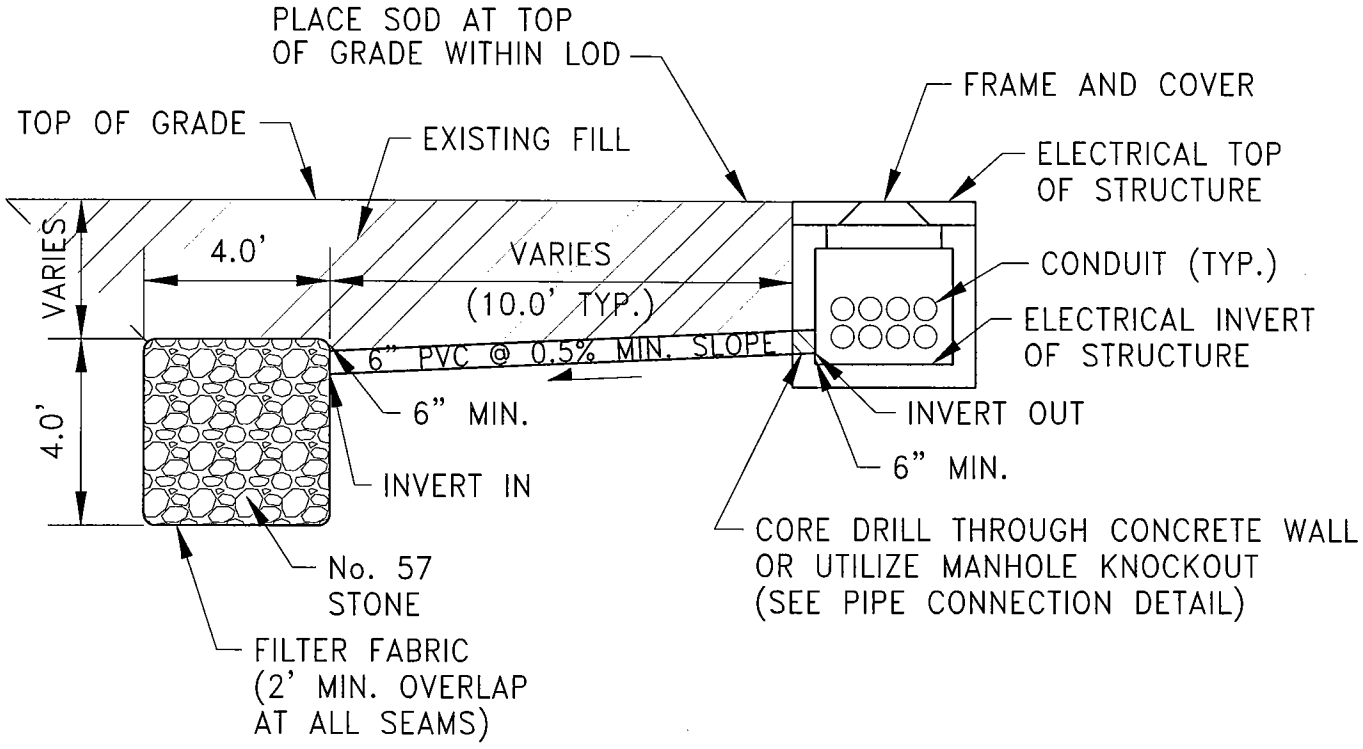
The following details depict the plan and section view of a typical ESD, section view of a typical pipe connection detail, and the plan view of a typical rodent screen detail.



ELECTRICAL STRUCTURE DRAIN DETAIL (PLAN)

N.T.S.

SHEET TITLE: ELECTRICAL STRUCTURE DRAIN DETAIL (PLAN)



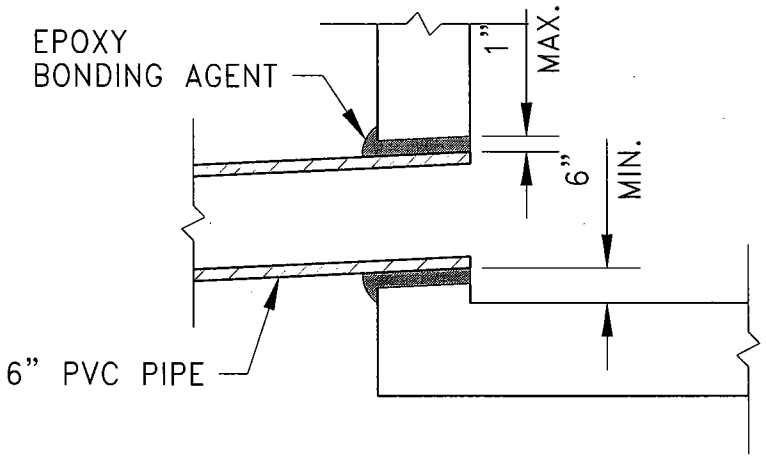
NOTE:

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.

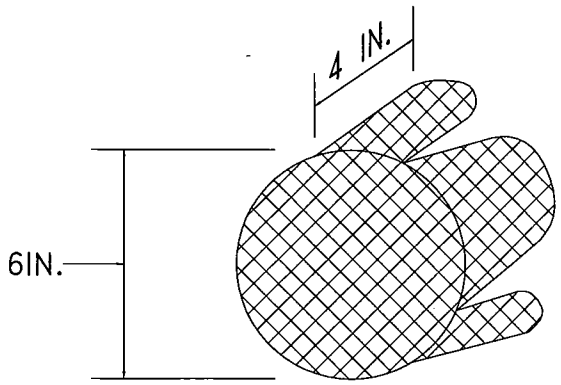
SHEET TITLE: ELECTRICAL STRUCTURE DRAIN DETAIL (SECTION)



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.

8.2 AIRFIELD CIVIL/SITEWORK

8.2.1 Pavement Design

1. 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 ~~recommends~~ 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.

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

8.2.1.1 Federal Aviation Administration (FAA) Specification Incentives

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.

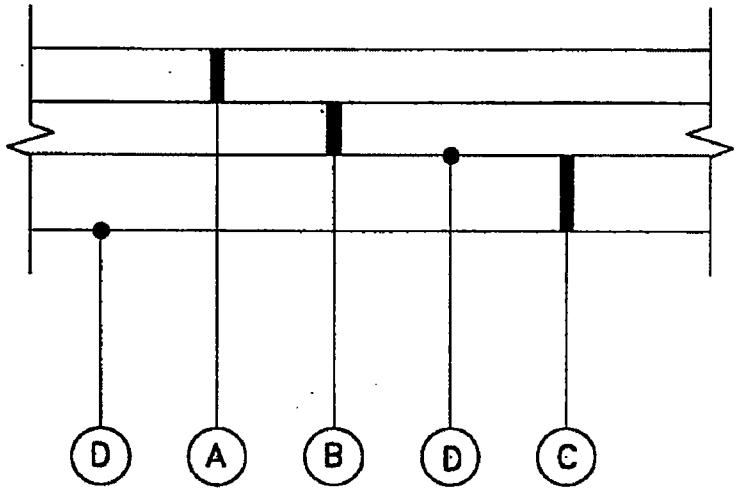
In order to accommodate the increased costs associated with the incentive, without issuing a change order, MAA is providing the following directions for preparation of the contract specifications and bid tabulation forms:

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



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

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 Baltimore/Washington International Thurgood Marshall Airport 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-1952D, 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.

8.3 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"

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"

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 E 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

Projects which install and/or modify loading bridges should be designed and specified to allow operation from the forward 2 passenger doors of the aircraft where applicable.

9.1.1 Pre-Conditioned Air and 400 Hertz Systems (and Associated Loading Bridge Requirements

1. 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.

2. 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.

9.1.1.1 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.

9.1.2 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 18.3.1 Grounding.

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 4.11.1.2 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 Thurgood 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 Thurgood Marshall and Martin State Airports, more specific information is provided in the Design Criteria Manual for SWM Design and Stream Restoration.

A. BWI Thurgood 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*. 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 Thurgood Marshall Airport. MDE requires both quantity and quality control of stormwater and establishes goals for both in the *2000 Stormwater Design Manual* (MDE, 2000).

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

Stormwater Management Ponds

MDE's *2000 Stormwater Design Manual* requires that stormwater management ponds constructed in Use III (Piny Run) and Use IV (Stony Run) watersheds are designed with a maximum detention time of 12 hours for the channel protection storage volume (i.e., the one-year storm event). MDE also requires the installation of a 3-inch low-flow orifice to prevent the pipe from clogging and to help ensure that the pond can drain in accordance with the designated time. These requirements are essential to preventing prolonged periods of standing water and support the FAA criteria.

FAA recommends the use of steep-sided, narrow, linear-shaped detention basins as opposed to retention basins, which retain the water quality volume for longer periods of time. MDE recommends the use of long flow paths (minimum ratio of 1.5:1 of length to width) and irregularly-shaped ponds, which coincides with the FAA criteria.

Stormwater Wetlands

Stormwater wetlands are typically used to treat and store the water quality volume through the use of small permanent pools and extended detention periods. As in the case of stormwater management ponds, MDE requires that flow paths be maximized and the surface area of a stormwater wetland be at least 1% of the

total drainage area of the facility. MDE also requires that at least 25% of the total water quality volume be in deepwater zones, with a minimum depth of 4 feet, and a minimal coverage of 50% in the planting zones after the second growing season. Both of these requirements can create large areas containing surface water and vegetation that are very attractive to wildlife. FAA prohibits the construction of stormwater wetlands and artificial marshes within 5 miles of an approach or departure surface.

Filtering Systems

MDE recommends that sand filters be designed to drain within 40 hours and that bioretention facilities be designed to drain within 48 hours and requires that the top few inches of colored material be removed and replaced with fresh material when the water remains on the surface of the filter bed for more than 72 hours. FAA requires that stormwater management facilities drain within 24 hours following a one- or two- year storm event and within 48 hours following a ten-year storm event.

MDE requires that underground sand filters be constructed with a gate valve located just above the filter bed for dewatering in the event of clogging. This drainage recommendation supports the FAA guidance, because it prevents conditions that would create standing water and attract hazardous wildlife.

Infiltration Systems

Infiltration is an important factor in predicting and reviewing drainage time, because many stormwater management detention ponds are used to store and treat the water quality volume in the bottom of the stormwater management ponds. Therefore, infiltration is paramount in preventing the formation of standing water for prolonged periods. MDE requires infiltration rate testing to ensure that the infiltration rate be no less than 0.52 inch per hour for infiltration trenches and basins. If the infiltration rate is less than 0.52 inch per hour for a surface sand filter or a bioretention facility, MDE requires the installation of an underdrain. In addition, MDE requires that infiltration tests be performed during the final plan phase and the grading permit phase. These requirements are essential for ensuring that infiltration facilities drain within reasonable periods.

Open Channel Systems

Open channel systems are usually designed with check dams to capture and treat the full water quality volume within dry or wet cells. MAA requires an underdrain for the dry swale to ensure this maximum ponding time is met and vegetation to mask the ponded water using appropriate species as presented in *Specifications for Performing Landscape Activities for the Maryland Aviation Administration* (see Appendix E).

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 E). 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 Thurgood 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 fro 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 Thurgood 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 Thurgood 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 Thurgood 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 Pier 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 Airport 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 Thurgood Marshall Airport 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 Airport

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.* (Copies of this document can be procured from MAA's Environmental Planner, Office of Facilities Planning.)

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 E.

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

E, 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.

B. Martin State Airport
Under development.

10.2 BIRD DETERRENT SYSTEMS

10.2.1 Waterfowl Deterrent System for Sediment Traps at BWI Marshall Airport

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.

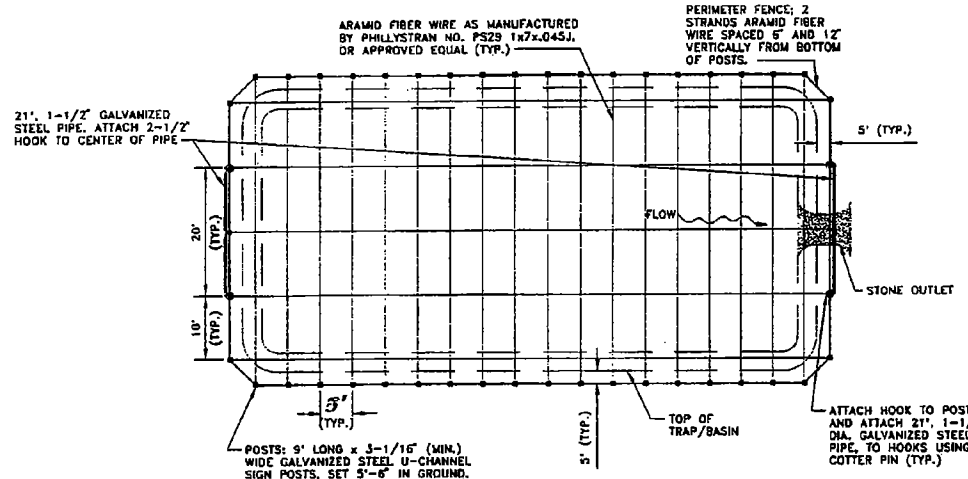
Initial grid spacing will be five feet for short spans and ten feet for long spans. See details for a typical layout. After monitoring the effectiveness of this system, MAA may require installation of additional long spans to decrease spacing to five feet. The ends of the grid wires will be strung from 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

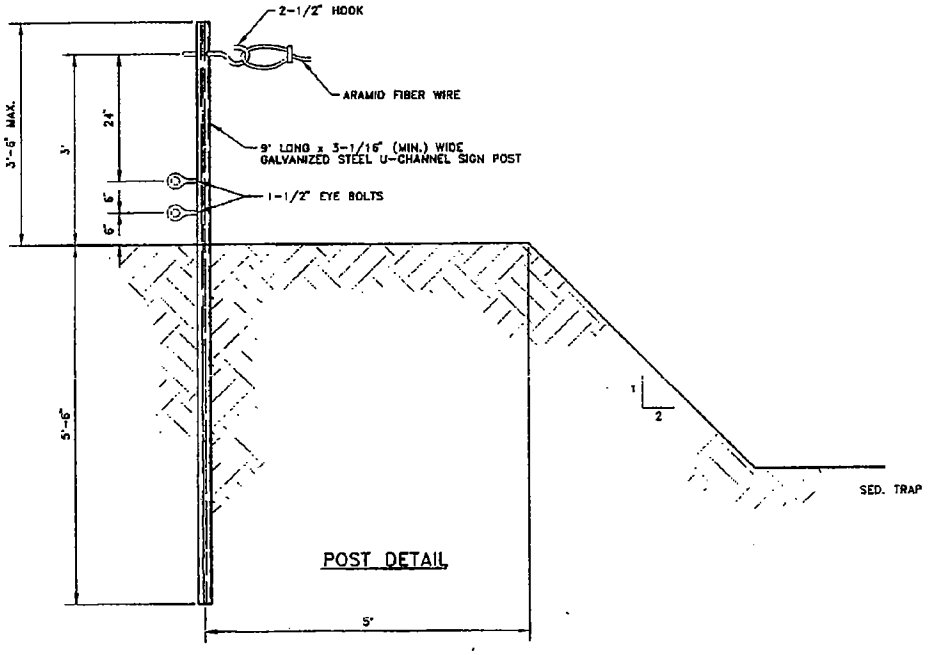


NOTE:

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

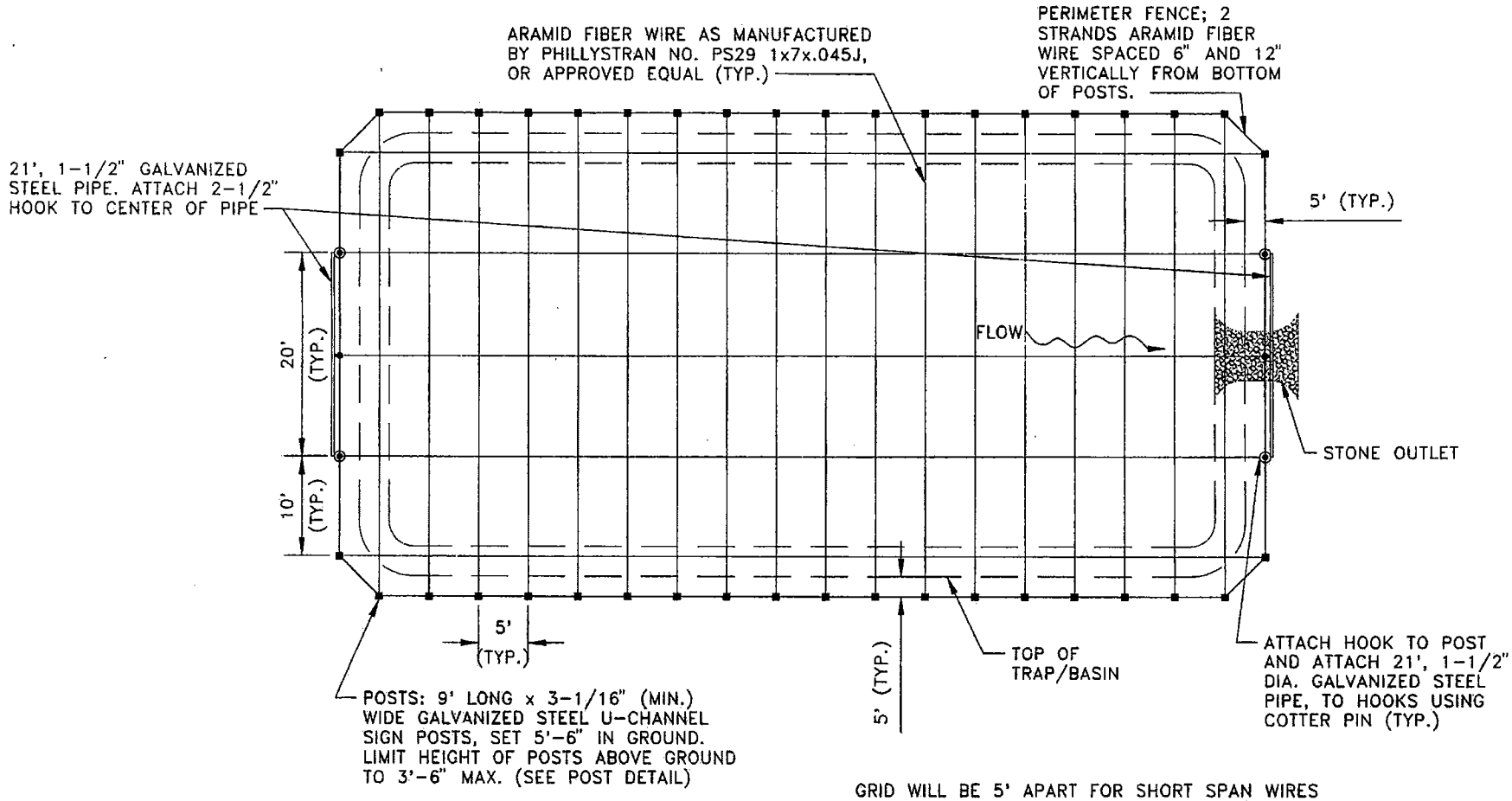
AFTER EACH SEDIMENT TRAP/BASIN IS CONSTRUCTED, POSTS ARE PLACED FIVE FEET OUTSIDE OF THE TOP EDGE OF THE TRAP/BASIN, SPACED FIVE FEET ON CENTER ON THE LONG SIDES AND TEN FEET ON CENTER ON THE SHORT SIDES, LEAVING ONE 20-FOOT GAP FOR THE GATE AND ANOTHER 20-FOOT GAP TO STRADDLE THE OUTLET WEIR. AFTER 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

SHEET TITLE: WATER FOWL DETERRENT SYSTEM FOR SEDIMENT TRAPS

DATE: APRIL 2005



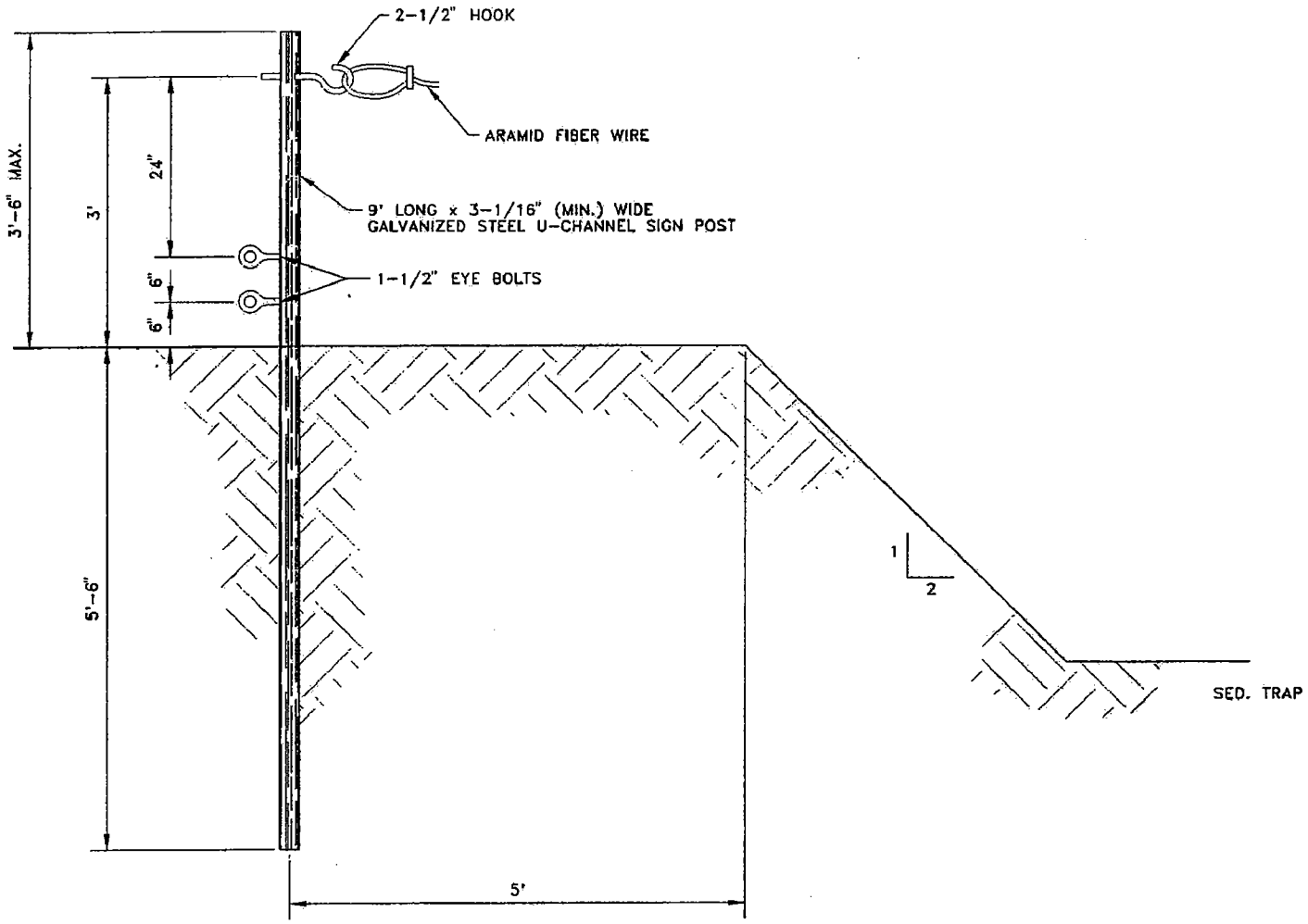
GRID WILL BE 5' APART FOR SHORT SPAN WIRES AND 10' APART FOR LONG SPAN WIRES (SEE NOTE). OUTSIDE GRIDWIRE TO BE PLACED OVER BOTTOM EDGE OF TRAP.

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.



POST DETAIL

SHEET TITLE: WATER FOWL DETERRENT SYSTEM FOR SEDIMENT TRAPS	DATE: APRIL 2005

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. After monitoring for effectiveness, installation of additional long spans may be ordered by MAA. 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) 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; 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 interstitial monitoring ~~capability~~.

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

3. UST monitoring system shall include ~~be one of~~ 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 appropriately sized concrete dead-men or hold-down slab.

5. UST excavation shall be lined with geotextile fabric.

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, 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. ~~Vaulted including the Underwriter's Laboratory approval for UL-2085, Fire-Resistant tank~~. 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 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 compliance wit 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 12.03.01.02, Fire Prevention Code
    k. Code of Federal Regulations 40 CFR 112.7, Spill Prevention Control and Countermeasure Plan
    l. BWI Tenant Directive 215.1, Deicing Procedures at Baltimore/Washington International Thurgood Marshall Airport
    m. BWI and MTN Tenant Directive 007.1, Building Permits – Baltimore/Washington International Thurgood Marshall Airport
    n. BWI Tenant Directive 502.1, Airport Fuel/Oil and Hazardous Material Spill Procedures for Legal Reporting Responsibilities
    o. BOCA National 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 pier locations where gate deicing is permitted (See BWI Tenant Directive 215.1 Deicing Procedures at Baltimore/Washington International Thurgood Marshall Airport). 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 Facilities Design Division.

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.

This second page 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 Engineering 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 Joanne Brooks, Environmental Program Manager, Division of Environmental Compliance for review and acceptance.

10.5.1 Renovation Work

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.

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.

10.5.3 Asbestos

1. 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.

10.6 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 Airport Metasys Facility Management System (FMS). Refer to Chapter 12.

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 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 required secondary containment as soon as possible, but no later than February

18, 2005. 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.

LED and Blade signs shall match existing.

11.1.3 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 Pier E 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.

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. This criteria can be obtained by contacting the MAA Manager of Facilities 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 New International Pier Millwork

MAA would like to maintain the architectural standard and structural integrity of the New International Pier 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
   1. Plastic laminate shall be Nevamar; MR-6-7-CR, PHANTOM GRAY MATRIX.

6. Solid Surface

   2. Solid surface material shall be Wilsonart; Surfacing veneer 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 bitumem roofs, 2) biannual maintenance performed.

2. If the proposed roofing system has not been previously approved by DGS, designers shall submit the system to Mr. William Gluck, Chief Project Management Design, DGS Engineering, for review and approval. Mr. Gluck can be reached at 410-767-4439. 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 Mr. Gluck.

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.

11.5.1 Satellite Dish Locations

Satellite receiving dish antenna located on the roof of Pier 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 Pier B or in the vicinity of Pier 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 Design Standards in Appendix G for 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 Pier 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 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

Effective immediately, these standards refer to:

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 (Users of this Design Standard 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.)

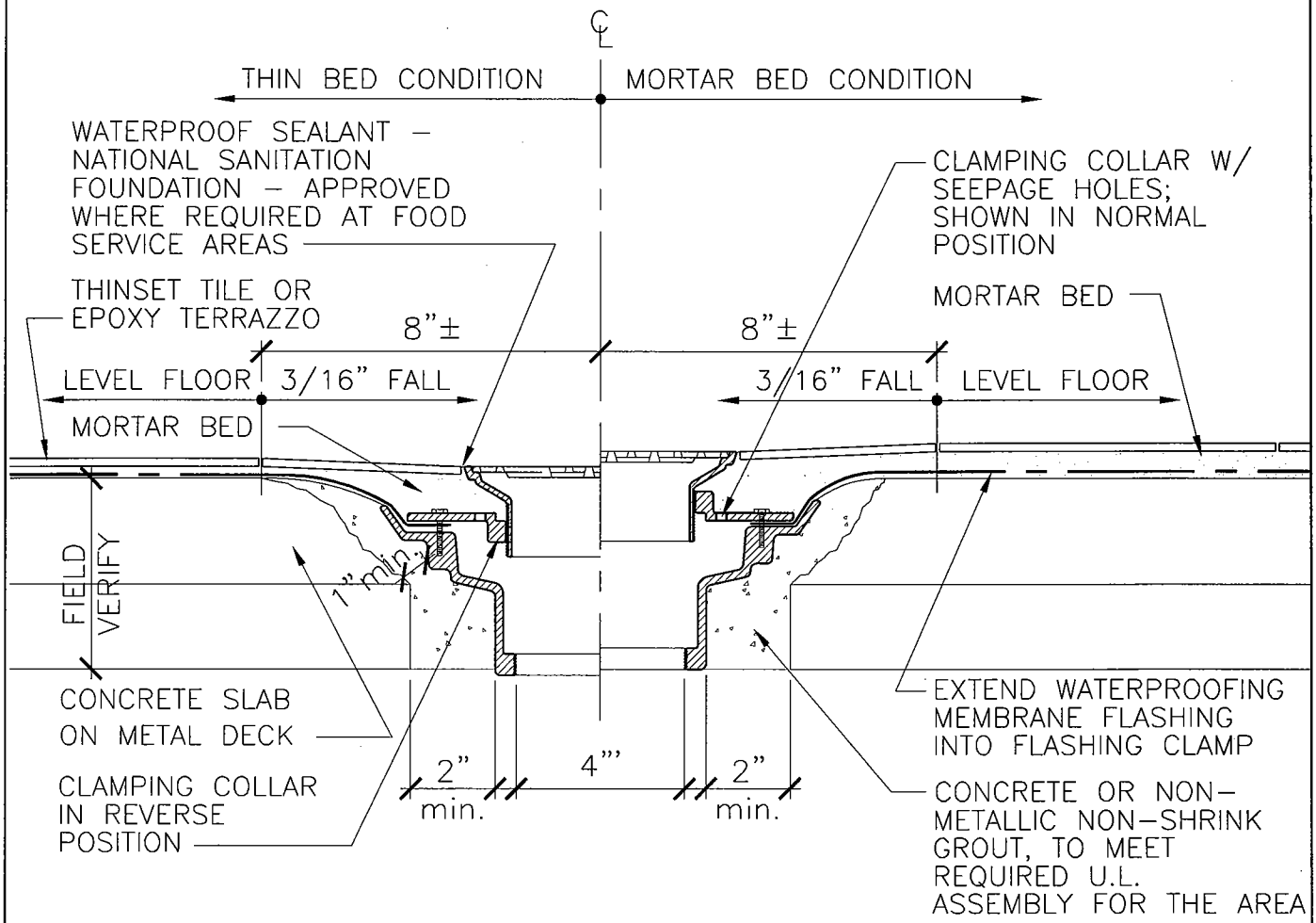
2. At perimeter walls, etc., turn floor covering up as a wall base and to protect turned-up vertical waterproofing.

11.6.8.5 Preventative measures to avoid water damage to floors from water heaters, 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

URS CONSULTING ENGINEERING AND PLANNING
849 International Drive Suite 320
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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		

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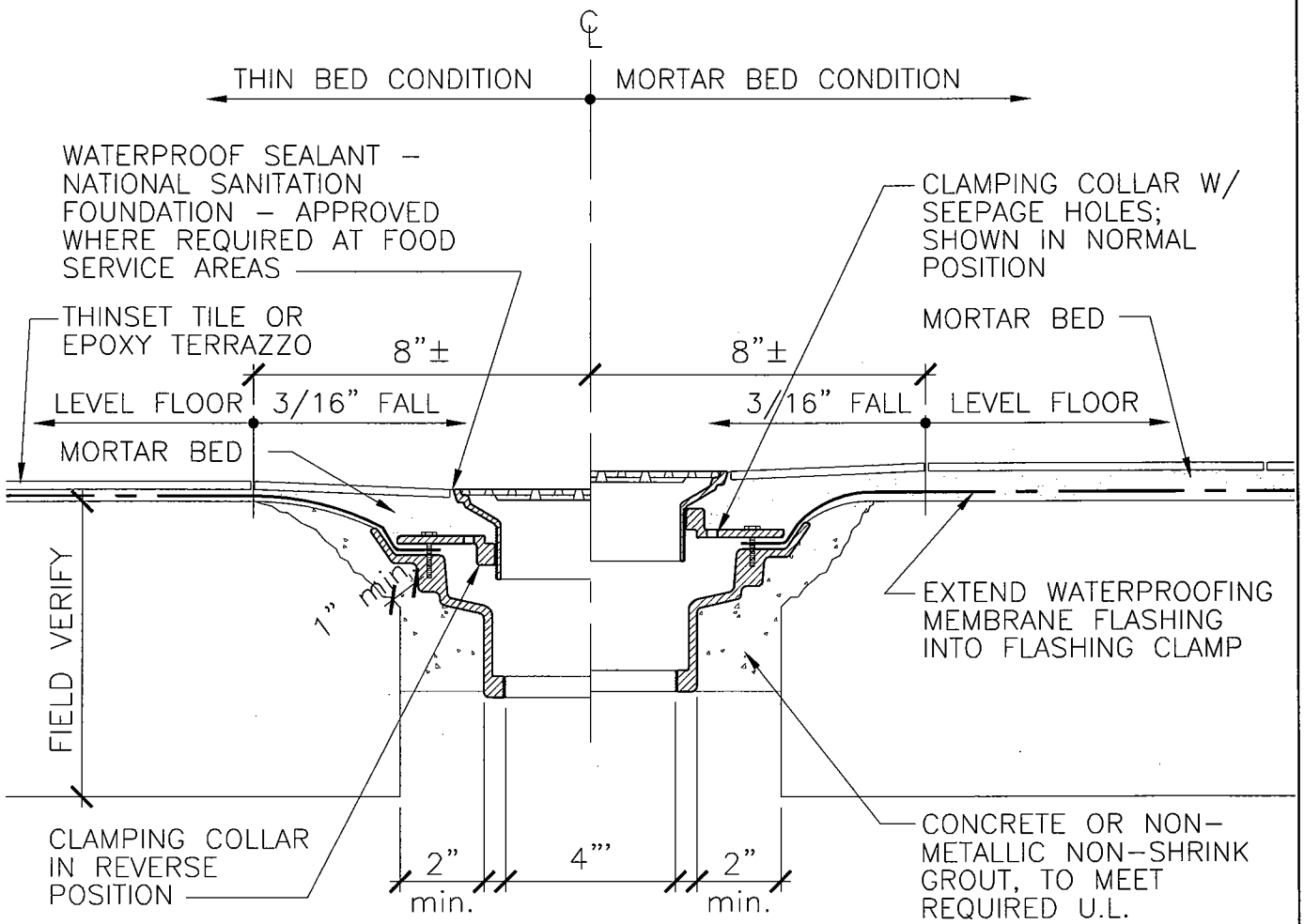

NOTE:
CORE DRILL OR SAW CUT AS NECESSARY TO REMOVE SLAB.
SLAB REINFORCEMENT CAN ONLY BE CUT WITH STRUCTURAL ENGINEER'S APPROVAL.

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

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PROJECT TITLE	DESIGN STANDARD FOR FLOORING IN WET AREAS
SHEET TITLE	FLOOR DRAIN IN SUSPENDED REINFORCED CONC. SLAB LOCATION

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

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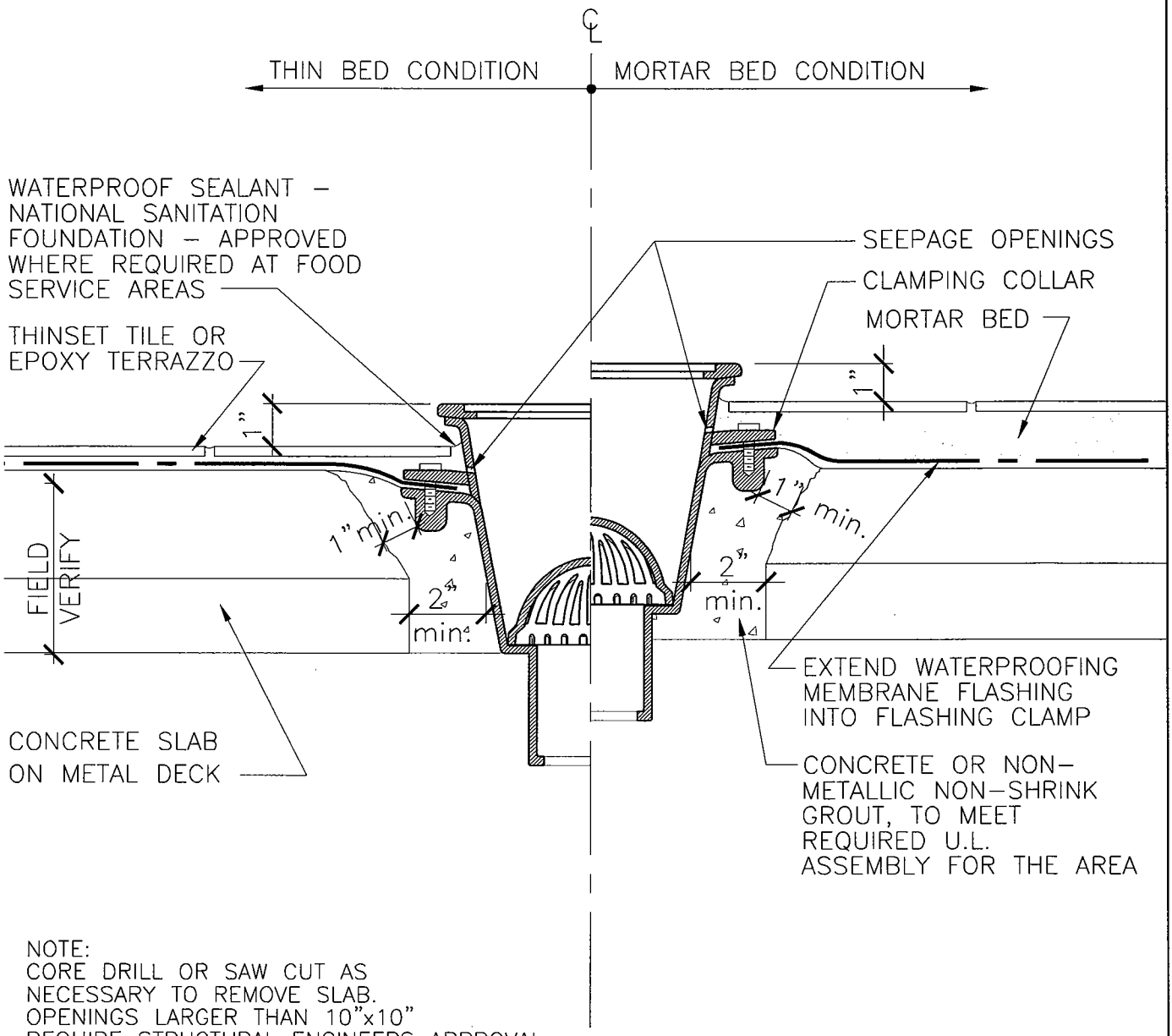

NOTE:
CORE DRILL OR SAW CUT AS NECESSARY TO REMOVE SLAB. OPENINGS LARGER THAN 10"x10" REQUIRE STRUCTURAL ENGINEERS APPROVAL.

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

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PROJECT TITLE	DESIGN STANDARD FOR FLOORING IN WET AREAS
SHEET TITLE	FLOOR SINK IN COMPOSITE SLAB LOCATION

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

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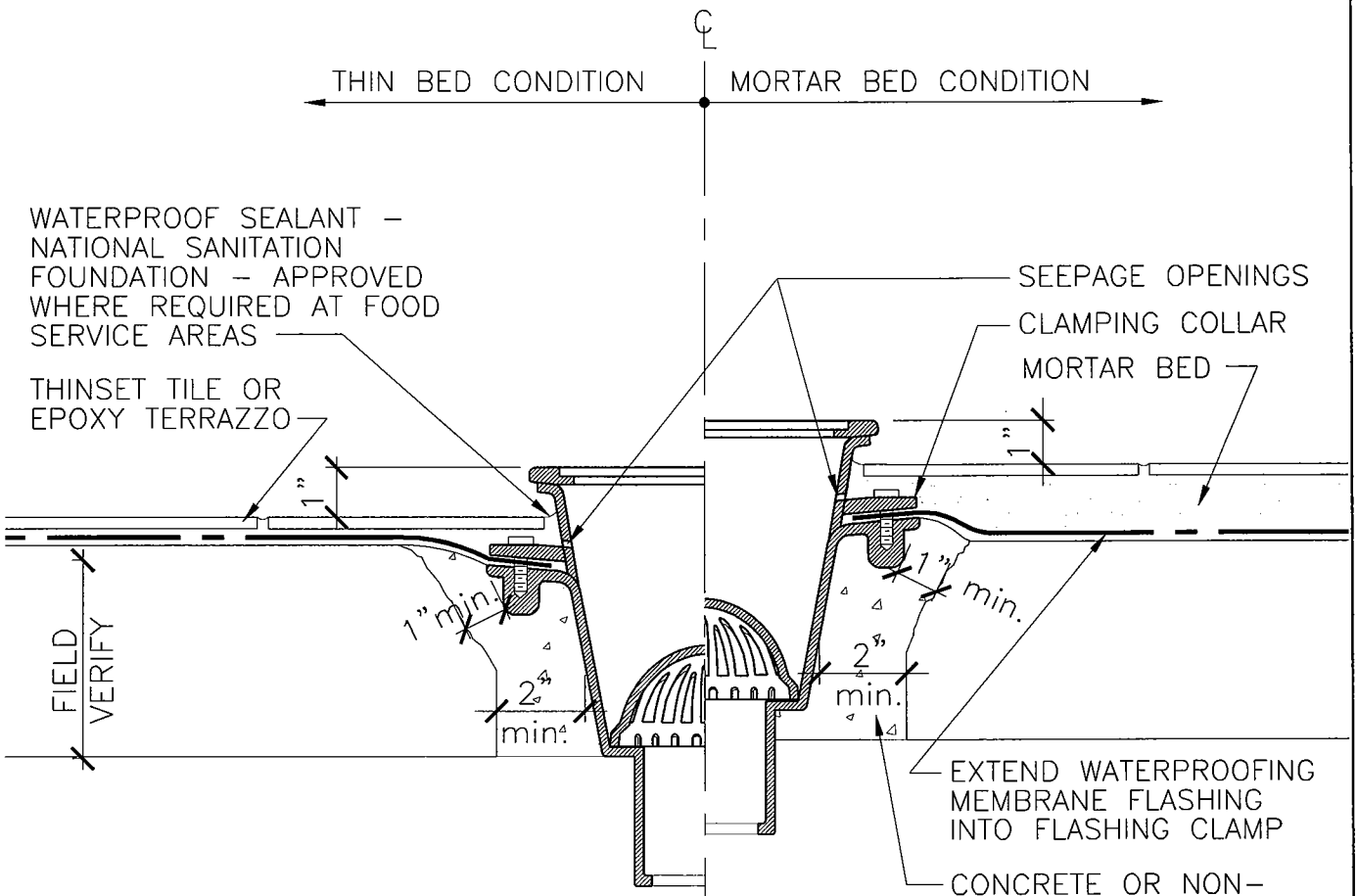

NOTE:
CORE DRILL OR SAW CUT AS NECESSARY TO REMOVE SLAB.
SLAB REINFORCEMENT CAN ONLY BE CUT WITH STRUCTURAL ENGINEER'S APPROVAL.

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

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PROJECT TITLE: DESIGN STANDARD FOR FLOORING IN WET AREAS

SHEET TITLE: FLOOR SINK IN SUSPENDED REINFORCED CONCRETE SLAB LOCATION

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

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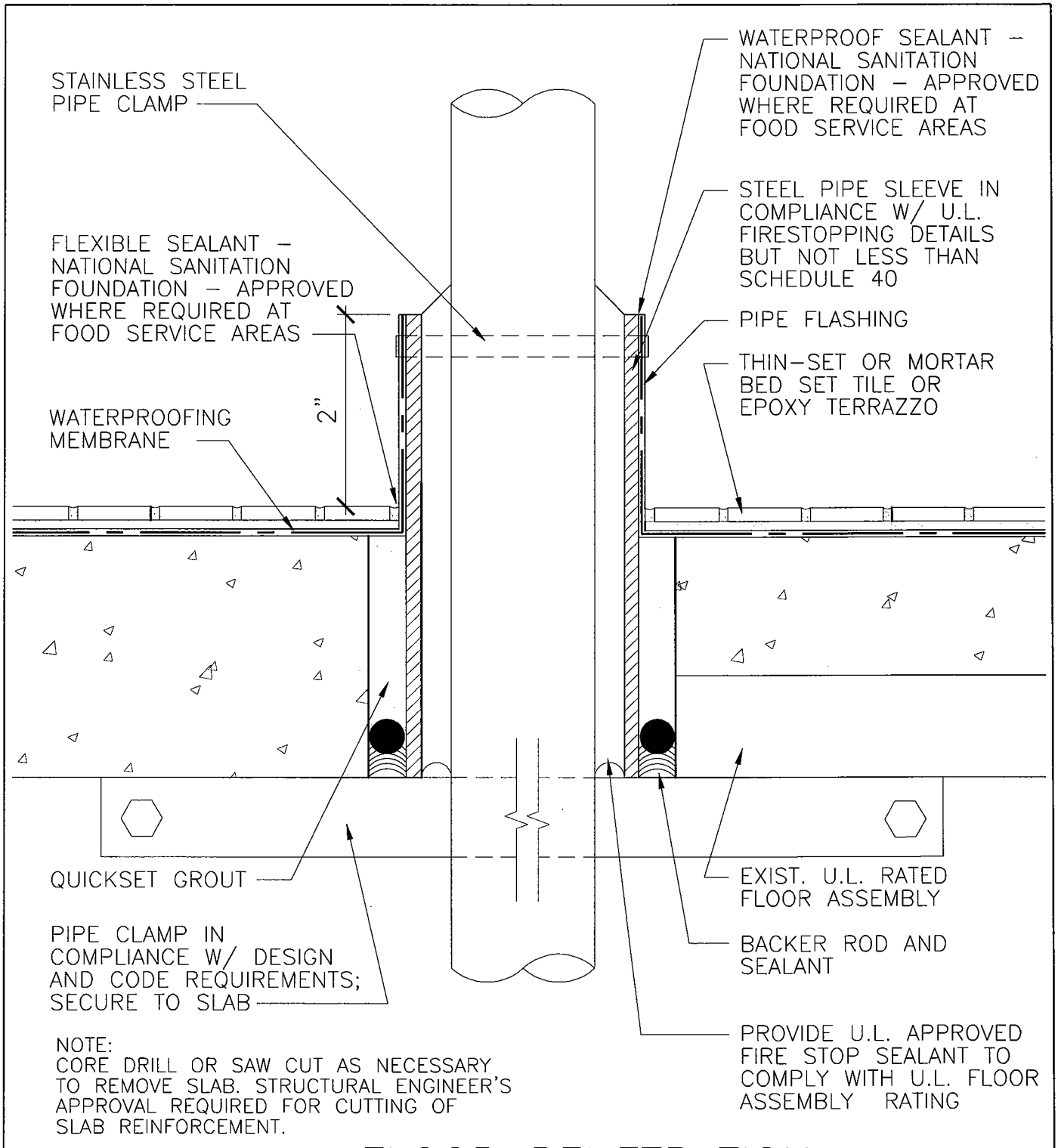

NOTE:
CORE DRILL OR SAW CUT AS NECESSARY TO REMOVE SLAB. STRUCTURAL ENGINEER'S APPROVAL REQUIRED FOR CUTTING OF SLAB REINFORCEMENT.

FLOOR PENETRATION

SCALE: N.T.S.

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PROJECT TITLE	DESIGN STANDARD FOR FLOORING IN WET AREAS
SHEET TITLE	PIPE FLOOR PENETRATION DETAIL

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 - 10:10am

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 Division of Facilities 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, 2000 Edition or later, 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.

11.8 RESTROOM STANDARDS

The Restroom Design Standards are contained in Appendix G.

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 included, but are not limited to, mechanical, switch gear, and electrical substation rooms. When fire rated doors are required, metal roll-up doors shall be specified.

11.9.2 Door Numbers

All BWI Marshall projects which involve the allocation or change of door numbers shall be coordinated with the Division Chief, Fire Prevention Division. The Fire Prevention Division has been assigned the responsibility of door management and shall provide guidance when new or replacement numbers are needed.

11.9.3 Sterile Area Access Doors

In accordance with TSA mandate 5142-04-10A2, any proposal to increase the number of sterile area access doors (eg new construction) must be approved by TSA's Federal Security Director.

11.9.4 Window Opaque

All projects at BWI Marshall shall be designed and specified per the following requirements wherever the work requires the obscuring or covering of existing exterior windows in the terminal facility:

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

1. Provide tinting of windows where required to opaque existing vision glass windows. Provide product as follows or an approved equal:

    a. Lumar – Window Film – NRM W PS3
    b. 3M – Fasara –San Marino

2. Product color is to closely match installed white spandrel glass.

3. Prior to installation, review glass surface and verify submitted film is compatible with surface.

4. Warranty – provide minimum ten year installation and material warranty.

5. Install window film as recommended by manufacturer and published guidelines from the International Window Film Association.

Terminal A/B and Concourses A and B (Where Exterior Wall Panel or Spandrel Glass is BLACK)

1. Provide infill panels where required to opaque existing vision glass windows. Provide hardboard panel (HBD) product as follows or approved equal.

    a. Omega Foam - Ply HBD by Laminators Inc.

i. 0.013 "Stucco" aluminum face on window side with polyester paint finish; color black.
ii. 1/8" Tempered Hardboard Stabilizers.
iii. Polyisocyanurate Foam Core.
iv. Manufacturer's standard white smooth finish on interior side of panels.

2. Install infill panels as detailed to interior of window frames wherever windows are required to be covered by tenant space requirements. See exhibits Horizontal Hardboard Panel, Concourse A & B, and A/B; and Vertical Hardboard Panel, Concourse B.

3. Provide manufacturer's standard panel product warranty.

Terminals C and D

1. Prior to installing panels specified below, remove all reheat coils, fin tube radiation, covers, and other devices, and abandon piping back to the main line. Demolition must provide for continuation of existing downstream service. Temporary outages may be required by demolition, but the piping loop must be retained to service existing downstream units which remain.

2. Provide infill panels where required to opaque existing vision glass windows. Provide hardboard panel (HBD) product as follows, or approved equal.

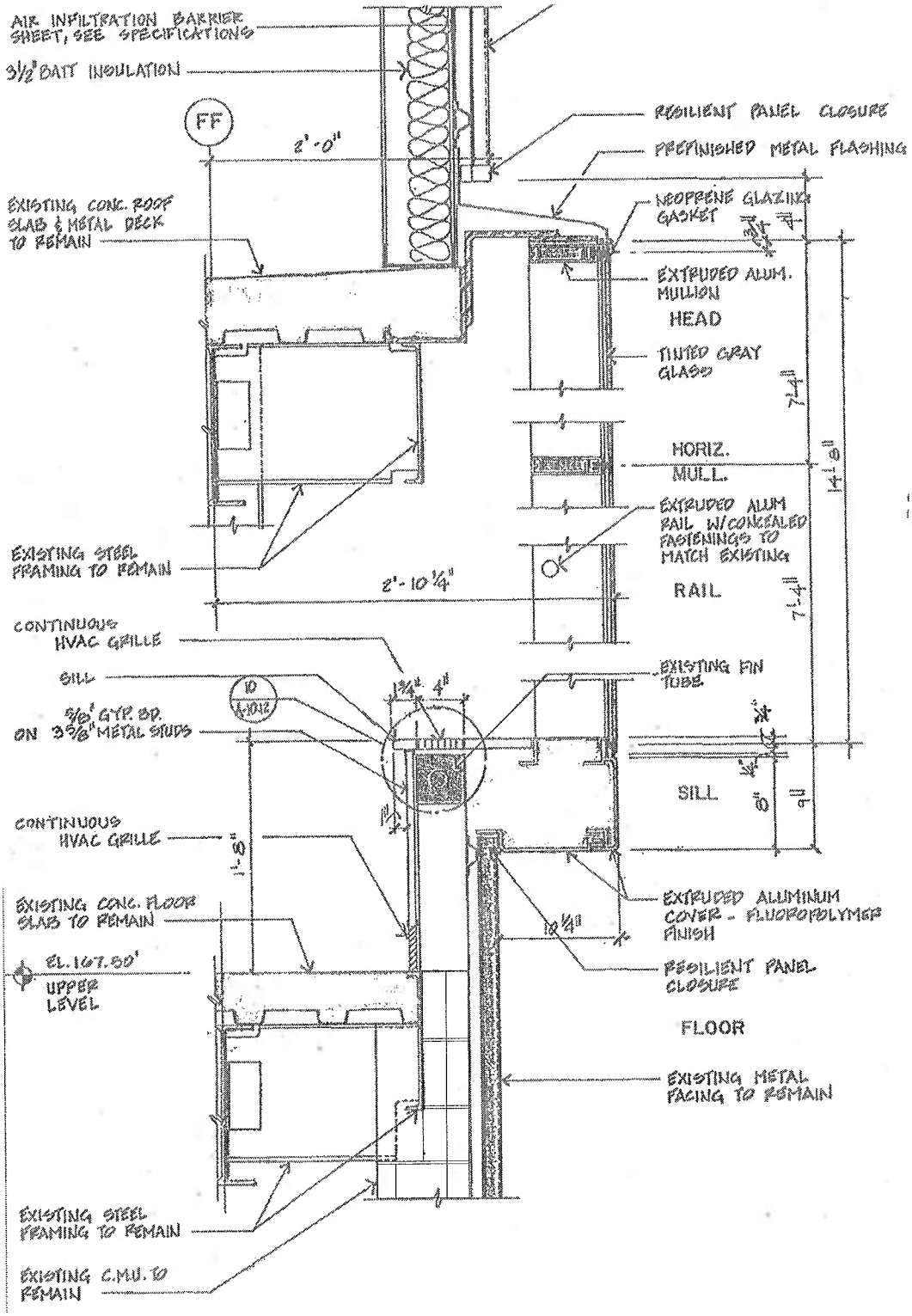
a. Omega Foam - Ply HBD by Laminators Inc.
i. 0.013 " Stucco" aluminum face on window side with polyester paint finish; color black.
ii. 1/8" Tempered Hardboard Stabilizers.
iii. Polyisocyanurate Foam Core.
iv. Manufacturer's standard white smooth finish on interior side of panels.

3. 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.

4. 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.

5. Provide panel manufacturer's standard product warranty.

Designer should refer to the following 5 exhibits.

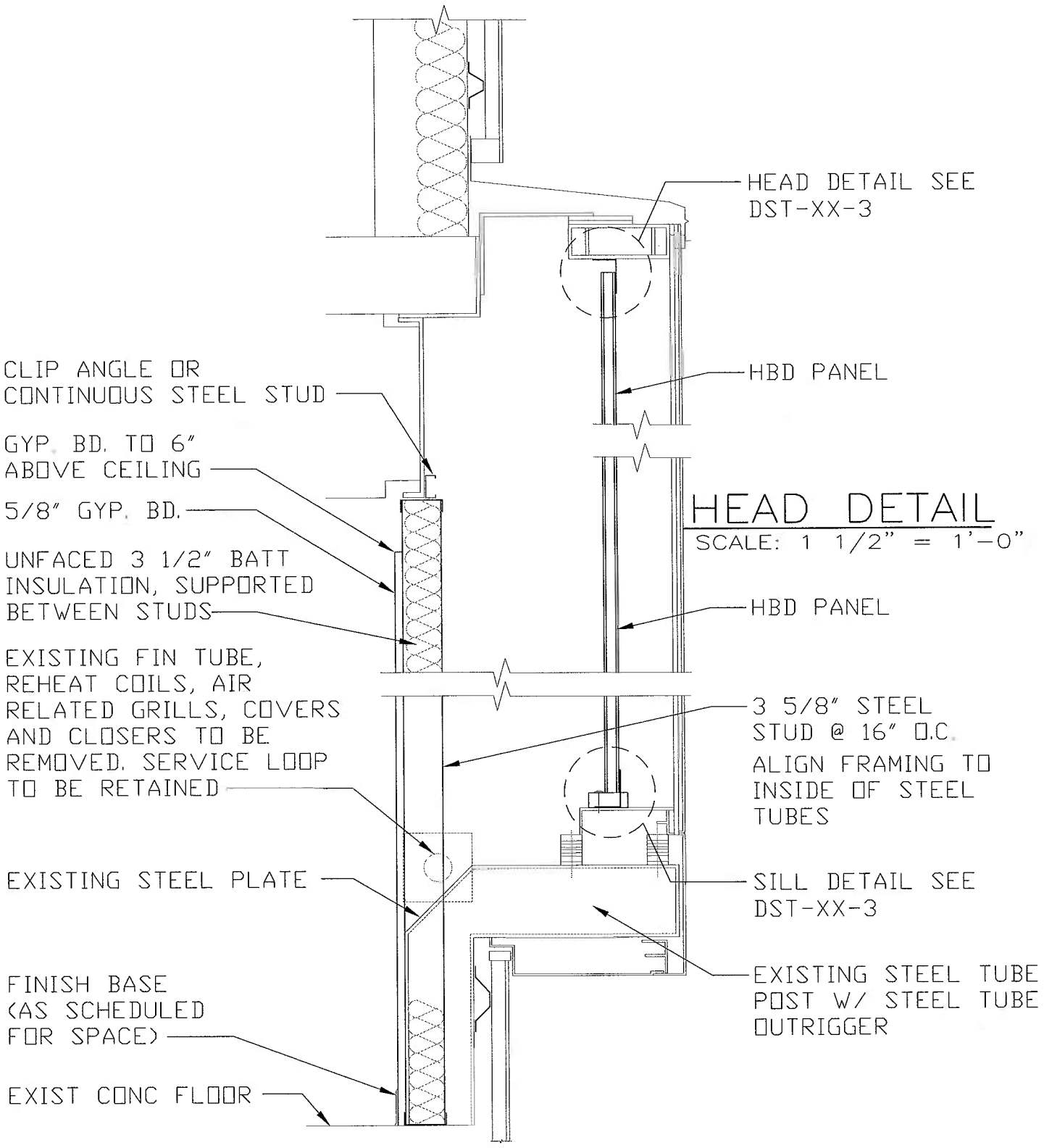


EXISTING WALL SECTION

SCALE: N.T.S.

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

SHEET TITLE: EXISTING WALL SECTION @ DOMESTIC TERMINAL



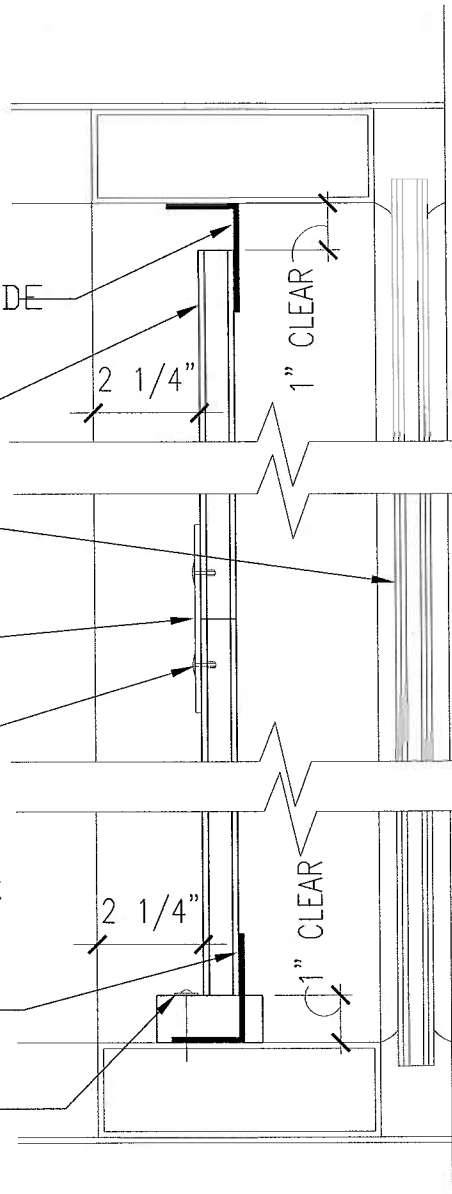
HEAD DETAIL

SCALE: 1 1/2" = 1'-0"

SILL DETAIL

SCALE: 1 1/2" = 1'-0"

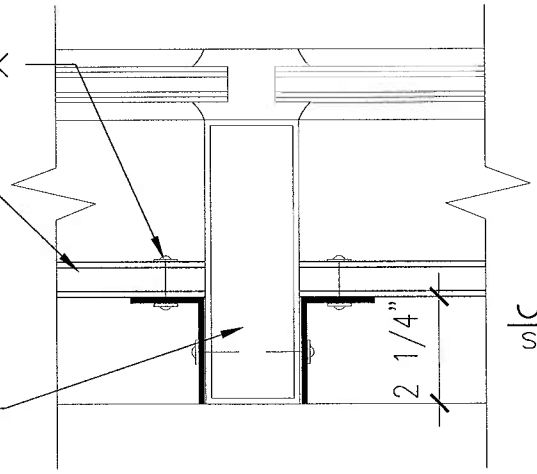
SHEET TITLE: WALL SECTION - STANDARD DETAIL @ DOMESTIC TERMINAL



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

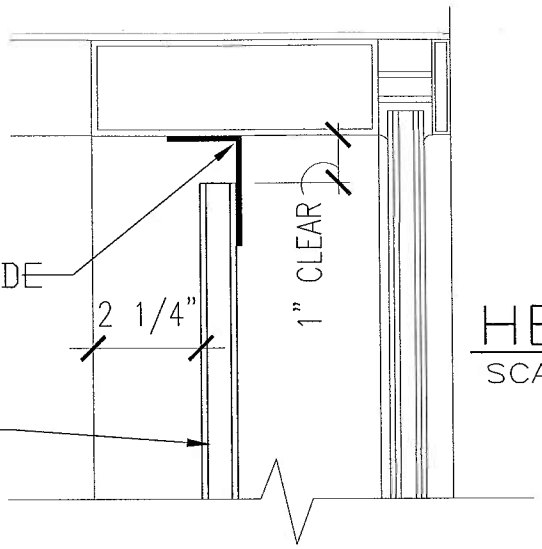
JOINT DETAIL
SCALE: 3" = 1'-0"

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



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

SHEET TITLE: DETAILS @ HARDBOARD PANEL



HEAD DETAIL
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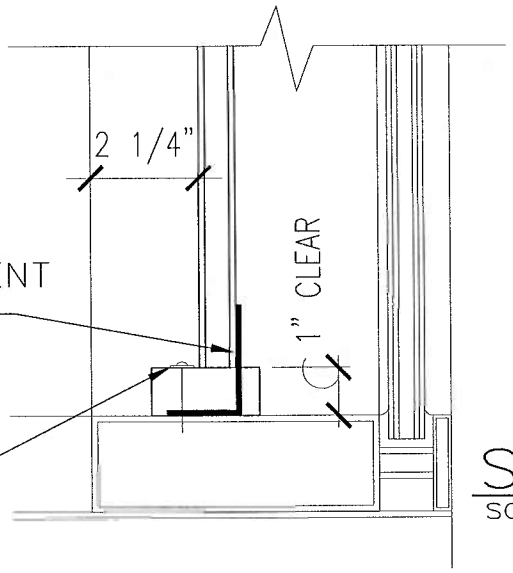
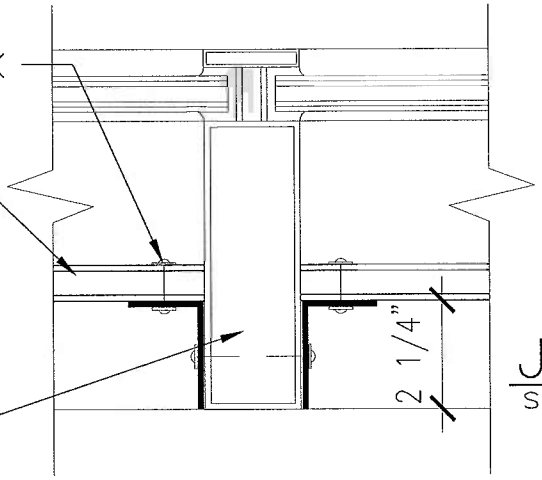


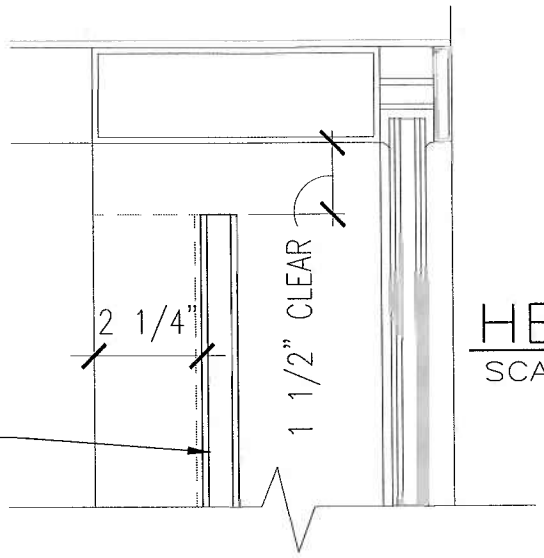
SILL DETAIL
SCALE: 3" = 1'-0"



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

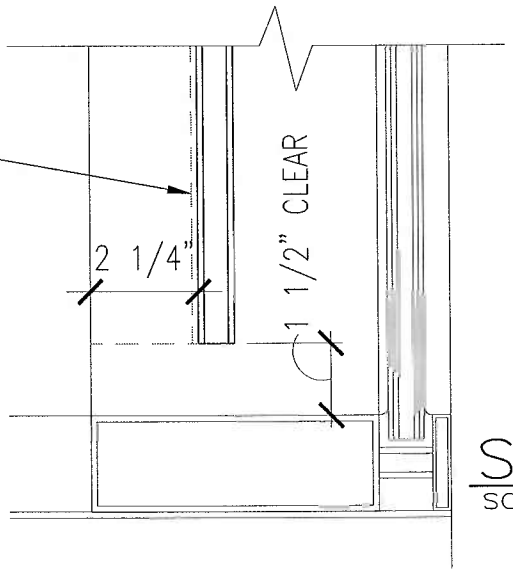
CONDITION 1 –
BEHIND GLAZED PANELS WHERE MAJOR DIMENSION IS HORIZONTAL

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"



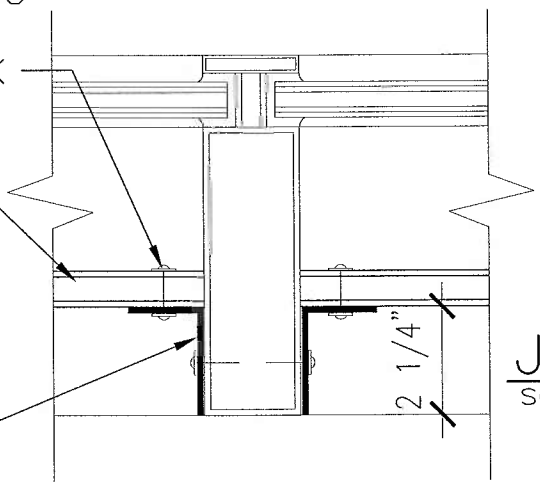
LINE OF
CONTINUOUS ALUM ANGLE

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.

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 Facilities Design.

12.3 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 Airport only). Refer to Chapter 17.

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.

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 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 Baltimore/Washington International Thurgood Marshall and Martin State Airports as part of the Maryland Aviation Administration capital projects, as well as tenant improvements, and other equipment procurements.

13.3.1 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 the Contractor's with methods to clean and flush all new HVAC piping prior to placing the piping into operation. This will reduce the chances of damage to the chilled water, HTHW, and heating water systems within the Main Terminal and Central Utility Plant.

13.3.2 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 completed, 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 video tapes of the pipe interiors to show that no (or very minimal) excavation and backfill dirt has entered the piping systems. Two copies of these video pipe inspections shall be provided to the Engineer. The tapes should clearly indicate the date, time, and section of piping being videoed. If these tapes 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-video tape 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."

13.4 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.

13.5 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. Comply with NFPA 54 and the International Fuel Gas Code for design, installation and purging of natural-gas piping.

8. 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.

9. 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 pipe 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:

10. Backflow preventers shall be installed on cold and hot water lines that serve sinks.

11. Backflow preventers shall be double check valve type, equal to Watts, Model 9D.

12. Backflow preventers shall be equipped with integral strainer, ball shut off valves, and drain connection.

13. 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.

CHAPTER 15: FIRE SUPRESSION SYSTEMS

Fire protection equipment shall be reviewed and approved by the MAA's Division Chief, Fire Prevention Division.

15.1 SPRINKLER SYSTEMS

15.1.1 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 Thurgood 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 4) 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 4) 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.

15.1.2 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.

15.2 FIRE HYDRANTS

Fire hydrants shall be designed and installed in accordance with the requirements of NFPA 1141 and shall be located so that fire hoses connected to the hydrant shall not impede streets, roadways, etc. General design guidelines are provided below but refer to Appendix D for the Standard Specification U-15/02505 – FIRE HYDRANT.

15.2.1 Aboveground Fire Hydrants

Fire hydrants shall be American Darling, Type B-62-B; Kennedy Valve, Model K-81-A; or Mueller, Model Super Centurion 250 with breakaway bolts, with a 5 sided 5/16" operating nut, two 2½" diameter hose nozzles (with National Standard threads) and a 4½" diameter steamer or pumper connection (with Baltimore City threads). Fire Hydrants shall be painted OSHA Orange.

15.2.2 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.

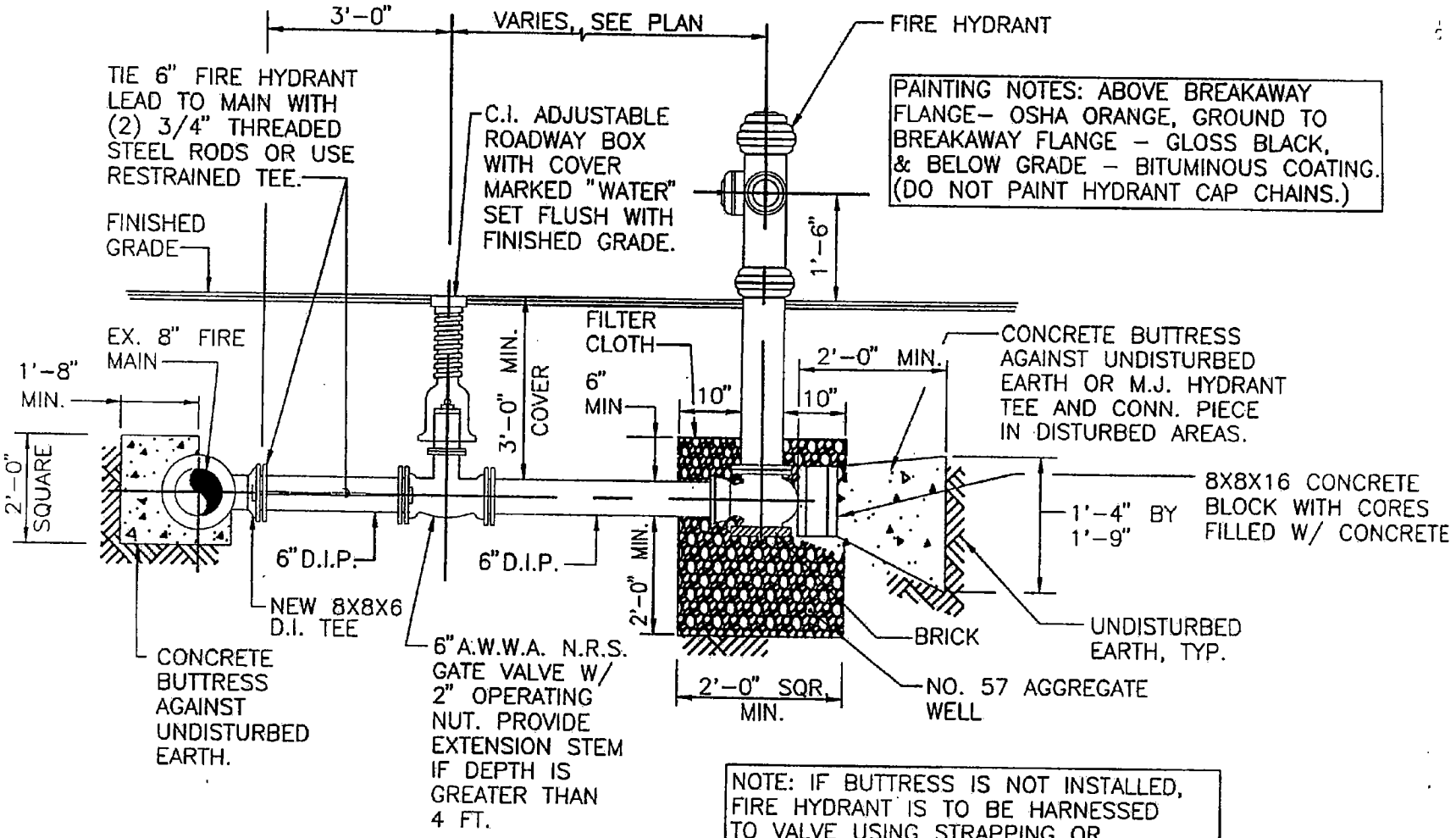
15.2.3 Underground Fire Hydrants (Aircraft Loading Areas)

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 4½" diameter steamer or pumper connection (with Baltimore City threads).

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. The cover shall be capable to withstand a live load of 200 psi plus 30% impact. 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.

SHEET TITLE: FIRE HYDRANT SETTING DETAIL

DATE: APRIL 2005

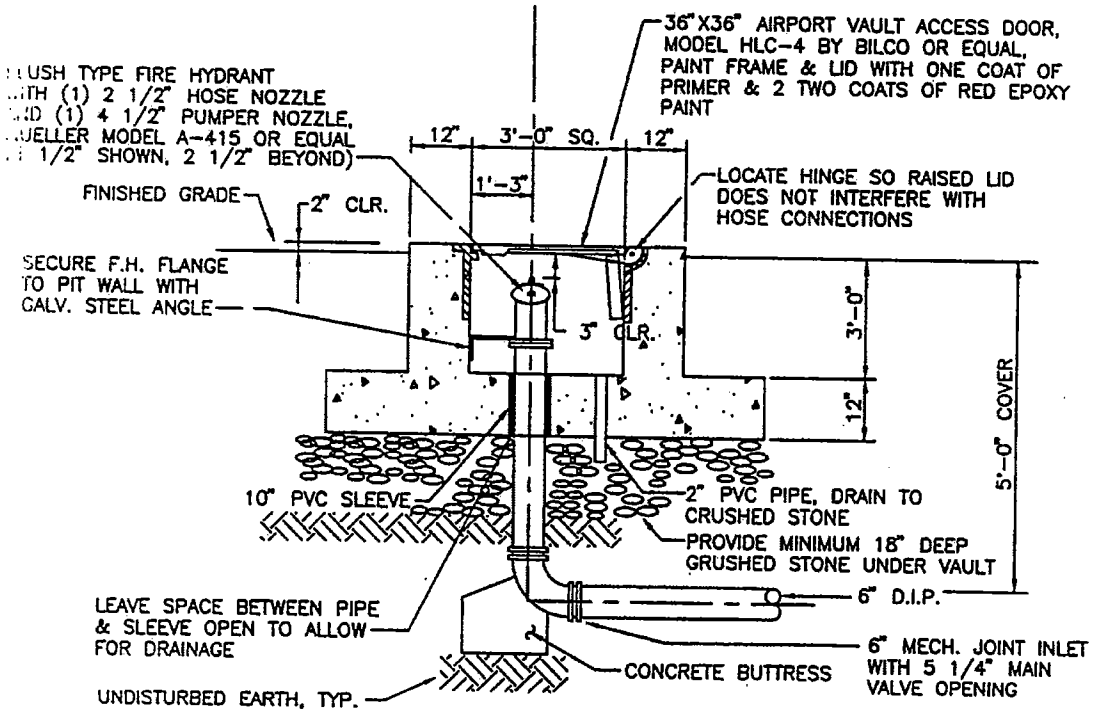


FIRE HYDRANT SETTING DETAIL

NOT TO SCALE

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

DATE: APRIL 2005



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 BALTIMORE CITY STANDARD THREADS ON THE 4-1/2" HOSE 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.

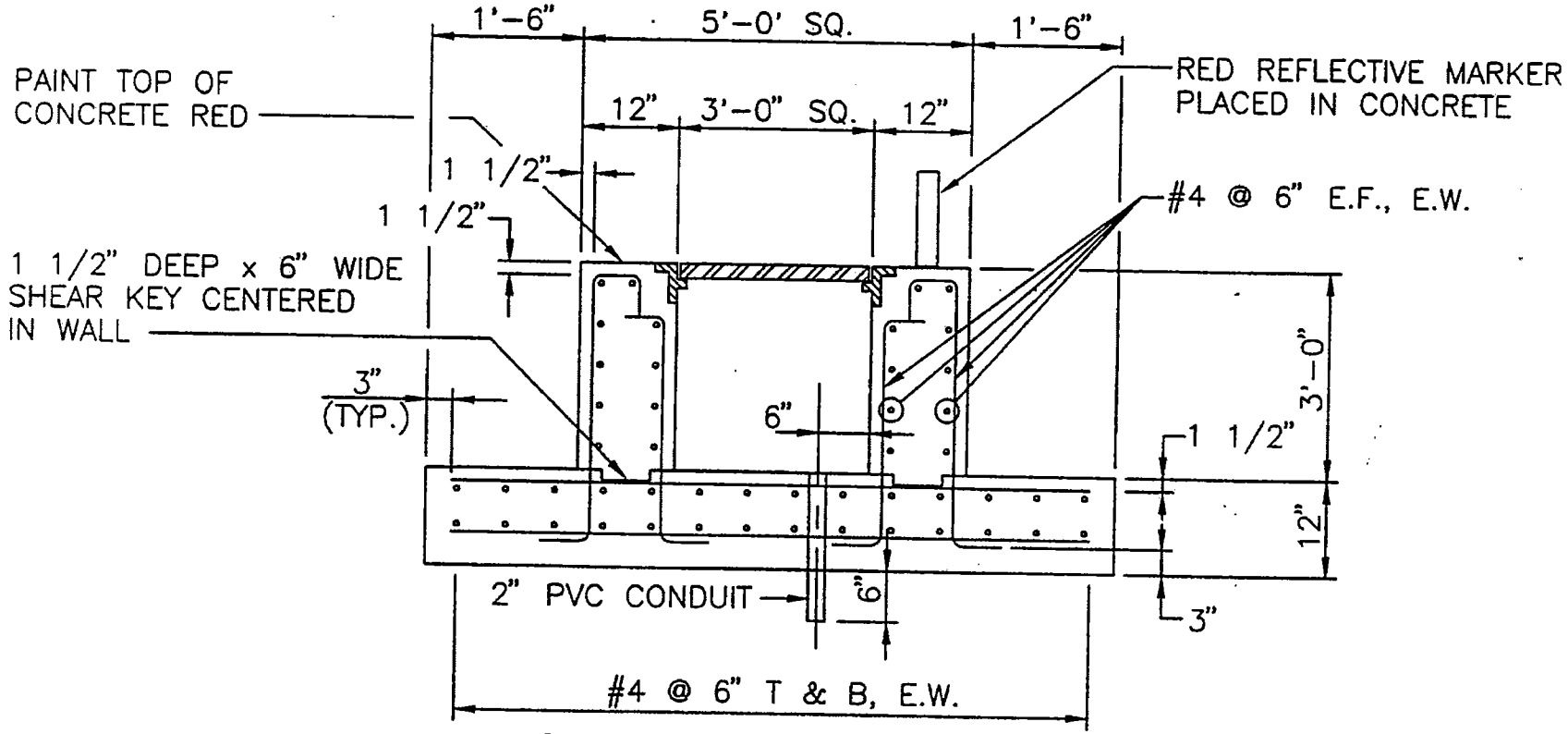
FLUSH TYPE FIRE HYDRANT AND VAULT DETAIL (FOR AIRCRAFT MOVEMENT AREAS ONLY)

NOT TO SCALE

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

DATE: APRIL 2005

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 FIRE HYDRANT AND VAULT DETAIL

(FOR AIRCRAFT MOVEMENT AREAS ONLY)

NOT TO SCALE

15.2.4 Construction Phasing for Fire Hydrants and Water Mains

In accordance with the Fire Laws of the State of Maryland, which has adopted NFPA-1 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." MAA FRD will allow the pad to be installed and the steel to be erected prior to the underground water mains and hydrants being in service.

15.3 CERTIFICATION OF FIRE PROTECTION AND DETECTION SYSTEM DESIGN

The following requirements shall be incorporated into the design and specifications of all projects at BWI Marshall and MTN Airports:

Certification:

1. A qualified 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 and detection systems.

2. For the purpose of meeting this requirement, a qualified fire protection engineer is defined as an individual meeting one of the following conditions:
   - An engineer having a Bachelor of Science or Master of Science degree in Fire Protection Engineering from an accredited university engineering program, plus a minimum of three (3) years work experience in fire protection engineering.
   - A 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 related engineering discipline, with a minimum of five (5) years experience dedicated to fire protection engineering.

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:

1. The design of the fire protection systems 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 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.

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, smoke removal systems, and stair pressurization systems.

A certification waiver 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 Division Chief, Fire Prevention Division.

2. 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.

   Fire detection system(s) 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, waterflow switches, infrared detectors, beam detectors, horns and strobes, control modules, and monitor modules.

   A certification waiver may be requested for the design/renovation of small system(s). This request shall be put in writing to the Division Chief, Fire Prevention Division. If a waiver is granted, the minimum 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 system(s) shall be defined as a system that is connected/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, or smoke removal systems.

CHAPTER 16: FIRE ALARM, LIFE SAFETY, AND SECURITY SYSTEMS

Appendix H - The Airport Wide Standard for Interface of Fire Alarm, Life Safety, and Security Systems at Baltimore/Washington International Thurgood Marshall Airport is currently being revised. Please refer to the MAA Project Manager, the Fire Marshal, and/or the Building Permit Coordinator for any specific design requirements.

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."

16.2 BWI MARSHALL AIRPORT FIRE ALARM SYSTEM

The Maryland Aviation Administration (MAA) has adopted the Honeywell Fire Alarm system for BWI Marshall Airport. All applicable contracts should 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.

16.2.1 Smoke Detectors

All smoke detectors must be UL or FM listed.

16.3 BUILDING SECURITY ALARM SYSTEM

16.3.1 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 MAA Fire Marshall. The specifications should require the contractor to complete the Authorization/Order form, and obtain the MAA's authorized signature. The Knox Box shall be Key Vaults Series 3200 Surface Mount.

Refer to the standard Authorization/Order form in Appendix B.

16.4 AIRPORT IT STANDARDS

Maryland Aviation Administration, Division of Airport Technology (OAT) has developed a design standard and uniform specifications for communication facilities, data distribution pathways, and infrastructure, both within and between building (Outside Plant) at BWI Thurgood Marshall and Martin State Airports. This document is contained in Appendix E – Standard Specifications. The document not only provides Standard Specifications but detailed information on design parameters, details and features that are to be incorporated into all projects, in order to provide consistency and compatibility between new and existing equipment/infrastructure.

CHAPTER 17: ELECTRICAL

The electrical systems for all facilities shall be based on proven design principles. 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.

17.1 GENERAL ELECTRICAL REQUIREMENTS

17.1.1 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.

17.1.2 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.

17.1.3 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.

17.1.4 Aluminum Electrical Wire

No aluminum electrical wire shall be permitted at BWI Marshall and MTN Airports.

17.1.5 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.

17.2 GROUNDING AND LIGHTNING PROTECTION

17.2.1 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.

17.2.2 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.

17.2.2.1 Protection for Parking and Revenue Control Systems

Surge suppression devices shall be installed on all electrical conductors connected to lane toll equipment (revenue plaza equipment, ticket dispensers

(spitters) and gates). Typical installations include data cabling (RS-422 for example) and electrical power circuits that feed the lane equipment, and booths.

Protection for Data Cabling

The RS 485/RS-422 circuits shall be protected with an EDCO PC-642-008LC signal line protection device. This device provides two stages of protection with an 8-volt clamp which coordinates well with the 6-volt normal operating voltages on RS-422/485 circuits. The LC suffix indicates low capacitance which allows the suppressor to operate at higher data rates. The EDCO PC series suppressor modules shall be ordered with a model PC-BIB base assembly. The first stage (odd numbered) terminals shall be connected to the field-side wiring and that the second stage (even numbered) terminals shall be connected to the equipment-side cabling to the protected equipment.

Many locations run RS-422 cables from lane-to-lane in a daisy-chain fashion (parallel connections). In these locations the inter-lane cabling shall be bridged in and then out to the next lane on the field-side wiring of the suppressor. This requires separate inbound and outbound inter-lane cables connected to the field-side of the suppressor with a short pigtail data cable between the suppressor equipment-side and the lane equipment. A suppressor shall be installed on the end of the inter-lane cabling where it attaches to an isolator or protocol converter. **Figure 1** below shows the inter-lane cabling configuration graphically.

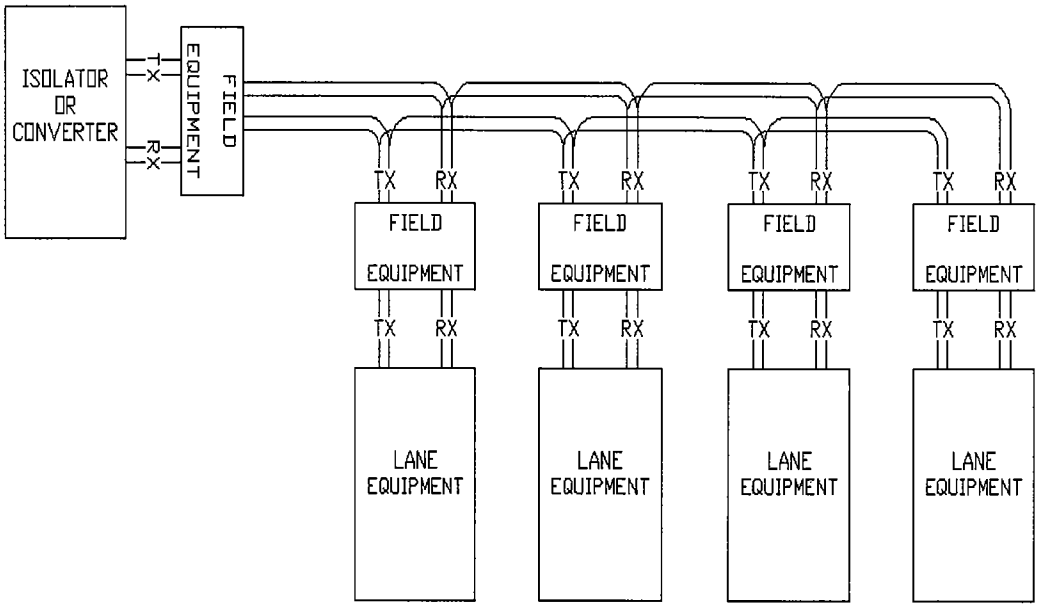


Figure 1 – Inter-Lane Cabling Configuration

Power ground wires and signal suppressor ground wires shall be as short as possible and be bonded to the equipment chassis as physically close to the suppressor as possible. This will minimize the effects of inductive voltage drop across these conductors and help control the voltage excursions that occur during a surge between the protected conductors and the equipment chassis. **Figure 2** below from the EDCO suppressor's application notes depicts these details.

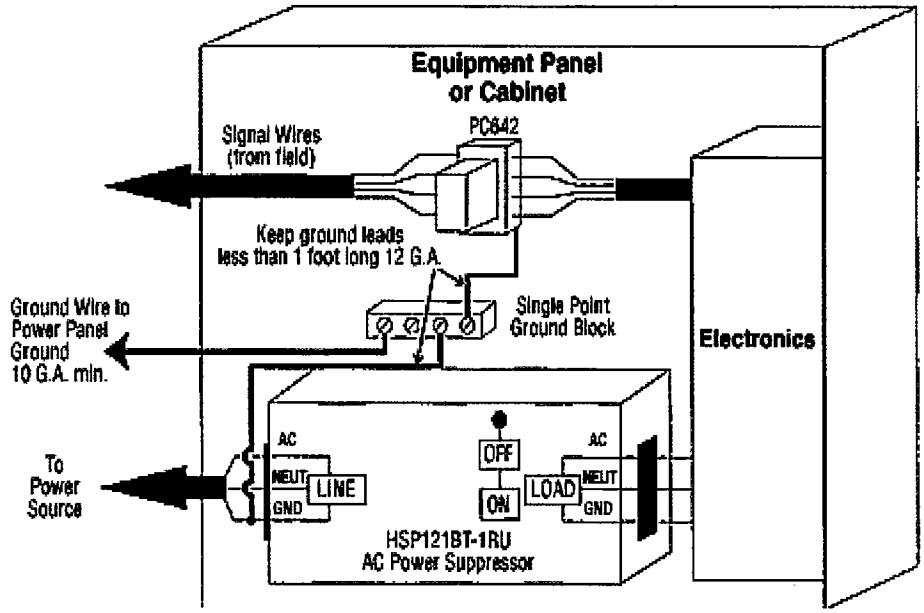


Figure 2 – Chassis Bonds for Suppressor Grounds

Protection for 120 Volt AC Powered Equipment

The 120 Vac powered cashier interface terminals, ticket spitters and gates shall be protected with either an EDCO model HSP121BT or a model HSP121A surge suppressor.

The EDCO HSP121BT has an external barrier strip which is suitable for installation inside ticket spitters, and gate operator housings that are not normally accessible to the cashier or others.

The EDCO HSP121A is mounted in a NEMA enclosure and has an internal terminal strip and knockouts that will accept conduit fittings or cord strain relief fittings. The EDCO HSP121A shall be used inside the cashier booths for protection of the cashiers' interface terminals. Using a cord strain relief fitting, the device shall be hard wired in series with the power input to the UPS at the booths. This will help ensure that the cashiers do not plug heaters into an unused receptacle protected by the surge suppression device as these devices are only rated for 15 amperes.

At the gates, these units shall be used to protect the 120 Vac feed to the controllers with the 120 Vac for the motors taken off upstream of the device. Motor loads shall not be fed through the surge suppressors.

The central equipment is typically located at the equipment cabinet in the Toll Plaza Administration building. The power equipment in the closet cabinet is usually supported by one or two plug-strips. An EDCO TS-1200G suppressor which will plug into one of the receptacles located in the cabinet shall be used. The plug-strip(s) can then be plugged directly into the EDCO TS-1200G. The "G" in the part number is an external binding post ground terminal. It connects to the internal grounds in the suppressor and provides a good point to attach the ground leads from the data line suppressors.

17.2.2.2 Protection for Closed Circuit Television Systems

Remote Closed Circuit Television (CCTV) cameras located at gates and parking areas are particularly susceptible to damage from lightning, largely due to the high level of exposure to direct lightning strikes or strikes in near proximity.

Protection for CCTV Cameras

The CCTV cameras typically include pan tilt assemblies, and are integrated units requiring 24 Vac power, RS-485 4-wire pan-tilt-zoom control and a coaxial video connection. A NEMA 4X rated equipment enclosure is typically installed at the base of each tower. This enclosure contains a quad electrical receptacle, a fiber-optic transceiver for video and control, a power transformer for camera power and a separate power transformer for the fiber-optic transceiver. Adequate space must be provided in the enclosure for the required surge suppression devices.

Figure 3 below depicts several measures that shall be taken at typical tower locations. An air terminal, fashioned from a galvanized ground rod shall be installed to protect the camera housing from direct lightning strike currents. A ground rod and bonding conductor to the tower shall be added to improve the ground resistance of the tower foundation. Continuous steel conduit shall be installed from the camera housing to the equipment enclosure to help shield the camera cabling from induced voltage if the tower is struck by lightning.

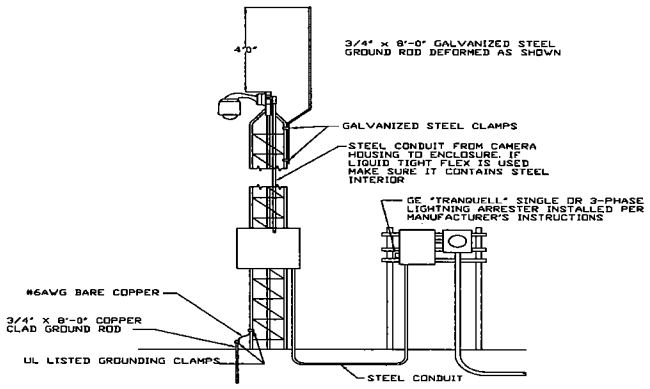


Figure 3 – CCTV Camera Tower Recommendations

Because of the relatively high exposure of these sites a high energy Metal Oxide Varistor (MOV) arrester shall be installed at the electrical panel serving each camera tower. The product recommended is a General Electric Tranquell device in either a 120/240 Vac single phase or 120/208 Vac three phase configuration. These units install in a knockout in the panel and either is directly connected to the buses or connected through a 30-ampere breaker. These units are rated for 10,000 ampere Category C exposure conditions and they will provide a first stage clamp down to a level between 2 kV and 3 kV. This provides an additional level of protection that will help extend the lifespan of suppressors installed inside the camera cabinet.

Figure 4 below shows the recommended configuration for the CCTV power, video and RS-422 pan-tilt-zoom control circuits at the base of the tower. These enclosures are typically equipped with quad 120 Vac receptacles to plug-in the camera power transformer and the plug-in DC supply for the fiber transceiver. Protect these receptacles with an EDCO HSP-121A, NEMA 4X, 120 Vac, suppressor. This suppressor (shown as A on Figure 4) is shown interconnecting these receptacles with the incoming power conductors. This suppressor will control voltage excursions from line-to-neutral and from line-to-ground to about 300-400 volts during 10 kiloampere Category C surge conditions. These suppressors are required in these locations due to the high exposure levels to direct lightning.

NOTES

A EDCO HSP-121A 120VAC NEMA 4X

B EDCO FAS-1-043HC 24VAC

C EDCO CX-06-BNC-Y-I GND ISOLATED VIDEO

D EDCO PC-642-008LC/PCB1B RS-485

E #12AWG COPPER & RING LUGS - KEEP SHORT

F NEW 4"SQ BOX WITH RECEPTS & COVER

G 1" X 1/8" COPPER BUS BONDED TO SIDE OF CABINET

H BOND HSP INPUT GROUND TERMINAL TO INCOMING GROUND CONDUCTOR. EXTEND BONDING JUMPER FROM INPUT GROUND THROUGH DRILLED HOLE TO BAR

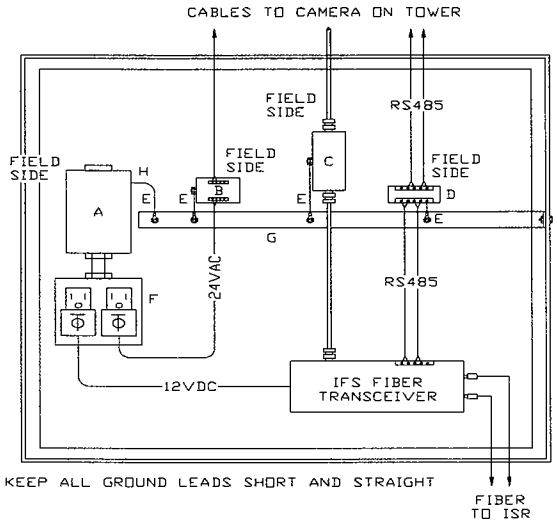


Figure 4 – CCTV Equipment Enclosure Recommended Configuration

An EDCO FAS-1-043HC, two-stage, suppression shall be installed to protect the 24 Vac power conductors to the camera assembly. This suppressor uses series inductors between the first and second stage rather than resistors, allowing it to pass several amperes of current.
An EDCO CX-06-BNC-Y-I, coaxial suppressor (shown as B on Figure 4) shall be installed to protect the camera video cable. This suppressor uses a female BNC connector on both the field-side and equipment-side. A clamp voltage of 6-volts is recommended as the peak-to-peak video levels should be around one volt.

An EDCO PC-642-008LC/PCB1B, two-pair low capacitance suppressor (shown as D on Figure 4) shall be installed to protect the RS-485 circuits with a clamping voltage of eight volts. This is consistent with the 6-volt operating range for the suppressor. This suppressor is polarity insensitive. The part number for this unit also includes a plug-in screw terminal base.
A copper ground bus (shown as G on Figure 4) shall be installed to terminate the ground leads for the suppressors. A flat conductor provides a significantly lower inductance than a round conductor, which is a major factor in having the suppressors track each other during high levels of lightning current. The bus bar is shown bonding to the side of the cabinet with stainless steel hardware and star washers to ensure that potentials inside the enclosure remain consistent with each other.

The power suppressor has a terminal strip for line, neutral and ground on both the unprotected and protected side. Line, neutral and ground conductors shall terminate on these strips. In addition, a #12 AWG copper conductor is shown between the unprotected ground terminal and the copper bus for the cabinet.

This will help to ensure that the ground reference for the power suppressor and ground leads for the other suppressors track each other during surge handling.

Properly connect the suppressors with their unprotected or field-side wiring terminals to the cabling leaving the enclosure. If connected backwards, the more sensitive (but faster acting) second stage will be exposed to excessive current and the suppressors may be damaged by the first lightning event.

Separation of cabling is required to minimize coupling between protected and unprotected cabling. If it is necessary to cross these cables over each other, make the crossover using right angles. This will help to minimize the inductive and capacitive coupling of energy between protected and unprotected circuits.

Protection is not provided for the 12 Vdc power supply to the IFS transceiver as this power circuit does not leave the enclosure.

17.2.2.3 Protection for Access Control System Gates

Due to the exposed location of access control components located at vehicular gates, there is likely to be damage by direct or nearby lightning strikes and the metallic fencing's ability to conduct nearby strikes to the gate locations.

Figure 5 shows the recommended method for protecting the access control equipment at the gates. Install an EDCO HSP-121A, two-stage hybrid, NEMA 4X, suppressor (See A on Figure 5) on the exterior of the access control enclosure to protect the power conductors. This approach is recommended as access control enclosures typically have insufficient space to place the suppressor in the housing. The incoming 120 Vac power entering the enclosure is looped out, through the suppressor and back into the enclosure where it is hard-wired to the 27 Vdc regulated switching power supply.

NOTES

A EDCO HSP-121A 120VAC NEMA 4X

B EDCO FAS-1-043HC 24VAC

C EDCO PC-642-008LC/PCB1B RS-485

D #12AWG COPPER & RING LUGS - KEEP SHORT

E 1" X 1/8" COPPER BUS BONDED TO SIDE OF CABINET

F EDCO FAS-1-043HC 24VAC OR DC

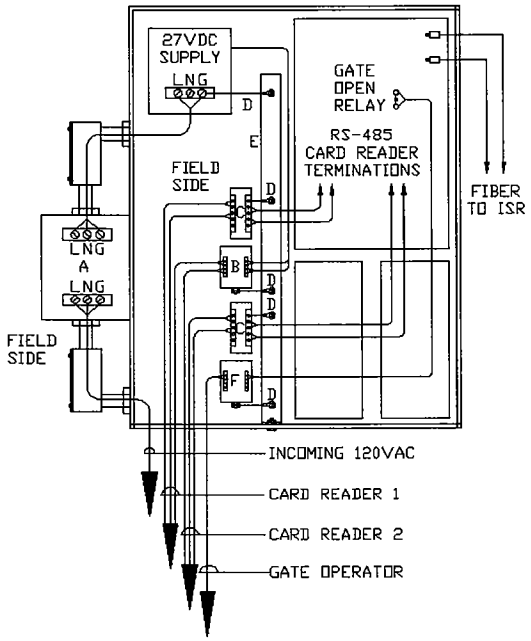


Figure 5 – Gate Access Control Recommended Configuration

An EDCO FAS-1-043HC, two-circuit, 24 Vac, suppressor shall be installed at each gate to protect the wiring to the two card readers. This EDCO AC suppressor was chosen for this application as the 27 Vdc used to power the remote readers is on the upper limit of what a 24 Vdc suppressor will tolerate. Since peak voltage on an AC circuit is 1.41 times the RMS value, the clamping threshold for the AC suppressor is actually set at 43-Volts. The suppressors for card reader power utilize a series inter-stage inductor rather than resistors making them suitable for this type of powering application.

Use EDCO PC-642-008LC/PCB1B, low capacitance, 8-volt, RS-485, suppressors for protection of the card reader data circuits. These suppressors shall include a plug-in screw terminal base that can be secured to the back or side panels in an enclosure.

In the event that Wiegand readers are ever required, the same manufacturer makes a 5-conductor Wiegand protector in the same package.

In lower exposure areas, there would not be concern about circuits that leave the enclosure isolated by a dry relay contact. Cases of welded relay contacts, contacts burned open and even miniature relays which were completely disintegrated have occurred in high exposure level situations. When this occurs there is often collateral damage to other components on the circuit board.
A 24 Vac suppressor shall be specified for in high exposure level situations. This is usable with AC or DC control voltages of up to about 30 volts as the clamping threshold is set at 43 volts. If higher voltages are required, a different

suppressor may be utilized with a clamp setting that is workable with the voltage being switched.

All of the rules and guidelines recommended for the CCTV enclosure apply to the card access installation. This includes separation of protected and unprotected conductors and keeping ground leads short.

No detail was produced for the remote card readers themselves. These readers shall be equipped with one of the reader power suppressors (also available in a single pair configuration) and an RS-485 suppressor installed in the junction box behind the reader. Bond suppressor grounds to the metallic housing for the reader and reader pedestal.

17.3 POWER DISTRIBUTION SYSTEM AND EQUIPMENT

17.3.1 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 Engineering and Construction Management.

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 available from MAA upon request.

   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).

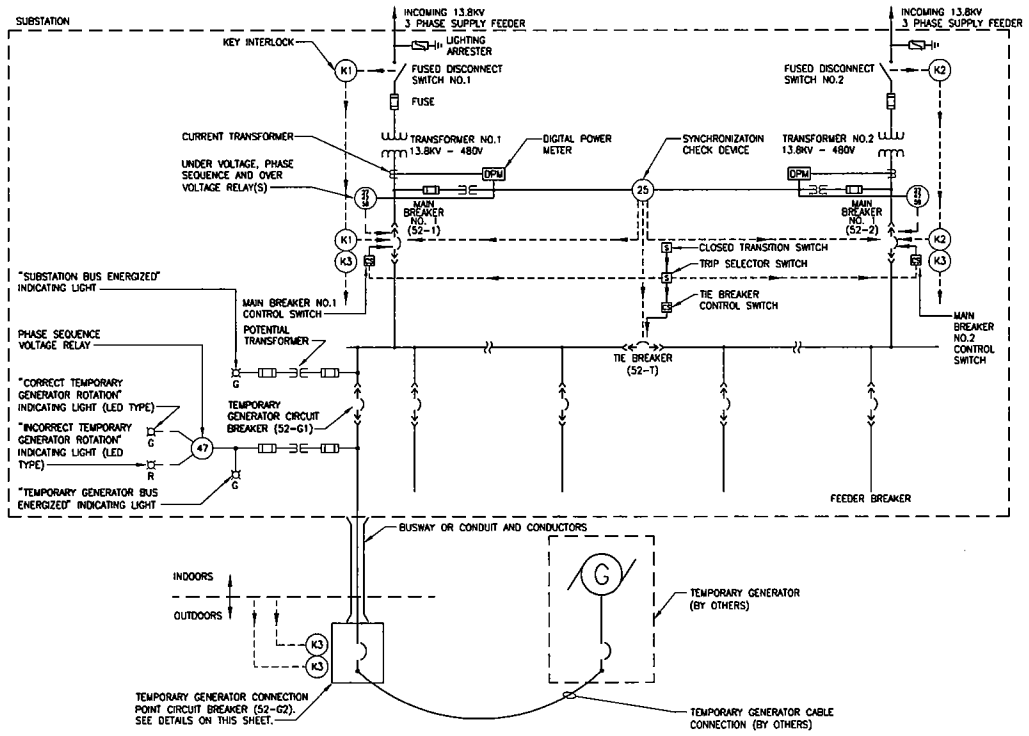
4. All substation short-circuit ratings shall be adequate for the combined available fault current contribution due to secondary closed transition switching. The available fault current shall be calculated for the moment that both secondary main breakers and the tie breaker are simultaneously closed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

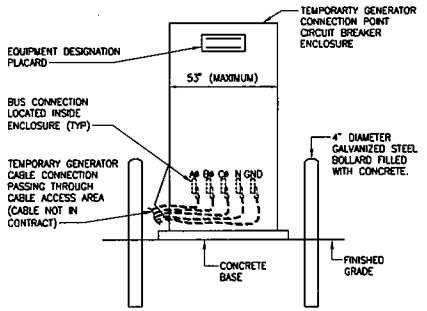
   The designer shall contact MAA maintenance personnel to see if any operating problems have occurred recently with closed transition operation at existing substations. If so, the designer shall request that BGE perform a circulating study. The designer shall make recommendations based on the results of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

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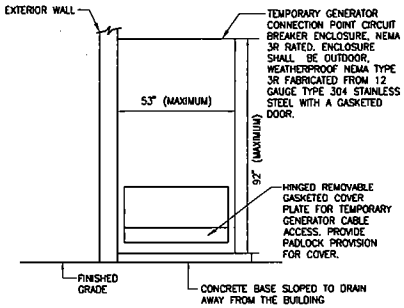

TEMPORARY GENERATOR CONNECTION POINT CIRCUIT BREAKER (52-G2) - SIDE VIEW

NOT TO SCALE

URS
CONSULTING ENGINEERING AND PLANNING
1099 Winterson Road
Linthicum, MD 21090
Phone: 410-853-4460 Fax: 410-853-4183

DESIGNED	D.M.W.
DRAWN	M.R.F.
CHECKED	D.L.B.
APPROVED	D.L.B.

REVISION NO.	REVISION DATE	DESCRIPTION

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

BWI

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-G1) LOAD SIDE BUS IS ENERGIZED AND VOLTAGE ROTATION IS INCORRECT.

     (2) OFF WHEN TEMPORARY GENERATOR CIRCUIT BREAKER (52-G1) LOAD SIDE BUS IS DE-ENERGIZED. OFF WHEN TEMPORARY GENERATOR CIRCUIT BREAKER (52-G1) LOAD SIDE BUS IS ENERGIZED AND VOLTAGE ROTATION IS CORRECT.

   - "TEMPORARY GENERATOR BUS ENERGIZED" INDICATING LIGHT:

     (1) ON WHEN TEMPORARY GENERATOR CIRCUIT BREAKER (52-G1) LOAD SIDE BUS IS ENERGIZED.

     (2) OFF WHEN TEMPORARY GENERATOR CIRCUIT BREAKER (52-G1) LOAD SIDE BUS IS DE-ENERGIZED.

   - PHASE SEQUENCE VOLTAGE RELAY:

     MONITORS TEMPORARY TEMPORARY GENERATOR CIRCUIT BREAKER (52-G1) LOAD SIDE VOLTAGE AND PROVIDES ELECTRICAL CONTACTS REQUIRED TO 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:

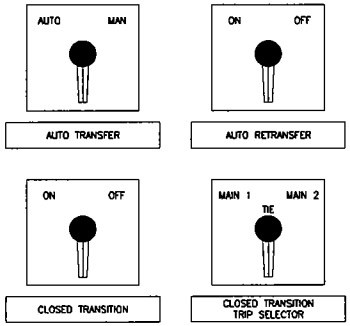
1. AUTOMATIC/MANUAL CONTROL SWITCH – ENABLES/DISABLES AUTOMATIC TRANSFER SCHEME.
2. RETRANSFER CONTROL SWITCH – ENABLE/DISABLE AUTOMATIC TRANSFER SCHEME AUTOMATIC RETRANSFER OPERATION.
3. NORMAL CONDITION – SECONDARY MAIN CIRCUIT BREAKERS (52-1 AND 52-2) ARE CLOSED, AND THE TIE BREAKER (52-T) IS OPEN.
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

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

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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.

17.3.2 Medium Voltage Electrical Phasing and Rotation (BWI Thurgood Marshall Airport only)

This design standard details the electrical phasing and rotation conditions for the BWI Marshall medium voltage electrical distribution system. This standard was requested to document field conditions found during recent modifications to the BWI Marshall North and South substations.

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.

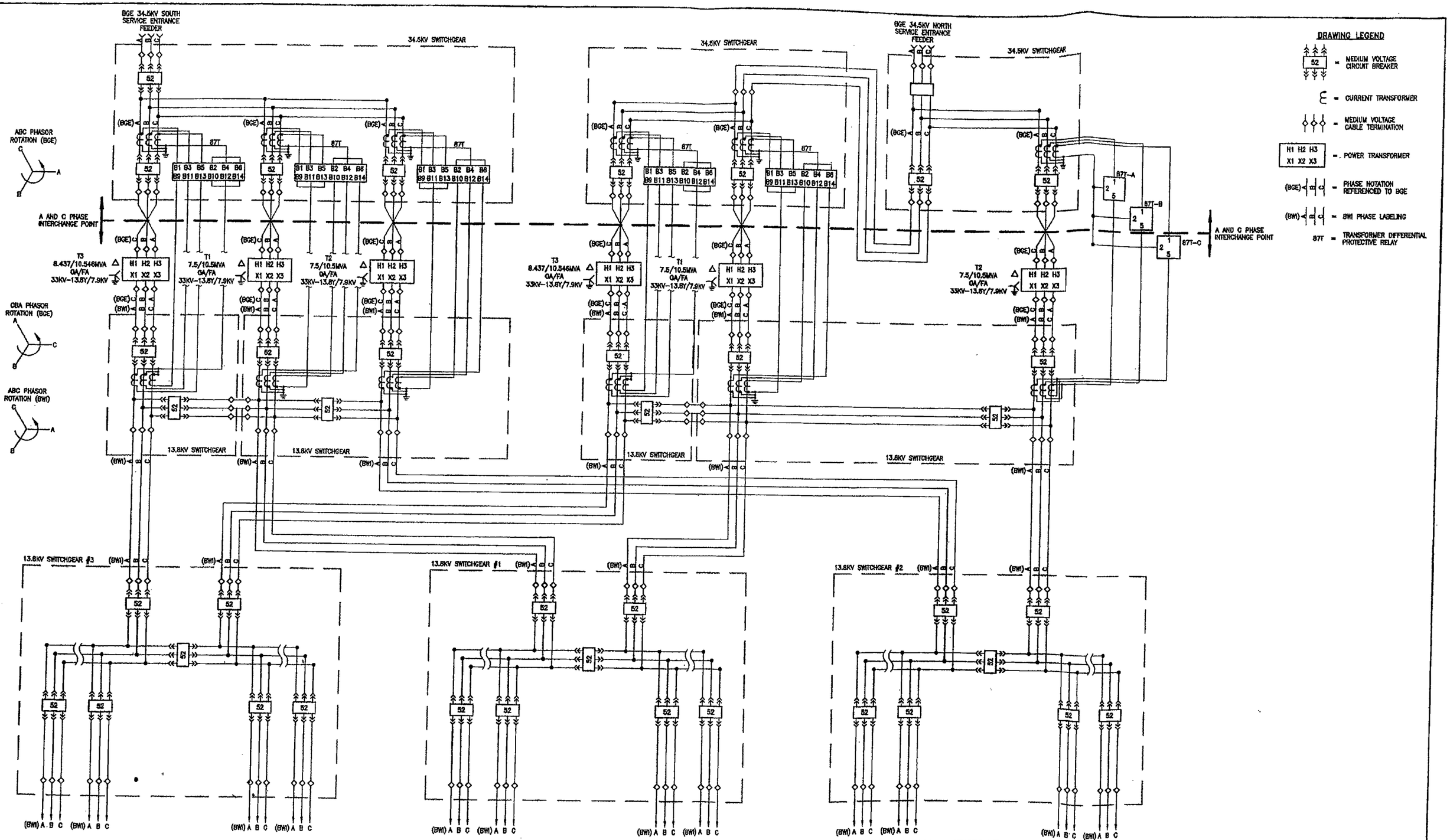
The term rotation refers to the order that the phases reach their maximum instantaneous line-to-neutral voltage value. There are two possible system rotations, ABC (positive sequence) or CBA (negative sequence). The rotation of the system determines the direction that a three-phase motor will spin when 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 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 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 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 Mr. Michael Karlinchak at 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 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.



BALTIMORE/WASHINGTON INTERNATIONAL AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION

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PROJECT TITLE: BWI DESIGN STANDARD DST 2005 - 01

SHEET TITLE: BWI MEDIUM VOLTAGE DISTRIBUTION SYSTEM THREE - LINE DIAGRAM

SCALE	PROJECT NO.	EXHIBIT NO.
NONE	--	
DATE: FEBRUARY 2005	SHEET REFERENCE: --	

17.4 EQUIPMENT

17.4.1 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.

17.4.2 Raceways

17.4.2.1 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 MAA Fire Marshal, shall be considered fire alarm wiring and shall be installed in a raceway system.

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.

17.4.2.2 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.

17.4.3 Boxes and Wiring Devices

17.4.3.1 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

17.5 EMERGENCY AND STANDBY POWER SYSTEMS

17.5.1 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.

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.

17.6 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.

17.7 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.

17.7.1 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:

14. 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.

15. 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.

16. 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.

17.8 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 18: LIGHTING

18.1 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 Division of Facilities 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.

18.1.1 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.

18.2 EXTERIOR LIGHTING

18.2.1 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 Engineering and Construction Management. 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. 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 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.

18.2.2 Airfield Lighting

18.2.2.1 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

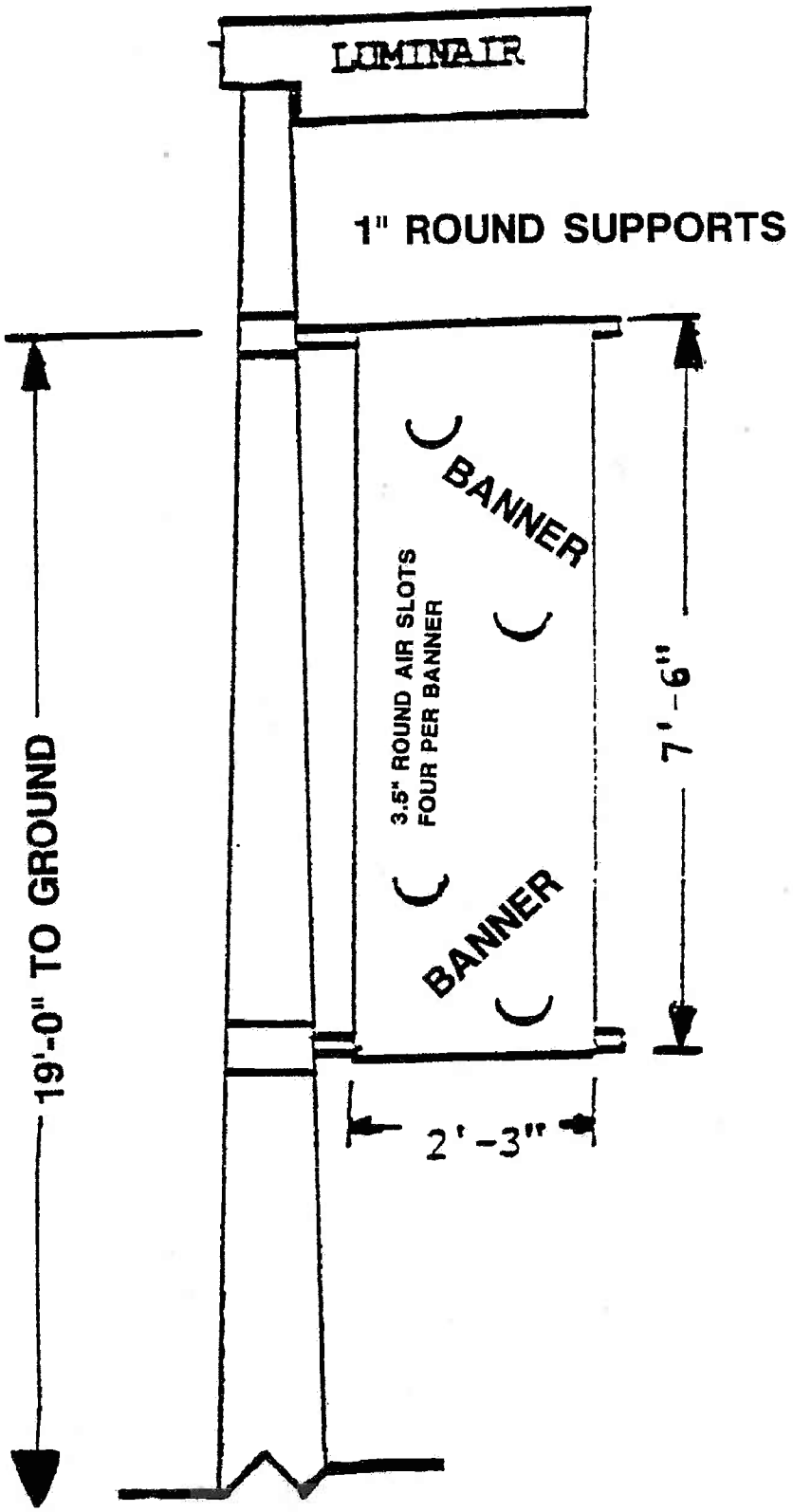
Reference is made to the advisory circular AC 150/5345-46B, Specification on Runway and Taxiway Light Fixtures. Effective immediately, in areas where L-852T lights are required, only Style 3 shall be specified. Any style 3 fixture that is installed at the airport must also be Federal Aviation Administration (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.

18.2.2.2 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.

18.2.3 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 Engineering and Construction Management. 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. 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 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 2.9.1)

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 19: SIGNAGE AND GRAPHICS

Refer to Appendix I for signage standards.

19.1 EXTERIOR SIGNAGE

19.1.1 Landside/Roadway Signage

19.1.2 Apron/Airfield Signage

19.1.2.1 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.

19.2 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.

19.3 DIRECTIONAL SIGNAGE

19.3.1 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 Division Chief, Fire Prevention.

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 type sign with red background and white reflective letters. The sign will be placed on the outside of the door. Sign size 9" x 11".

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.