MARYLAND AVIATION ADMINISTRATION

Interim Design Standards

BWI

MARTIN STATE AIRPORT

DIVISION OF FACILITIES DESIGN

Prepared April 2005

TABLE OF CONTENTS

*Red Text indicates sections under development

*Red Text indicates sections under development

*Red Text indicates sections under development

*Red Text indicates sections under development

*Red Text indicates sections under development

*Red Text indicates sections under development

*Red Text indicates sections under development

*Red Text indicates sections under development

*Red Text indicates sections under development

*Red Text indicates sections under development

TABLE OF CONTENTS CONTINUED

EXHIBITS

APPENDICES

*Red Text indicates sections under development

INTRODUCTION

The Interim Design Standards incorporates all Maryland Aviation Administration (MAA) Design Standards (DSTs) in a consolidated format. It is required that all A/Es performing work that will be constructed on airport property should perform services consistent with the MAA policies, standards, procedures, and construction requirements contained in these Interim Design Standards and its appendices. In addition to the existing MAA Design Standards, the Interim Design Standards also includes some additional standards that have been recently developed. These include the following:

- Restroom Design Standards (found in Appendix E)
- Revisions to DST 97.4 – adds additional language regarding the use of sewage ejector pits (Found in Section 9.1.9)
- Sole Source Equipment Specifications (found in Appendix D)
- BWI Signage Standards (found in Appendix I)
- S-1 Series Plug Cutouts for Lockout/Tag-out (found in Section 19.2.2.1)
- L-824 Cables for Airfield Lighting Circuits (found in Section 19.2.2.2)
- Standard Specifications for Construction and Materials (found in Section 4.13.4)
- Medium Voltage Electrical Phasing and Rotation (found in Section 18.4.3)

If any of the included design standards 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 and set standards for both Baltimore/Washington International (BWI) and Martin State (MTN) Airports in order to achieve consistency in design and construction projects related to the Maryland Aviation Administration (MAA) and MAA Tenants. These Interim Design Standards are mandated regulations of the MAA.

1.2 BACKGROUND

1.2.1 Baltimore/Washington International (BWI) Airport

1.2.2 Martin State (MTN) Airport

CHAPTER 2: GENERAL DESIGN AND CONSTRUCTION POLICIES

2.1 STANDARDS OF ETHICAL CONDUCT

2.2 COMPATIBILITY WITH AVIATION OPERATIONS

2.3 ARCHITECTURAL COMPATIBILITY

2.4 AIRPORT LAND USE PLAN

2.5 ENVIRONMENTAL PROTECTION

2.6 HISTORIC PRESERVATION

2.7 SAFETY

2.8 SECURITY REQUIREMENTS

2.8.1 Vehicle Access on BWI Airport Movement Area (DST 97-2)

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.

2.9 FULL AND OPEN COMPETITION

2.10 BRAND NAME OR EQUAL REQUIREMENTS

2.11 SOLE SOURCE PROCUREMENT

2.12 MINORITY BUSINESS ENTERPRISE (DBE) PARTICIPATION

2.13 MAINTAINABILITY AND OPERABILITY

2.14 TENANT PROJECTS

2.15 PARTNERING

2.16 FACILITY MAINTENANCE AND OPERATIONS

SECTION II: DESIGN PROCEDURES

CHAPTER 3: GENERAL ARCHITECT/ENGINEER CONTRACT MANAGEMENT

CHAPTER 4: DESIGN PHASE

4.1 AIRPORT CONSTRUCTION PROJECT CHECKLIST (DST 95-2)

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 (DSTS 99-16, 2000-05)

FAA requirements for proposed development must be followed at BWI 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. At the initiation of each project, designers 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.

2. 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. Fore 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.

3. Pre-design meetings are required for all airfield projects prior to 30% completion.

4. 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.

5. 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.

6. 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.

7. 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.

8. 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.

9. 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.

If the above requirements conflict with any other codes or regulations, it should be brought immediately to the attention of the Manager, Division of Facilities Design.

4.3 KICKOFF MEETINGS

4.4 DESIGN MEETINGS (DST 2001-03)

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 REPORT

4.6 DESIGN REVIEWS

4.6.1 Responsibilities

4.6.2 Procedures

4.6.3 Process (DSTs 99-6, 99-11)

All written comments from the Fire Marshal's office 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 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

4.8 ENVIRONMENTAL COORDINATION

4.8.1 MDE (DST 99-15)

All BWI 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.

4.8.2 Chesapeake Bay Critical Area

4.8.3 Forest Conservation Procedures

4.9 FAA COORDINATION

4.9.1 Radar Reflectors (DST 99-18)

The FAA has installed radar reflectors throughout the airfield as part of the surface detection system. All contract documents at BWI 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 STORMWATER MANAGEMENT/DRAINAGE REPORT

4.11 DESIGN PHASES AND SUBMITTAL REQUIREMENTS (DST 2001-07)

The items shall be verified and included in all construction documents prepared for the MAA Division of Facilities Design. Prior approval from the MAA Manager of Division of Facilities Design must be obtained for any deviations from the following items.

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.

4.11.1 Programming and Schematic Design Submittal

4.11.2 Design Development (30% Review) Submittal

4.11.2.1 Drawings

4.11.2.2 Technical Provisions and Specifications

4.11.2.3 Cost Estimate

4.11.2.4 Design Report and Calculations

4.11.2.5 Schedule

4.11.3 Construction Documents 60% Submittal

4.11.3.1 Drawings

4.11.3.2 Technical Provisions and Specifications

4.11.3.3 Cost Estimate

4.11.3.4 Design Report and Calculations

4.11.3.5 Schedule

4.11.3.6 Extra Materials (Attic Stock) List

4.11.4 Construction Documents 100% Submittal

4.11.4.1 Drawings

4.11.4.2 Technical Provisions and Specifications

4.11.4.3 Cost Estimate

4.11.4.4 Design Report and Calculations

4.11.5 Bid Documents

4.11.5.1 Certification Requirements

4.12 DRAWING REQUIREMENTS

4.12.1 Drawing Materials

4.12.2 Drawing sizes

4.12.3 Characteristics of Drawings

4.12.4 Standard Drawings

MAA has established certain drawings that shall be incorporated within all contract documents. They are found in Appendix J. These include:

- Erosion and Sediment Control sheets
- General Safety and Phasing Plan

4.13 CONSTRUCTION SPECIFICATIONS (DST 98-6)

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 D.

4.13.1 General Specification Requirements

4.13.2 Non-Technical Specifications

4.13.3 Building Specification Format

The MAA has adopted the American Institute of Architects (AIA) "MasterSpec®" building construction specifications system. All building contract specifications shall be developed using the most recent edition of "MasterSpec®."

The "MasterSpec®" Division I 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 I requirements, and will take precedence. Generally, Division I

should only be used to supplement and enhance the MAA Standard Provisions for Construction.

4.13.4 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 be used. Landscaping and Landscaping Materials for MAA construction projects are included in Appendix D.

4.13.5 Sole Source Specifications

Sole Source Specifications are found in Appendix D.

4.14 DESIGN CALCULATIONS

4.14.1 Checking

4.15 FINISH MATERIALS AND COLOR BOARDS

4.16 COST ESTIMATING

4.16.1 Development of Cost Estimates (DST 94-5)

Since the MAA utilizes various funding sources for construction projects, the following procedure for development of construction cost estimates and included additional 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) percent but should be coordinated with the MAA Project Manager.

3. Design contingencies and construction contingencies should be listed as separate line items.

4. 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.

5. 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.

6. 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.

7. 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.

The MAA standard format for cost estimates should be used for preparing all estimates. It is found in Appendix B.

4.16.2 Requirements of Cost Estimates

4.16.3 Value Engineering

4.16.4 Constructability

4.16.5 Liquidated Damages

CHAPTER 5: BIDDING AND PROCUREMENT

CHAPTER 6: CONSTRUCTION ADMINISTRATION

6.1 SHOP DRAWING/SUBMITTAL REVIEW

6.1.1 Fire Marshal Comments (DST 99-06)

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 (DST 2004-06)

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

6.3 PERIODIC PROGRESS REVIEW AND COODINATION MEETINGS

6.4 DRAWING/DOCUMENT CHANGE CONTROL

6.5 CONSTRUCTION CLOSE-OUT AND TURNOVER

6.6 RECORD DRAWING PREPARATION (DST 99-12)

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.

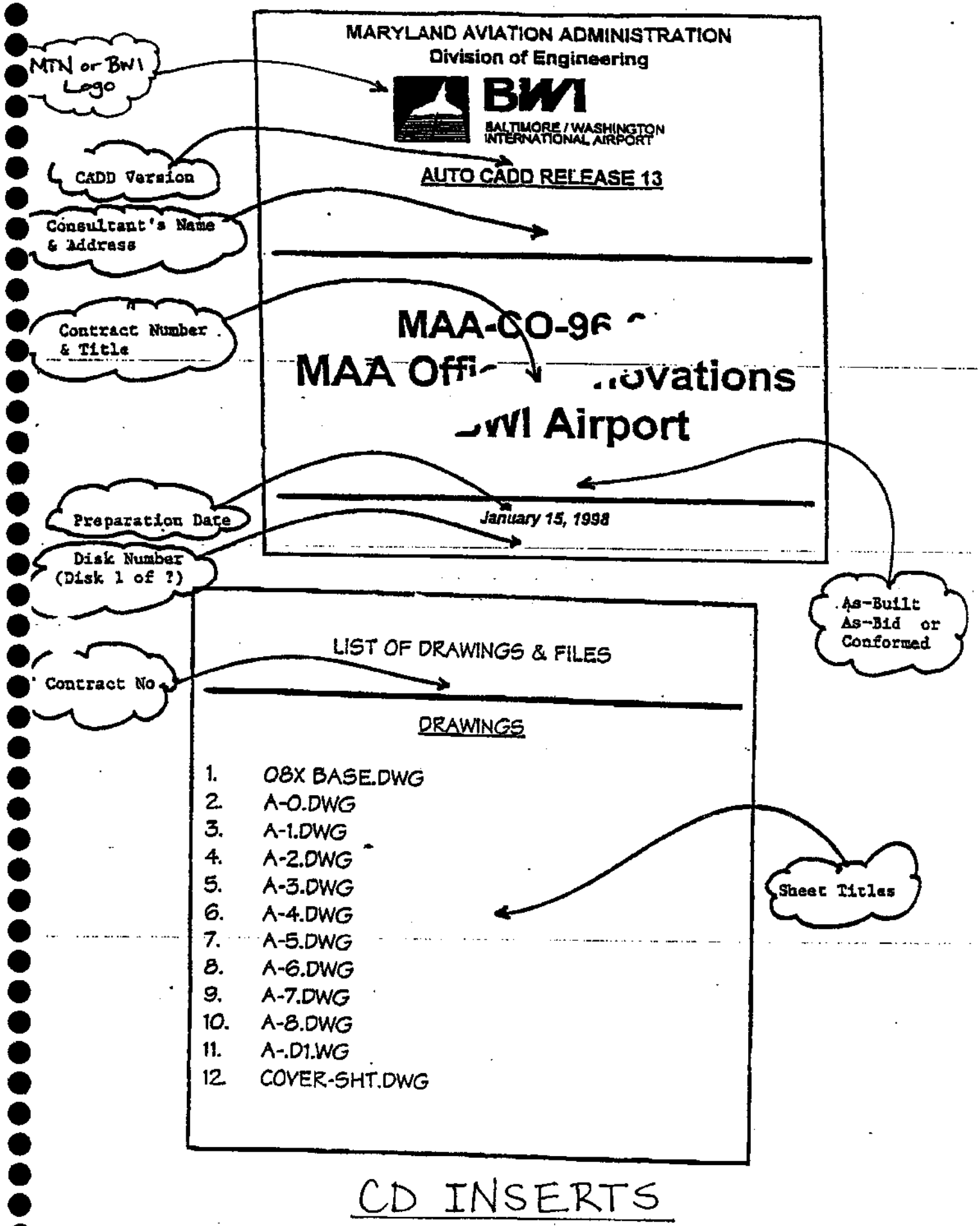
Deliverables shall include:

- 1 set of blueline prints (2 sets if AIP funding is used in the project)
- 1 set of reproducible mylar plots, sealed by Professional Engineer or Registered Architect, with original signature.
- 2 CDs with electronic files

Drawings shall include:

- Revision block shall be labeled "As-Built" with date of issue.
- The following disclaimer shall be placed on each sheet (including the title sheet): "These record drawings dated… and titled "As-Built" have been developed from the Contractor's record of changes made 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."
- 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 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"; 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.


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: INTRODUCTION

CHAPTER 8: GENERAL REQUIREMENTS (DST 96-3, 2001-12)

8.1 CODE REQUIREMENTS

The A/E shall design the project to comply with the MAA Design Standards and applicable codes in these design criteria. The A/E 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 20 September 2004.
   - COMAR 05.02.07 Maryland Building Performance Standards (MBPS) 20 September 2004.
   - COMAR 29.06.01.07 State Fire Prevention Code 01 August 2004.
   - COMAR 05.02.02 Maryland Accessibility Code 18 March 2002.
   - COMAR 09.20.01 Maryland State Plumbing Regulations 23 July 2001.

2. Applicable Codes above incorporate by reference, and contain amendments to the following Model Codes:
   - International Building Code 2003.
   - NFPA 1 Uniform Fire Code 2003.
   - NFPA 70 National Electrical Code 2002.
   - NFPA 101 Life Safety Code 2003.
   - Americans with Disabilities Act Accessibility Guidelines 23 July 2004.
   - International Mechanical Code 2003.
   - National Standard Plumbing Code Illustrated 2000; 2001 Supplement (Maryland Building Performance Standards).
   - International Plumbing Code 2003 (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 A/E shall incorporate appropriate references to nationally accepted standards for the design, fabrication and installation of particular equipment. Also, the A/E 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.

8.1.1 Fire Egress Analysis (DST 96-5)

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.

Sample analysis and detail follow:

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).

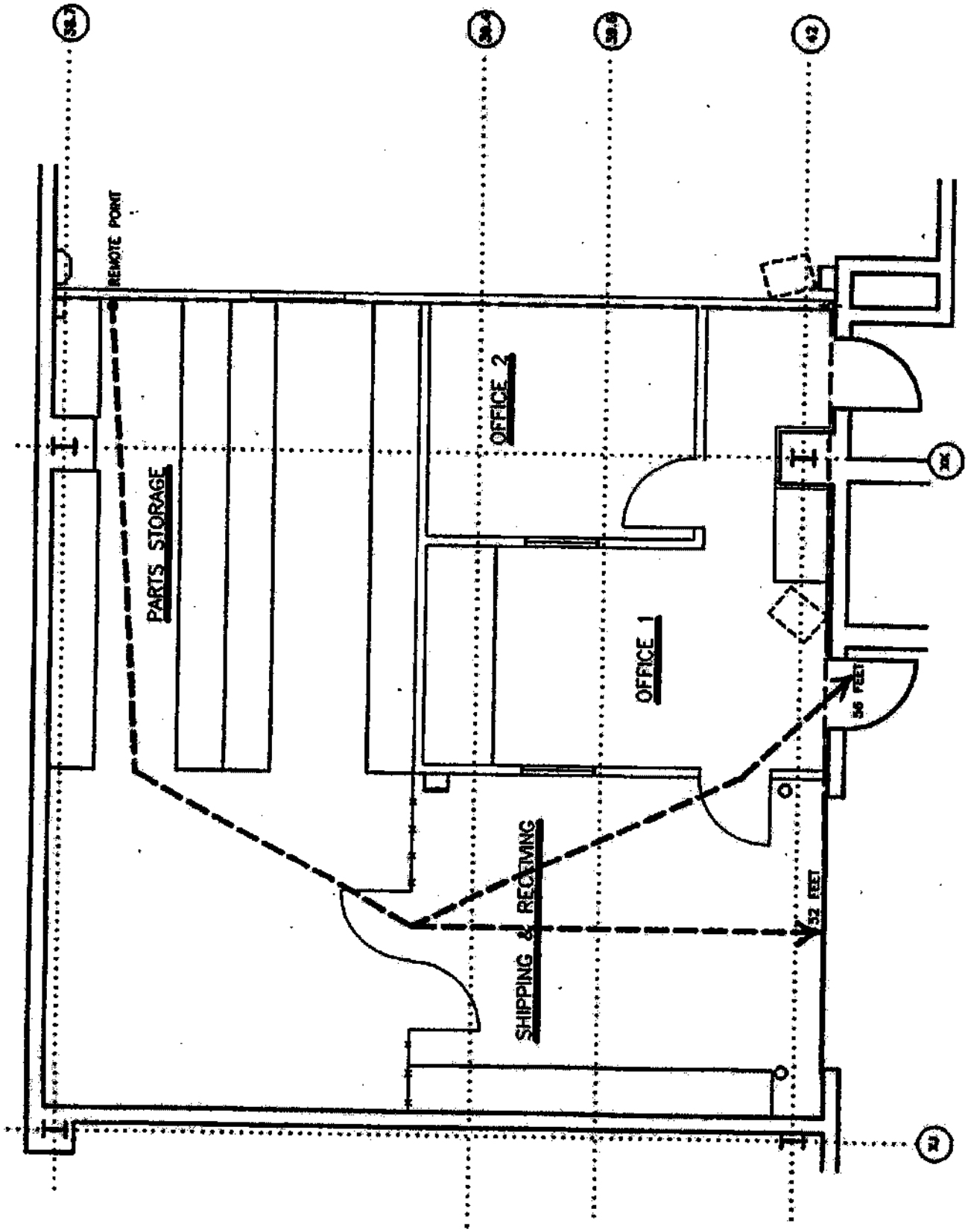
ADDITIONAL REQUIREMENTS

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.



FLOOR PLAN

SHEET TITLE: SAMPLE FIRE EGRESS PLAN

DATE: APRIL 2005

8.2 ACCESS FOR DISABLED PERSONS

8.3 USE OF NON-COMBUSTIBLE MATERIALS

8.4 GENERAL SITE DEVELOPMENT REQUIREMENTS

8.5 DESIGN AIRCRAFT

8.6 HEIGHT LIMITATIONS

8.7 RUNWAY, TAXIWAY, AND TAXILANE CLOSURES

8.7.1 Runway 10-28 and 15R-33L Intersection Closure (DST 98-14)

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 must approve any project that requires closure of both runways.

This allows BWI 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.

8.8 CONSTRUCTION ADJACENT TO RAILROADS

8.9 WORK HOUR RESTRICTIONS

8.10 GENERAL COORDINATION REQUIREMENTS

8.11 CONCESSION SERVICES RELOCATIONS

8.12 EQUIPMENT AND MATERIAL STORAGE

8.13 HAUL ROUTES

8.14 DISPLAYS, DECORATIONS AND COMPANY IDENTIFICATION

8.15 CONSTRUCTION CONTRACTOR QUALITY CONTROL

8.16 WARRANTIES AND GUARANTEES

8.17 TESTING AND OPERATIONAL REQUIREMENTS

8.18 OPERATION AND MAINTENANCE MANUALS

8.19 SAFETY AND SECURITY DURING CONSTRUCTION

Refer to Appendix J for the Standard General Phasing and Safety Plan.

8.19.1 Traffic Cones (DST 99-10)

Twelve (12") inch traffic controlling cones shall not be used for projects at BWI 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.

8.19.2 Dust Control (DST 90-3)

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

CHAPTER 9: SITE DEVELOPMENT

9.1 GENERAL SITE WORK AND UTILITIES

9.1.1 Survey Control

9.1.2 Geotechnical Investigation

9.1.3 Site Preparation (DST 90-1, 96-4)

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.

1. 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.

9.1.4 Grading / Retaining Walls

9.1.5 Utility Line Relocation and Abandoned Utility Lines

9.1.6 Existing Utility Line Connections and Shutdowns

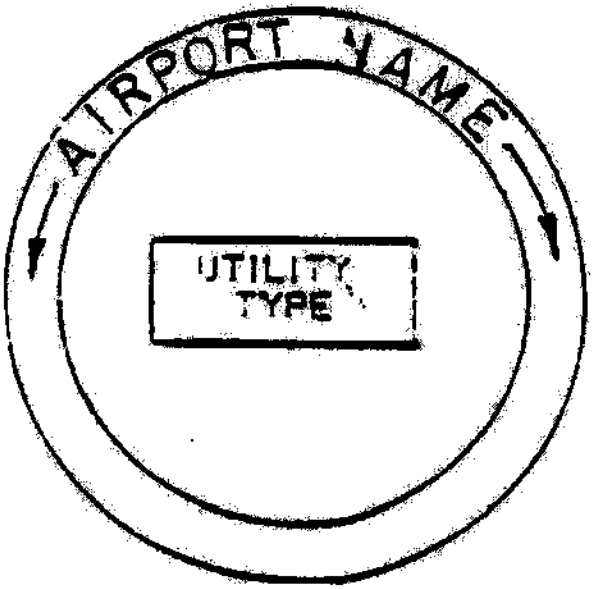
9.1.7 Underground Utility Trenches, Utility Markings, and Manhole/Handhole Covers/LIDS (DSTs 99-7, 91-2)

Utility Markings: The design and construction of all BWI 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/lides 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

9.1.8 Water Mains

9.1.9 Sanitary Sewers (DST 97-4)

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.

9.1.10 Storm Drainage

9.1.11 Electric/Phone/Telecommunications

9.1.11.1 Parking Facility Public Telephones (DST 94-4)

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.

9.1.12 Miscellaneous Site Elements

9.1.12.1 Flagpoles

9.1.12.2 Bollards (DST 90-3)

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

9.1.13 Site Furnishings (Benches, Trash Receptacles, Etc.)

9.2 AIRFIELD CIVIL/SITEWORK

9.2.1 Critical Design Aircraft

9.2.2 Geometrics

9.2.3 Line of Sight

9.2.4 Gradients and Slopes

9.2.5 Pavement Design

1. No. 2 Stone (DST 99-17): The design and construction of all Martin State (MTN) Airport projects shall include the requirement of placing an additional layer of No. 2 Stone under the design pavement section. Due to the excessive amount of unsuitable material located at MTN, MAA recommends the consultant place No. 2 Stone and filter fabric over the entire paved area. The unsuitable material shall be removed and backfilled as determined by the engineer. No. 2 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 No. 2 Stone. Refer to *MARTIN STATE AIRPORT.*

2. Subbase and Base Course (DST 98-10): Cement Treated Base Course materials shall not be used in the design and construction of flexible pavements in projects at BWI or Martin State Airports.

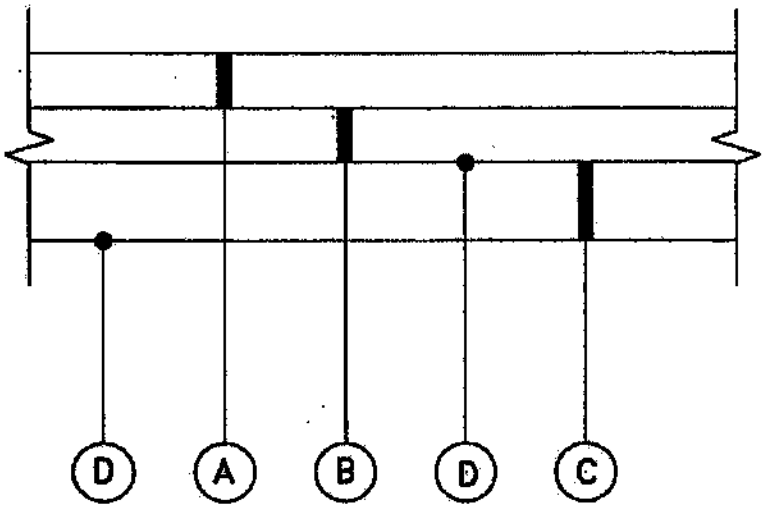
9.2.5.1 Pavement Grooving

9.2.5.2 Federal Aviation Administration (FAA) Specification Incentives (DST 98-5)

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:



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

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

Payment will be made under:

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

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

9.2.6 Pavement Marking

9.2.7 Security Fencing and Vehicle Gates

9.2.8 Storm Drainage

9.2.9 Turfing

9.2.10 Site Preparation for Navaids

9.3 LANDSIDE CIVIL/SITEWORK

9.3.1 Roadways and Parking

9.3.1.1 Parking Lots

9.3.1.2 Sidewalks

9.3.2 Pavement Design

9.3.3 Traffic Signals and Signage

9.3.4 Storm Drainage

9.3.5 Building Setbacks

9.3.6 Landscaping

Standard MAA Landscaping Specifications are in Appendix D.

9.3.7 Storage, Loading/Unloading, Service and Refuse Areas

9.3.8 Fencing and Screens

CHAPTER 10: PASSENGER BOARDING BRIDGES

10.1 GENERAL (DST 96-1)

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.

CHAPTER 11: ENVIRONMENTAL PROCEDURES AND REQUIREMENTS

Also refer to section 4.8 for Environmental Coordination.

11.1 FLOOD PLAIN AND WETLANDS

11.2 SEDIMENT CONTROLS AND STORMWATER MANAGEMENT

11.2.1 Sediment and Erosion Control

11.2.2 Stormwater Management Facilities

BELOW INCLUDES INFORMATION FROM THE DESIGN CRITERIA MANUAL FOR STORMWATER MANAGEMENT DESIGN AND STREAM RESTORATION DEVELOPED BY SES AND PB. BWI AIRPORT SPECIFIC, NEED TO EXPAND TO INCORPORATE MARTIN STATE AIRPORT.

The SWM facilities shall comply with federal and state requirements for water quality and quantity control in an aviation environment. This information will:

- Document state regulations and federal guidelines that affect stormwater management facility and stream restoration design; and
- Provide general guidance on how MAA intends to implement the regulations and guidance for new SWM facilities.

This manual builds upon and is consistent with the *Comprehensive Stormwater Management Plan Update* prepared by MAA from 2000 to 2002, which provides a planning-level evaluation of existing and future facility needs using information on existing conditions, and the 2001 *Draft Airport Layout Plan* for BWI.

Maryland Department of the Environment's (MDE's) stormwater management guidance is 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 Airport, unless Federal Aviation Administration (FAA) guidance is conflicting. A comparison of MDE stormwater management requirements and FAA's enforceable guidance is provided in the following paragraphs.

MAA must comply with MDE's stormwater management requirements and comply with enforceable guidance set forth by FAA. MDE requires both quantity and quality control of stormwater and establishes goals for both in the *2000 Stormwater Design Manual* (MDE, 2000). To ensure the safety of the traveling public, MAA 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.

Most of the MAA's requirements and recommendations are associated with the treatment and storage of the water quality volume. MAA is particularly concerned with facilities that produce open water for prolonged periods, because open water can attract waterfowl and other wildlife that could increase the risk of wildlife strikes. 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.

11.2.2.1 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.

MDE does not accept the use of dry extended detention ponds to meet water quality volume storage requirements. However, it does require the use of a permanent pool to meet water quality storage requirements. MDE's pond storage requirements for the water quality volume conflict with FAA's guidance, because they create open water that does not drain within 24 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.

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.

MDE requires that all infiltration systems dewater the entire water quality volume within 48 hours of a storm event. It also requires that an observation well be installed in every infiltration trench so that water levels in the trench may be measured to ensure that the trench drains properly and does not hold water for more than 48 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.

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. MDE requires that the maximum allowable ponding time within an open channel be less than 48 hours and that an underdrain be provided for the dry swale to ensure this maximum ponding time is met. 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. Furthermore, MAA requires an underdrain for the dry swale to ensure this maximum ponding time is met and vegetation to mask the ponded water using appropriate species as presented in *Specifications for Performing Landscape Activities for the Maryland Aviation Administration* (see Appendix D).

Vertical Clearance Guidelines for Groundwater Table

In addition to the infiltration rate requirements, MDE provides vertical clearance guidelines for the groundwater table. If the groundwater table is intercepted, it can create volumes and periods of standing water that exceed those addressed by the original design. MDE's vertical clearance guidelines for the groundwater table reduce the potential for prolonged periods of standing water and support FAA and MAA goals for stormwater management facilities within the Airport Zone.

11.2.2.2 Facility Locations and Restrictions

To further reduce wildlife attractiveness associated with stormwater management facilities for BWI Airport, MAA has designated Wildlife Hazard Management (WHM) zones in which various types of stormwater management facilities are

appropriate (see Appendix B). 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.

Within WHM Zone A, no new stormwater management facilities with open water components may be constructed. This includes, but is not limited to, detention and retention facilities, bioretention facilities, artificial marshes and wetland mitigation projects. *To achieve water quality and quantity associated with new MAA development within WHM Zone A, stormwater management facilities must be constructed underground.*

Within WHM Zone B, open water stormwater management facilities are permissible; however, as stated in the FAA AC, they must drain within 24 hours of 1- and 2- year storm events and within 48 hours of 10- year storm events. Appropriate masking techniques should be implemented if the facility retains water for more than 24 to 48 hours or if the facility attracts potentially hazardous wildlife (see Appendix D).

11.2.2.3 Landscaping Guidance

MAA provides guidance for landscaping (including appropriate seed mixtures) in its *Specifications for Performing Landscaping Activities for the Maryland Aviation Administration* (see Appendix D). In this document, MAA details appropriate species to utilize during design of new stormwater management facilities.

Table 2-1

Summary of MAA's Design Criteria for Stormwater Management Facilities

Facility	MDE Regulation	FAA Guidance	MAA Design Criteria
Stormwater Management Ponds	• Maximum detention time of 12 hours for channel protection volume (i.e., the one-year storm). • Long flow paths (minimum ratio of 1.5:1). • Permanent pool to meet water quality volume requirements.	• Maximum detention time of 12 hours. • Long flow paths (minimum ratio of 1.5:1). • No permanent pools (open water is considered to be a wildlife attractant.	• Maximum detention time of 12 hours. • Long flow paths (minimum ratio of 1.5:1). • No permanent pools (open water is considered to be a wildlife attractant.
Stormwater Wetlands	• Typically used to treat and store the water quality volume through the use of small permanent pools and extended detention periods.	• Neither stormwater wetlands nor artificial marshes should be constructed within 5 miles of an approach or departure surface.	• Neither stormwater wetlands nor artificial marshes should be constructed on MAA property within 5 miles of an approach or departure surface.
Filtering Systems	• Sand filters should drain within 40 hours. • Bioretention facilities should drain within 48 hours and replaced when water remains for more than 72 hours.	• FAA requires standing water to drain within 24 hours following a 1- or 2- year event, and within 48 hours following a 10- year event	• Design all filtration systems to drain within 24 hours following a 1- or 2- year event, and within 48 hours following a 10- year event. • Replace filter material when water remains on the surface of the filter bed for more than 24 hours following a 1- or 2- year event, or more than 48 hours following a 10- year event.

Table 2-1

Summary of MAA's Design Criteria for Stormwater Management Facilities

Facility	MDE Regulation	FAA Guidance	MAA Design Criteria
Infiltration Systems	• All infiltration systems must dewater the entire water quality volume with 48 hours of a storm event. • An observation well must be installed in every trench to measure and ensure that the trench drains properly.	• FAA requires standing water to drain within 24 hours following a 1- or 2- year event, and within 48 hours following a 10- year event.	• All infiltration systems must dewater the entire water quality volume within 24 hours following a 1- or 2- year event, and within 48 hours following a 10-year event.
Open Channel Systems	• The maximum allowable ponding time within an open channel be less than 48 hours. • Provide an underdrain for the dry swale to ensure this maximum ponding time is met.	• FAA requires standing water to drain within 24 hours following a 1- or 2- year event, and within 48 hours following a 10- year event.	• FAA requires standing water to drain within 24 hours following a 1- or 2- year event, and within 48 hours following a 10- year event. • Provide an underdrain for the dry swale to ensure this maximum ponding time is met. • Provide vegetation to mask the ponded water using appropriate species as presented in *Specifications for Performing Landscape Activities for the Maryland Aviation Administration* (see Appendix B).
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.

11.2.2.4 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 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.

Existing Conditions and Immediate Stormwater Management Needs

During the Phase II investigation, MAA identified six of the 22 subwatersheds associated with BWI 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 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

Compliance with FAA Design Guidance

FAA provides siting criteria for potential wildlife hazard attractants. The AC specifies that potential wildlife attractants should be located 10,000 feet from airports serving turbine-powered aircraft, such as BWI Airport, as well as a distance of 5 statute miles from approach or departure airspaces.

FAA's design guidance for stormwater management facilities recommends:

- The use of underground stormwater infiltration systems, such as French drains or buried rock fields, where soil conditions allow;
- Detention ponds rather than retention ponds (Retention ponds are more attractive to hazardous wildlife than detention ponds because they provide a more reliable water source);
- Steep-sided, narrow, linearly-shaped, rip-rap lined channels;
- Ponds that drain within 24 hours of a 1- and 2- year storm event and within 48 hours of a 10-year storm event; and
- Elimination of all vegetation that provides food or cover for potentially hazardous wildlife. (To comply with this guidance, MAA's stormwater management facility designs will be developed following MAA's *Specifications for Performing Landscaping Activities for the Maryland Aviation Administration.*)

Compliance with MDE Design Guidance

As discussed in Section 5.2.1, MDE provides design guidance for stormwater management facilities in its *2000 Maryland Stormwater Design Manual.* Guidance provided in this manual for water quality and quantity control must be adhered to during design of stormwater management facilities while incorporating design guidance and the more stringent drainage requirements set forth by the FAA.

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, 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 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 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.

11.2.3 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.

Table 4-1

Geomorphic Stability:
Existing Conditions at BWI 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.

MAA has developed 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

In its Advisory Circular (AC) No. 150/5200-33 "*Hazardous Wildlife Attractants on or Near Airports*," FAA provides enforceable guidance for minimizing wildlife strike hazards through 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.

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 D.

MAA recommends that stream restoration projects be designed following a natural channel design process that includes:

- A quantitative, field-based method of stream channel geomorphic assessment to understand existing aggradation/degradation processes;

- An identification of stream conditions that would be stable for the restored channel; and
- Restoration design based upon the stable form (i.e., the reference reach). [1]

[1]A discussion of the natural channel design process is presented in: *The Reference Reach, A Blueprint for Natural Channel Design*, 1998, by David Rosgen, Wildland Hydrology, Pagosa Springs, CO.

A quantitative understanding of existing conditions requires the following:

- A field survey of representative pool and riffle cross-sections and a long profile through each reach of the stream channel to be restored,
- Pebble counts,
- Pavement and subpavement sampling and analysis,
- Estimates of bank erosion, and
- Sediment transport rates.

Hydrologic and hydraulic modeling must be performed to understand the response of the existing channel to storm flow events. The results obtained from the model and the field measurement data can be combined to provide a complete quantitative understanding of existing conditions.

The natural channel design method requires field survey at nearby gage sites and a reference reach site. In the design process, the gage site data is used to validate field observations of bankfull discharge. The stable reference reach data is used to determine the dimensionless hydraulic geometry that forms the basis of the design (plan views and typical riffle and pool cross-sections) for the stream restoration project.

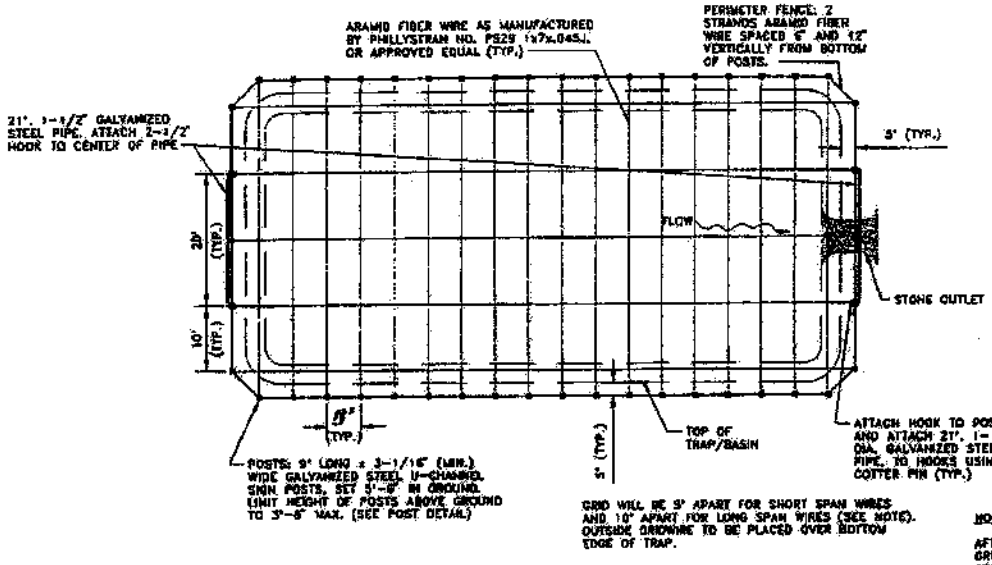
To minimize the attractiveness of the stream restoration project area, the plans set, specifications, and special provisions must be prepared using *Specifications for Performing Landscaping Activities for Maryland Aviation Administration*, which provide temporary and permanent seed mixes appropriate for dry and wet conditions. Proposed plantings must be selected from the list of landscape plans provided in Appendix A.

11.3 BIRD DETERRENT SYSTEMS (DST 2001-09)

11.3.1 Waterfowl Deterrent System for Sediment Traps at BWI Airport

There is a need to discourage ducks and other waterfowl from being attracted to stormwater in sediment traps. The system proposed for BWI 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

BIRD DETERRENT SYSTEM FOR SEDIMENT TRAPS AND SEDIMENT BASINS

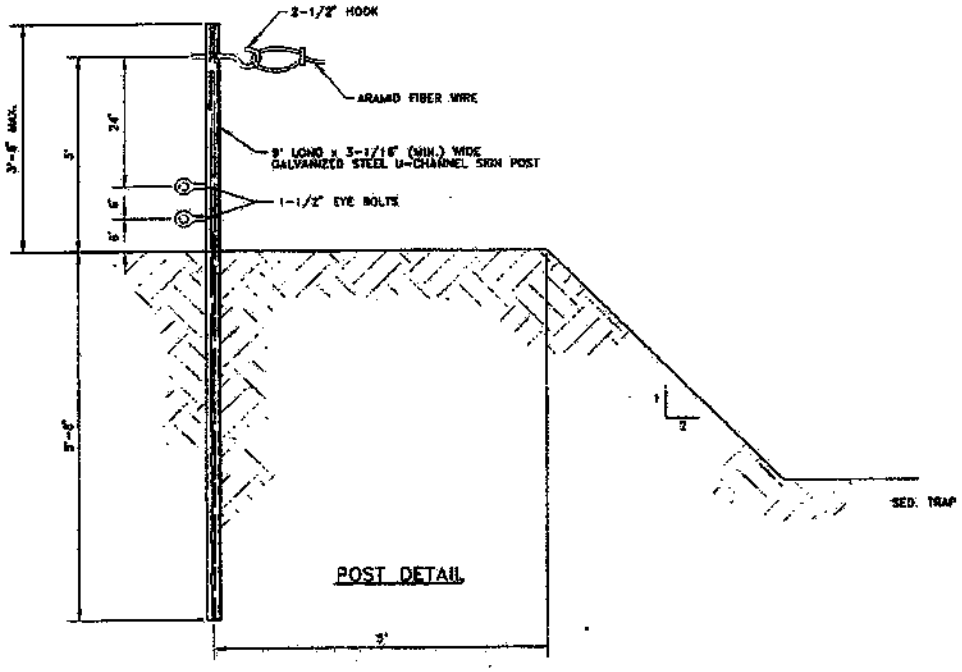


NOTE:

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

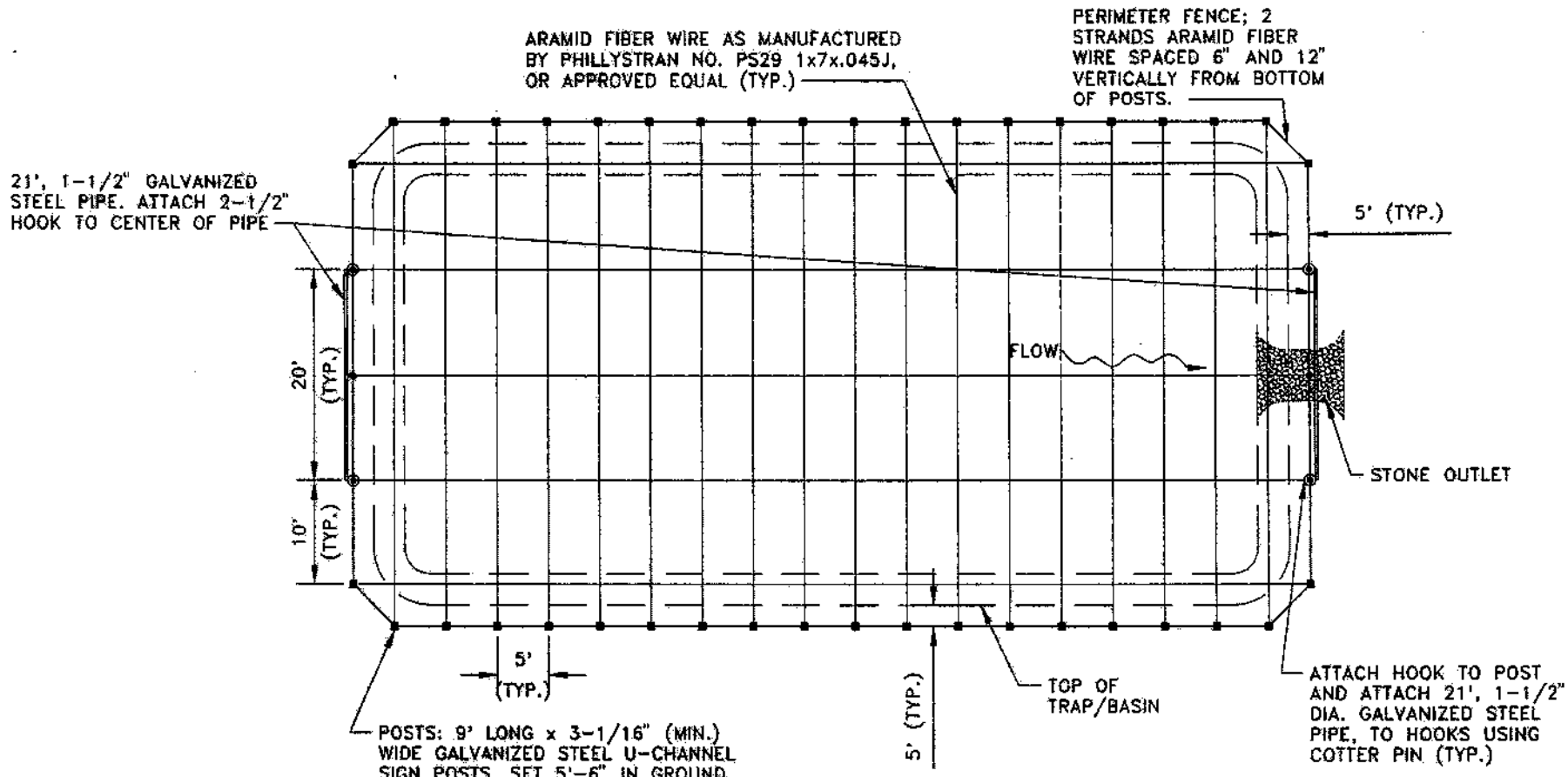
AFTER EACH SEDIMENT TRAP/BASIN IS CONSTRUCTED, POSTS ARE PLACED FIVE FEET OUTSIDE OF THE TOP EDGE OF THE TRAP/BASIN, SPACED FIVE FEET ON CENTER ON THE LONG SIDES AND TEN FEET ON CENTER ON THE SHORT SIDES, LEAVING ONE 20-FOOT GAP FOR THE GATE AND ANOTHER 20-FOOT GAP TO STRADDLE THE OUTLET WEIR. AFTER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



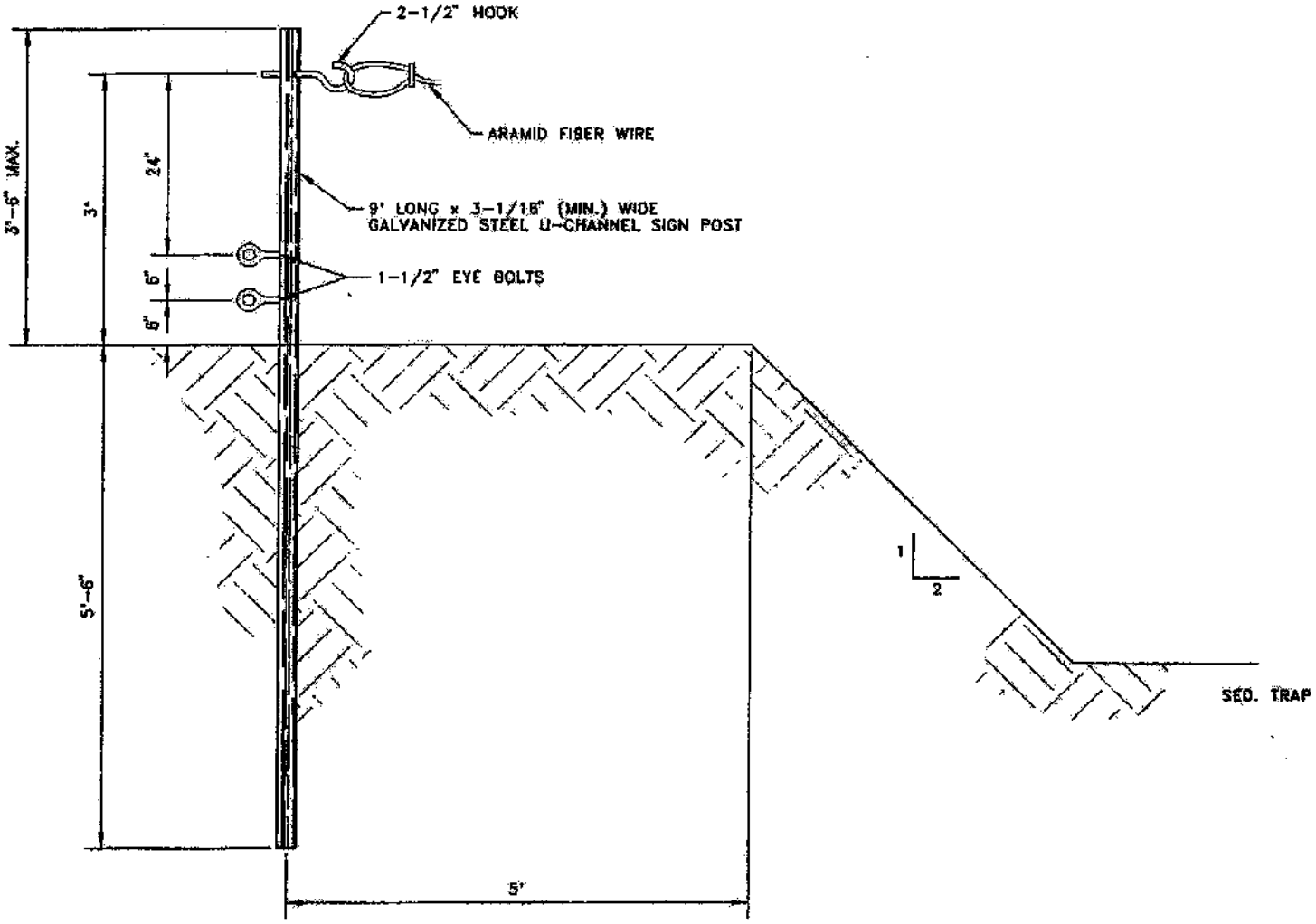
GRID WILL BE 5' APART FOR SHORT SPAN WIRES AND 10' APART FOR LONG SPAN WIRES (SEE NOTE). OUTSIDE GRIDWIRE TO BE PLACED OVER BOTTOM EDGE OF TRAP.

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

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 following detail 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.

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.

11.4 UNDERGROUND STORAGE TANKS (UST) (DST 98-7)

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 one of the following: 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 be one of the following: automatic tank gauging including interstitial monitoring, containment sump, and/or dispenser sump monitoring, with UST high level alarm.

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.

11.5 REMOVAL OF UNDERGROUND STORAGE TANKS

11.6 ABOVE GROUND STORAGE TANKS (DST 99-1)

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; and all related EPA or Federal regulatory requirements.

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

1. Aboveground Storage Tanks shall be Double-Wall 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 Schedule 40 galvanized steel. 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) for review and approval by the MAA Manger of Environmental Compliance.

11.6.1 Glycol ASTs (DST 2001-04)

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), particulary NFPA 1, 10, 30 & 30A, 70, 415, and 704; COMAR 12, State of Maryland Fire Prevention Code, Code of Federal Regulations, and BWI 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 Airport
    m. BWI and MTN Tenant Directive 007.1, Building Permits – Baltimore/Washington International 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 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 by telephoning (410) 859-7018.

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.

11.7 ASBESTOS AND OTHER HAZARDOUS MATERIALS

11.7.1 Renovation Work (DST 90-1)

For renovation work, a checklist should be formulated to insure all possible sources of asbestos have been removed, i.e., ceiling tile, floor tile, insulation, etc. If asbestos is suspected, the MAA Safety Coordinator shall be contacted to initiate the proper documentation and testing of the site and determination of the proper abatement procedures.

11.7.2 Lead Paint (DST 91-1)

The Designer shall determine if the project has potential lead exposure. Where the potential for lead exposure exists, request the MAA Safety Coordinator 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 non 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.

11.7.3 Asbestos (DST 92-6)

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.

11.8 GLYCOL COLLECTION (DST 2004-04)

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

11.9 FUEL TRUCK PARKING (DST 2004-01)

The design of all facilties at BWI 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 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 requirements 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 12: ARCHITECTURAL / BUILDINGS

12.1 BUILDING LOCATION

12.1.1 Height Restrictions

12.1.2 Siting and Orientation

12.1.3 Ground Level Equipment/Services

12.1.4 Public Exposure

12.1.5 Noise

12.2 DESIGN CONTINUITY (DST 2000-01)

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 A/E, MAA's Project Manager, and Resident Architect shall identify any specialty architectural sub-consultants required for interior design, graphics, furnishings, etc.

12.2.1 Domestic Terminal Baggage Claim Areas (DST 2000-01)

The Architect 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.

12.2.2 Domestic Terminal Ticketing Concourse (DST 2000-01)

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 tenat/designer's choice shall be silk-screened on the belt.

LED and Blade signs shall match existing.

12.2.3 Domestic Terminal Security Checkpoints (DST 2000-01)

Terminal Security Checkpoints shall comply with all regulations issued by the FAA 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.

12.2.4 Domestic Terminal and Pier E Holdrooms (DST 2000-01)

The furnishings and finishes in the 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 are the responsibility of the MAA. Ticket and lift and gate podium design shall match existing unless approved by MAA.

12.2.5 Commercial Storefronts and Signage (DST 2000-01)

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.

12.2.6 Service Areas (DST 2000-01)

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.

12.2.7 Offices (DST 2000-01)

The design of office space shall be coordinated with the MAA Resident Architect.

12.2.8 FIDS/BIDS Enclosures (DST 2000-01)

The design of FIDS/BIDS enclosures shall be coordinated with the MAA Resident Architect.

12.2.9 Terminal Curbside (DST 2002-02)

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

12.3 AESTHETICS

12.3.1 Sustainable Design Inovation

12.3.2 Size, Mass and Scale

12.4 TENANT IMPROVEMENTS

12.4.1 New International Pier Millwork (DST 98-1)

MAA would like to maintain the architectural standard and structural integrity of the New International Pier millwork. Accordingly, modifications 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.

12.5 PUBLIC AREA MATERIALS, FINISHES AND COLORS

Refer to Restroom Design Standards in Appendix E for materials, finishes, and colors of restrooms.

12.6 ROOF SYSTEMS (DST 2000-07)

All projects at BWI 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 bitum 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 Adminstration (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.

12.6.1 Satellite Dish Locations (DST 94-7)

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. Any proposed satellite dish antenna locations should be reviewed and coordinated with MAA Operations and FAA-BWI.

12.7 FLOOR AND WALL COVERINGS

Refer to Restroom Design Standards in Appendix E for Restroom floor and wall coverings.

12.7.1 Ceramic Tile (DST 2000-01)

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.

12.7.2 Carpet Tile (DST 2000-01)

1. Terminal E Carpet Tile: Carpet tile used in Pier E Holdrooms is manufacturered 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 A/E shall coordinate selection of carpet with the MAA Resident Architect.

12.7.3 Painting (DST 2000-01)

Architects shall specify "white" paint colors that are standard with the DOM in order to minimize the paint colors they have to keep on hand.

12.7.4 Wall Covering (DST 2000-01)

The wall covering used in the public areas of the Domestic Terminal shall be the MAA standard.

12.7.5 Solid Surfacing Material (DST 2000-01)

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

12.7.6 Plastic Laminate (DST 2000-01)

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.

12.8 LOCK SYSTEM

12.8.1 Finish Hardware (DST 2000-01)

All projects shall specify MAA standard hardware and locksets. A list of the MAA Division of Maintenance (DOM) approved hardware and locksets is available from the Division of Facilities Design. The DOM must approve all hardware that deviates from the list.

12.8.2 Cipher Locks (DST 2003-04)

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.

12.9 GLARE REDUCTION/DESIGN

12.10 RESTROOM STANDARDS

The Restroom Design Standards are contained in Appendix E.

12.11 DOORS/WINDOWS

12.11.1 Entries

12.11.2 Roll-up Doors (DST 99-13)

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.

12.11.3 Door Numbers (DST 99-9)

All BWI 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.

12.12 FURNISHINGS

12.12.1 Holdroom Tandem Seating (DST 2000-01)

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.

12.12.2 Exterior Benches and Bike Racks (DST 2000-01)

5. 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.

6. Bike Racks: Bike racks are manufactured by Landscape Forms, Inc. of Kalamazoo, MI. They are "Pi Rack". The color and finish is "Grotto" powdercoat.

12.12.3 Trash Receptacles (DST 2000-01)

Department of Maintenance (DOM) must approve trash receptacles.

12.12.4 Master Clock System (DST 2000-01)

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.

12.13 PASSENGER CONVEYANCE

12.13.1 Elevators

12.13.2 Escalators

12.13.3 Moving Walkways

12.13.4 Elevator, Escalator and Moving Walkway Numbering System

CHAPTER 13: STRUCTURAL AND STRUCTURAL SYSTEMS

13.1 GENERAL

13.2 VIBRATION

13.2.1 Basic Design Rules

13.3 MATERIALS

13.3.1 Reinforced Concrete (With Subcategories) (DST 96-1)

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.

13.3.2 Metals

13.3.3 Masonry

13.4 STRUCTURAL SYSTEMS

13.4.1 Building Systems

13.4.1.1 Loads

13.4.2 Parking Structures

13.4.3 Aircraft Bridge Structures

13.4.4 Highway Bridges

13.4.5 Pedestrian Bridges

13.4.6 Retaining Walls

13.4.7 Tunnels

13.4.8 Post-tension Systems

13.5 MISCELLANEOUS STRUCTURAL ITEMS

13.5.1 Monorails and Support Beams for Cranes and Hoists

CHAPTER 14: HEATING, VENTILATION, AND AIR CONDITIONING (HVAC) (DST 2000-01)

The Chief, HVAC Systems and the DOM must approve the design of proposed mechanical systems. The HVAC system shall be designed in accordance with DGS. The HVAC systems shall be tied to the Facility Management System (FMS) (BWI Airport only). Refer to Chapter 17.

14.1 DESIGN CONDITIONS

14.2 INDOOR AIR QUALITY

14.3 ENERGY CONSERVATION

14.4 NOISE CONTROL

14.5 ROOFTOP EQUIPMENT

14.6 DUCTWORK

14.6.1 Duct Liner

14.7 VALVE REQUIREMENTS

14.8 CONTROL SYSTEMS

14.9 TESTS AND BALANCE

14.10 THERMAL INSULATION FOR MECHANICAL SYSTEMS

14.10.1 Installation of Insulation and Accessories

14.10.2 Refrigerant Line Insulation

CHAPTER 15: PLUMBING

15.12.1 Thermal Metering

15.12.2 Tenant Metering

15.12.3 Food and Beverage Concessions

15.12.4 Natural Gas Meter Installation

15.12.5 Remote Reading

15.12.6 Standard Meters

15.12.7 Domestic Water Meters – Building Service Entrance

CHAPTER 16: FIRE SUPRESSION SYSTEMS (DST 2000-01)

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

16.1 FIRE SUPPRESSION - GENERAL

16.1.1 New and Existing Systems

16.1.2 General Design Requirements

16.2 SPRINKLER SYSTEMS

16.2.1 General

16.2.2 Dry Pipe Sprinkler Systems

16.2.3 Wet Pipe Sprinkler Systems

16.2.4 Foam Systems

16.3 PIPE AND APPURTENCES

16.3.1 Pipe, Valve, Fitting, Pipe Hanger and Support

16.4 FIRE HYDRANTS (DST 99-8, 99-8A)

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.

16.4.1 Aboveground Fire Hydrants (DST 99-8, 99-8A)

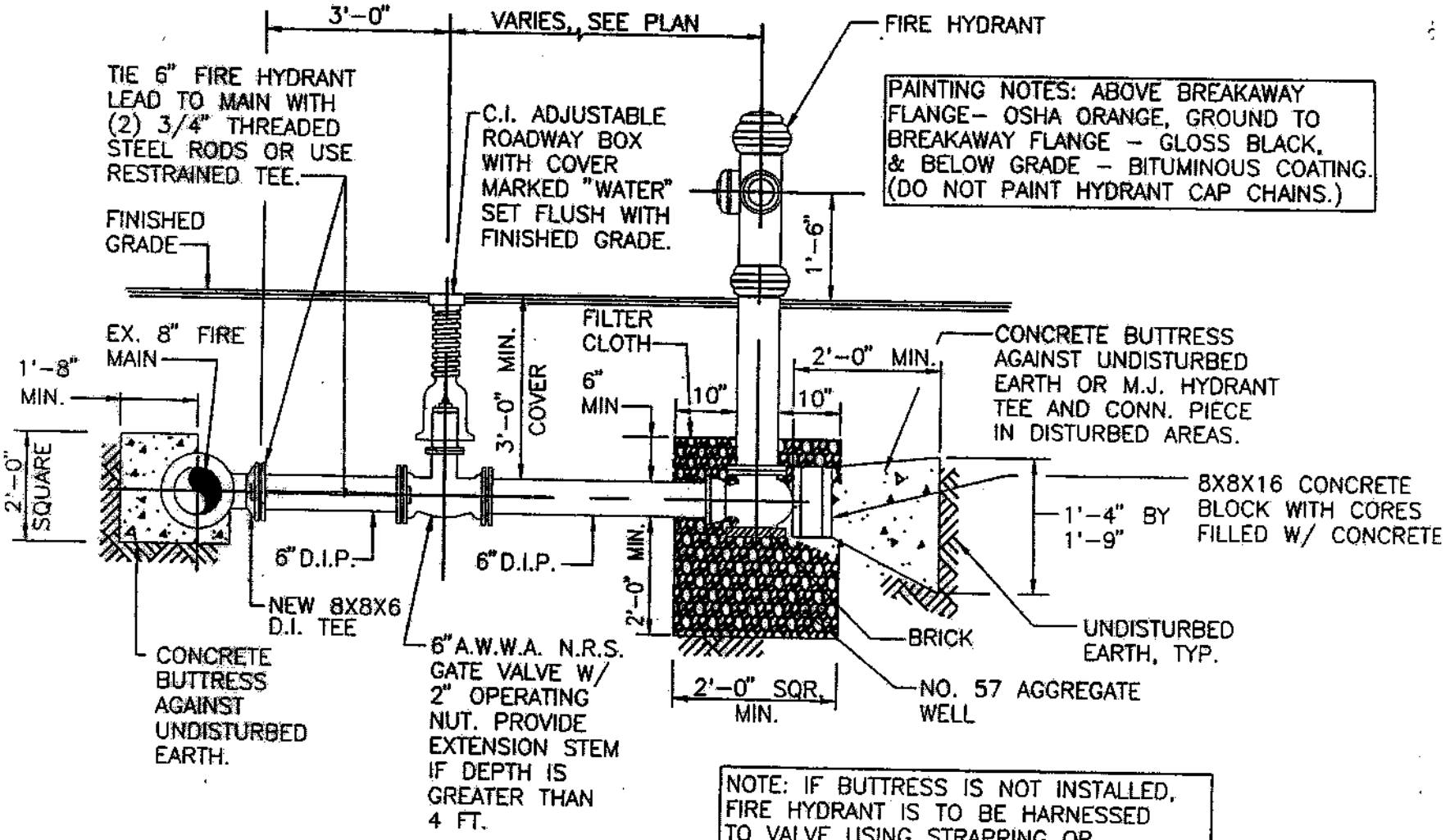
Fire hydrants shall be American Darling, Type B-62-B; Kennedy Valve, Model K-81-A; or Mueller, Model Super Centurion 250 with breakaway bolts, with a 5 sided 5/16" operating nut, two 2½" diameter hose nozzles (with National Standard threads) and a 4½" diameter steamer or pumper connection (with Baltimore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

Fire Hydrants shall be painted OSHA Orange.

16.4.2 Underground Fire Hydrants (Non-Aircraft Loading Areas) (DST 99-8, 99-8A)

SHEET TITLE: FIRE HYDRANT SETTING DETAIL

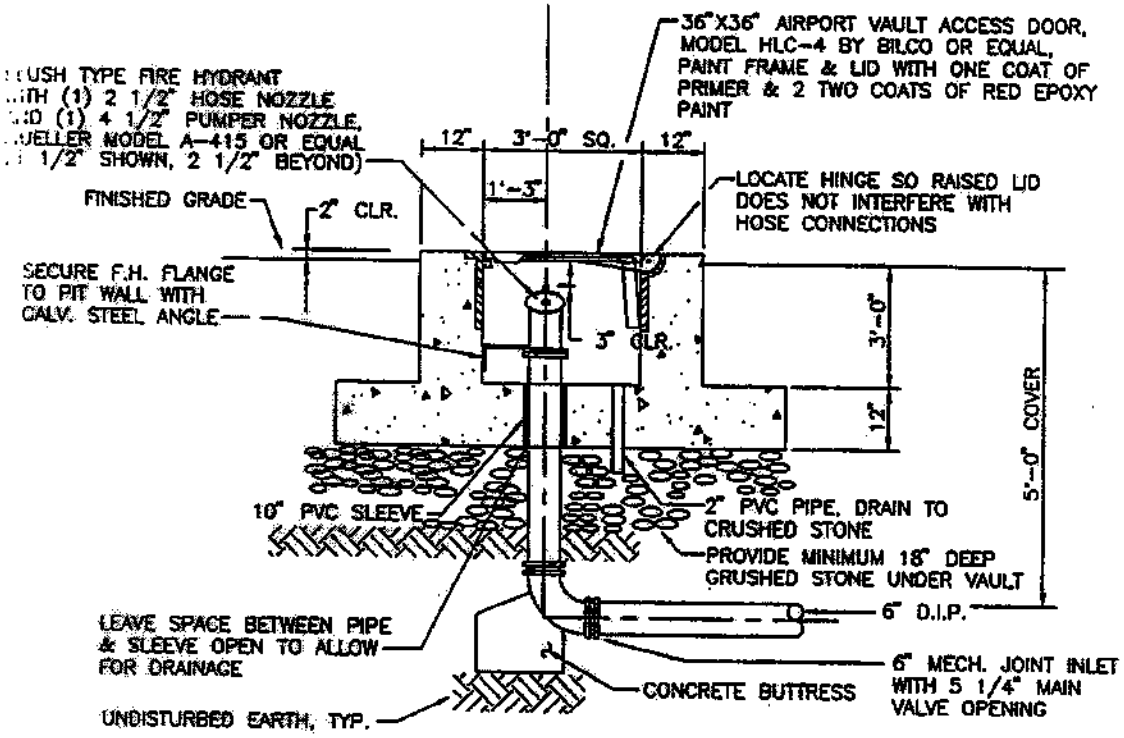
DATE: APRIL 2005



FIRE HYDRANT SETTING DETAIL

NOT TO SCALE

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



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.

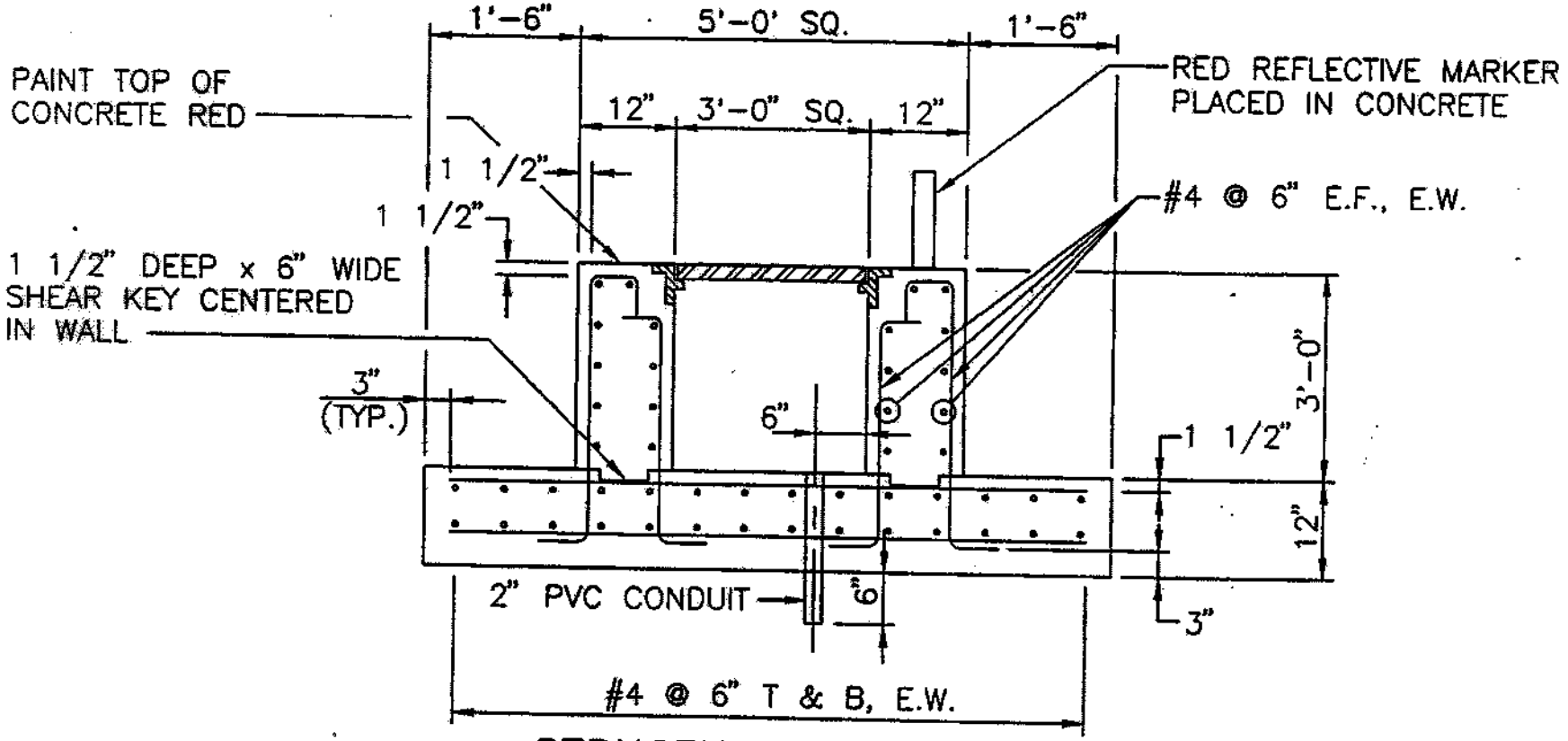
4. ON THE ACCESS DOOR, OVER THE RED PAINT, PROVIDE A WHITE FIRE HYDRANT SYMBOL WHICH IS A MINIMUM OF 2 FEET LONG, PAINTED TO MATCH THE NFPA 170 FIGURE 4-2.5.

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

NOT TO SCALE

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

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

DATE: APRIL 2005

Flush type fire hydrants shall be Mueller or approved equal with a 5 sided 5/16" operating nut, one 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.

16.4.3 Underground Fire Hydrants (Aircraft Loading Areas) (DST 99-8, 99-8A)

Flush type fire hydrants shall be Mueller or approved equal with a 5 sided 5/16" operating nut, one 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 arounc 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.

16.4.4 Wall Mounted Fire Hydrants

16.5 STANDPIPE SYSTEMS AND FIRE DEPARTMENT CONNECTIONS

16.5.1 Standpipe Systems

16.5.2 Fire Department Connections

16.6 FIRE PROTECTION WATER SUPPLY

16.6.1 Flow Tests

16.7 PORTABLE FIRE EXTINGUISHERS

16.8 POST INDICATOR VALVE

16.9 FLOOR CONTROL VALVE

16.10 CERTIFICATION OF FIRE PROTECTION AND DETECTION SYSTEM DESIGN (DST 99-14)

The following requirements shall be incorporated into the design and specifications of all projects at BWI 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 diction 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.

16.11 FINAL ACCEPTANCE TESTING

16.11.1 Sprinkler System Acceptance Testing

16.11.2 Final Inspection Flow Testing

16.11.3 Additional System Testing

CHAPTER 17: FIRE ALARM, LIFE SAFETY, AND SECURITY SYSTEMS

(DSTs 99-2, 99-4)
Refer to Appendix H for The Airport Wide Standard for Interface of Fire Alarm, Life Safety, and Security Systems at Baltimore/Washington International Airport.

17.1 BWI AIRPORT FIRE ALARM SYSTEM (DST 96-1)

The Maryland Aviation Administration (MAA) has adopted the Honeywell Fire Alarm system for BWI 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 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 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 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.

17.2 BUILDING SECURITY ALARM SYSTEM

17.2.1 Knox Box System (DST 96-6)

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.

17.3 TERMINAL SECURITY MONITOR SYSTEM

17.4 AUTOMATED ACCESS CONTROL SYSTEM

17.5 AIRPORT COMMUNICATION SYSTEMS (ACS)

17.6 SECURITY

17.7 METASYS FACILITY MANAGEMENT SYSTEM (DST 98-12)

CHAPTER 18: 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.

18.1 GENERAL ELECTRICAL REQUIREMENTS

18.1.1 Spare Capacity (DST 96-7)

All contract documents for retrofitting, modifying, or new building construction, which involve data jacks, cabling, etc. shall be designed to include, at a minimum, one duplex outlet on a UPS circuit adjacent to each data jack location. This requirement is in addition to any convenience outlet requirements, and is to provide UPS protection for each PC-CPU and future telephone system which is deployed.

18.1.2 Voltage Drop

18.1.3 Short Circuit Current

18.1.4 Power Factor

18.1.5 Total Harmonic Distortion (DST 2002-01)

1. In order to minimize potential effects of harmonics from: Frequency Converters (including 400 hertz ground power units for aircraft), and Uninterruptible Power Supplies (UPS) of 30,000 volt-ampere capacity or greater, the technical specifications for each piece of such equipment must include the following requirements:

    a. Harmonics Content: total harmonic distortion (THD) of the input current waveform, as measured at the input terminals where the equipment is connected to the premises electrical system, shall be 30% or lower whenever the load on the equipment is 50% of its rated output or higher, independent of external filters.
    b. Power Factor: the input power factor measured at the input terminals, where the equipment is connected to the premises

electrical system, shall be 90% or higher whenever the load on the equipment is 50% of its rated output or higher.

2. For Adjustable Frequency Drives (AFDs) for motors 25 horsepower or larger, the technical specifications for each piece of such equipment must include the following requirements:

   a. Harmonics Content: total harmonic distortion (THD) of the input current waveform, as measured at the input terminals where the equipment is connected to the premises electrical system, shall be 15% or lower, and the THD of the voltage waveform shall be 3% lower whenever the load on the equipment is 50% of its rated output or higher, independent of external filters.
   b. Power Factor: the input power factor measured at the input terminals where the equipment is connected to the premises electrical system, shall be 90% or higher whenever the load on the equipment is 50% of its rated output or higher.

3. 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 with IEEE Std 519-1992 Tables 10.2 and 10.3. The point common coupling for the study shall be the immediately upstream medium voltage to low voltage substation in the Airport distribution system. If the study indicates that the IEEE standard cannot be met with above THD limits, then the designer shall specify lower limits so that the IEEE Standard requirements are met.

18.1.6 Surge/Trasient Suppression/Protection

18.1.7 Insulating Fluids

18.1.8 Demand and Load Flow Calculations

18.1.9 Distribution and Utilization Voltages

18.1.10 Energy Conservation in Electrical Systems

18.2 EQUIPMENT ROOMS

18.3 GROUNDING AND LIGHTNING PROTECTION (DST 2004-5)

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.

18.4 POWER DISTRIBUTION SYSTEM AND EQUIPMENT

18.4.1 Substations (DST 2004-02)

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 North and South substation respectively. Refer to ***DETAILS SK-1 and SK-2*** for additional information. The current BWI 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 schemeand 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 ***Details SK-1 and SK-2*** 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.

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. Refer to ***Details SK-1 and SK-2*** 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 Office of Airfield Operations and Security, as well as the Office of Maintenance and Utilities. Refer to ***Details SK-1 and SK-2*** 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 purposed and manufactured by the circuit breaker manufacturer or by the circuit breaker manufacturer factory authorized field service organization. An 8-1/2" x 11" aluminum sign attached to outside of the enclosure shall be installed with the following wording: "Substation _____ Generator Connection." The name of the substation shall be filled in the blank space.

9. Contract documents shall require performance of a short-circuit and coordination study during construction to establish settings for all new adjustable system protection devices. All new devices shall be selectively coordinated with existing devices and operating schemes including but not limited to, overload/short-circuit protection and automatic transfer schemes.

10. Contract documents shall require furnishing and installation of permanently attached engraved instruction placards including substation one-line diagram and all substation sequence of operations. Locate on placard at substation interior wall with an emergency lighting fixture with integral battery back-up in close proximity. Locate one placard on the inside of the temporary generator connection point circuit breaker enclosure.

11. Contract documents shall require furnishing and installation of a framed wall-mounted one-line diagram for the substation and the entire downstream distribution system. Locate with substation room.

18.4.2 Medium Voltage Electrical Phasing and Rotation (BWI only)

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

The term phasing refers to the fact that the BWI 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 attached three-line diagram, Exhibit EX-1. The three-line diagram shows that A and C phases are interchanged at the primary of each power transformer located in the BWI 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 Exhibit EX-1 are the associated transformer differential protection relay control wire modifications to compensation for the A and C phase interchange.

The phasing conditions shown on Exhibit EX-1 are marked (BGE) when referenced to the incoming BGE phasing and are marked (BWI) to indicate BWI system labeling. The incoming BGE feeders are ABC rotation. The BWI system is ABC rotation (when referenced to BGE) down to the point that A and C phases are interchanged. This point is labeled on Exhibit EX-1. Beyond this point, the BWI system is CBA (when referenced to BGE); however, the BWI system is labeled and operated as an ABC rotation system or downstream Airport distribution equipment. As long as the existing BWI 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 system rotation. Temporary generator rotation shall be electrically tested by the Contractor prior to connecting to the BWI system. Generators connected to BWI 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.

18.4.3 Power arrangement for Various Building Types

18.5 EQUIPMENT

18.5.1.1 Primary Interrupter Switches

18.5.1.2 Transformers with Medium Voltage Primary

18.5.1.3 Transformers – General Purpose Distribution

18.5.1.4 Low Voltage Switchgear

18.5.1.5 Motor Controllers

18.5.1.6 Panelboards (Power and Lighting) (DST 2000-10)

BWI and MTN Airport projects shall only specify Square-D 120/208 circuit breaker panelboards. Accordingly, "No substitutions will be accepted" shall be used when specifying Square-D circuit breaker panelboards.

18.5.2 Raceways

BGE 34.5KV SOUTH SERVICE ENTRANCE FEEDER

34.5KV SWITCHGEAR

BGE 34.5KV NORTH SERVICE ENTRANCE FEEDER

34.5KV SWITCHGEAR

34.5KV SWITCHGEAR

ABC PHASOR ROTATION (BGE)

CBA PHASOR ROTATION (BGE)

ABC PHASOR ROTATION (BWI)

A AND C PHASE INTERCHANGE POINT

A AND C PHASE INTERCHANGE POINT

T3 8.437/10.546MVA OA/FA 33KV-13.8Y/7.9KV

T1 7.5/10.5MVA OA/FA 33KV-13.8Y/7.9KV

T2 7.5/10.5MVA OA/FA 33KV-13.8Y/7.9KV

T3 8.437/10.546MVA OA/FA 33KV-13.8Y/7.9KV

T1 7.5/10.5MVA OA/FA 33KV-13.8Y/7.9KV

T2 7.5/10.5MVA OA/FA 33KV-13.8Y/7.9KV

87T

87T-A

87T-B

87T-C

13.8KV SWITCHGEAR

13.8KV SWITCHGEAR

13.8KV SWITCHGEAR

13.8KV SWITCHGEAR

13.8KV SWITCHGEAR #3

13.8KV SWITCHGEAR #1

13.8KV SWITCHGEAR #2

DRAWING LEGEND

- 52 = MEDIUM VOLTAGE CIRCUIT BREAKER
- = CURRENT TRANSFORMER
- = MEDIUM VOLTAGE CABLE TERMINATION
- H1 H2 H3 / X1 X2 X3 = POWER TRANSFORMER
- (BGE) = PHASE ROTATION REFERENCED TO BGE
- (BWI) = BWI PHASE LABELING
- 87T = TRANSFORMER DIFFERENTIAL PROTECTIVE RELAY

BWI BALTIMORE/WASHINGTON INTERNATIONAL AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION

OFFICE OF ENGINEERING AND CONSTRUCTION MANAGEMENT

URS

CONSULTING ENGINEERING AND PLANNING
1899 Winterson Road
Linthicum, MD 21090
Phone: 410-855-6160 Fax: 410-855-6163

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	SHEET REFERENCE	
FEBRUARY 2005	--	

FILE NAME: P:\20827870\CAD\3-LINE-DIAG.dwg PLOTTED: Friday, February 11, 2005 - 9:04am

18.5.2.1 Raceways – Within Buildings (DST 2000-02, 2001-05)

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.

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.

All Fire Alarm related wiring and cable shall be installed in a raceway system as detailed in indoor wiring methods 1 through 3 shown above. The use of flexible metal conduit shall be permitted only for final connections for hard to reach fire alarm devices as approved by the Fire Marshall. See BWI Airport Wide Standard for Interface of Fire Alarm, Life Safety and Security Systems in Appendix H.

Cable tray shall be permitted for low voltage communication wiring/cable only. All security related wiring/cable shall be installed in a raceway system as detailed in indoor wiring methods 1 through 8 shown above. 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.

18.5.2.2 Raceways – Underground (DST 1999-07)

Marking tape indicating "Electrical Cable Buried Below" shall be installed. The tape should be 3" wide and positioned 8"-12" deep below top of ground, or 4" wide and positioned at a maximum 3"-6" deep below the bottom of pavements.

18.5.2.3 Manholes and Handholes

18.5.3 Boxes and Wiring Devices

18.5.3.1 Electrical Receptacles (DST 2003-01)

Duplex receptacles shall be rated at 20 amperes, 125 volts, and be polarized, parallel blade type with ground and National Electrical Manufacturer's Association (NEMA) 5-20R configuration. Regular power receptacles for corridors, hallways, and other areas subject to heavy use by housekeeping and cleaning machinery should be equivalent in quality to Pass & Seymour (P&S) 5362A. In other regular or normal power use areas, receptacles equivalent in quality to P&S Type 5362 should be specified. The receptacles shall be side wired.

Cover plates for receptacles shall be brushed stainless steel.

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

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

18.5.4 Wire and Cable

18.5.4.1 Low Voltage Systems

18.5.4.2 Medium Voltage Cable

18.5.5 Electrical Identification

18.6 EMERGENCY AND STANDBY POWER SYSTEMS

18.6.1 Diesel Powered Engine – Generator Load Bank (DST 2003-02)

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.

18.7 METERING OF POWER

Each substation shall be provided with secondary watt-hour demand meters. All watt-hour demand meters shall have digital readout and pulse output for future remote monitoring.

Watt-hour meters shall be provided for tenant spaces by the tenant. Each food and beverage tenant shall provide watt-hour demand meter in the MAA electrical closet. All other tenants shall include provisions for future metering. These meters shall be "E-Mon" brand and shall be located in the MAA electrical closet. A spare 2" conduit shall be installed from each metering location to the nearest telephone closet. Provisions shall consist of routing the tenant feeder through a current transformer cabinet located adjacent to the MAA electrical panelboard. Watt-hour meters shall be socket type with a by-pass type meter base and they shall be ANSI approved.

Metering at substation shall be Square-D Powerlogic system.

For double ended substations, a meter shall be provided in each side of the double ended switchgear. Meter shall measure all of the following: voltage, current, power, power factor, frequency, kilowatt-hours, and demand. Unit shall have the following additional features: 4 optically isolated status inputs, 2 optically isolated RS485 communications ports, Modbus and DNP communications protocol. In addition, one meter in any group shall have an internal modem. An auxiliary contact on each main and tie circuit breaker

shall be wired to the status inputs on one power meter. The transformer over-temperature alarm on each transformer shall be wired to a status input on the associated power meter. The RS485 ports on all meters shall be daisy-chained together. A category 5 telecom cable shall be extended from the meter with the internal modem to the nearest telecom closet.

18.8 TEMPORARY ELECTRIC POWER SERVICE

For temporary electric power service during construction, designers shall include the following requirements in the specifications. These requirements are usually found in:

Technical Specifications
Temporary Facilities and Control
Section 01500

Part 2 – Products
2.2 Equipment

H. Power Distribution System: Service entrance drop cable to the first disconnect may be aluminum, subject to conditions specified in Part 3 of this specification. Circuit wiring conductors, inward from the first disconnect, shall be copper.

I. Power Distribution System Circuits: Circuits for temporary power distribution and lighting, not exceeding 125 volts AC, 20 ampere rating, may be permitted to use nonmetallic sheathed cable, provided that:

a. The installation meets requirements of the NEC, and
b. The cables are installed overhead and left exposed for surveillance.

Add the following new language to:

"Part 3 – Execution", under Section "3.2 Temporary Utility Installation"

If, as allowed under Part 2 – Products above, aluminum conductors are used for service drops, they shall be inspected monthly for the duration of their use. A written report on the cable condition shall be submitted to the MAA's authorized inspection firm.

18.9 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.

18.9.1 Navaids

CHAPTER 19: LIGHTING

19.1 INTERIOR LIGHTING (DST 2000-01)

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.

19.2 EXTERIOR LIGHTING

19.2.1 Apron Lighting

All light poles and fixtures shall be specified based on aesthetics, design parameters, and replacement/maintenance considerations. Consultants shall match existing products when modifying and/or expanding existing facilities. A list of lamps that are kept in stock is available to Consultants in the Office of 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.

19.2.2 Airfield Lighting

19.2.2.1 Lighting and Visual Aid Systems and Fixtures

Lockout / Tag-out for Airfield Lighting for S-1 Series Plug Cutouts

All S-1 series plug cutouts shall be the lockable type. The following is the specification for the S-1 series plug cutout:

"SERIES PLUG CUTOUT TYPE S-1. S-1 series plug cutouts shall be lockable, individually keyed with two keys, capable of carrying 20 Amperes, and shall have four contacts that close the circuit between the regulator and series lighting loop. The body shall be constructed of high strength plastic. Porcelain bodies may not be used. The series plug cutout shall be protected against arcing."

L852T, Style 3 Inpavement Lights

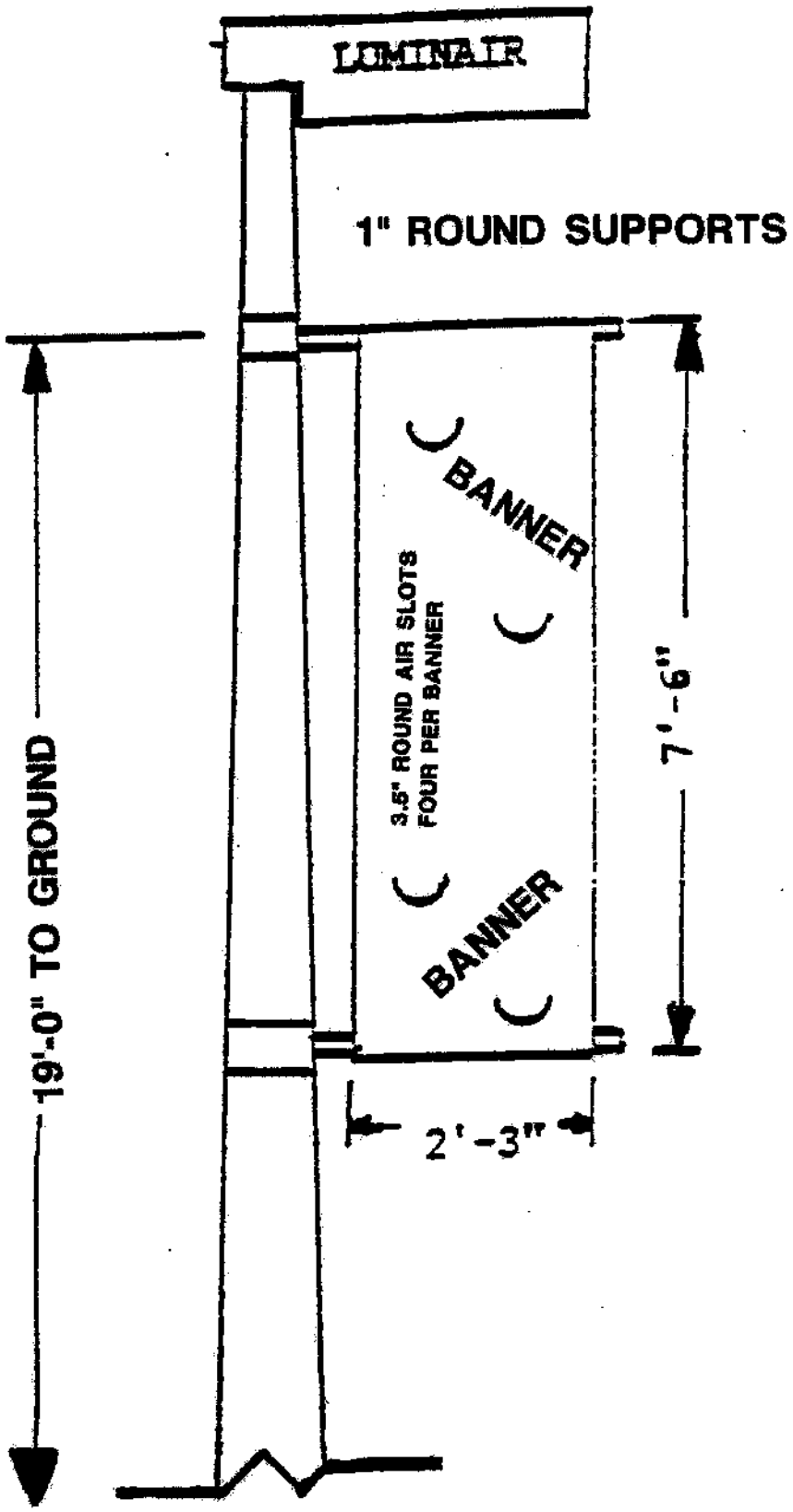
Reference is made to the advisory circular AC 150/5345-46B, Specification on Runway and Taxiway Light Fixtures. Effective immediately, in areas where L-852T lights are required, only Style 3 shall be specified. Any style 3 fixture that is installed at the airport must also be Federal Aviation Administration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

19.2.2.2 Cable and Conduit

L-824 Cables for Airfield Lighting Circuits

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

The following is the specification for this cable.



SHEET TITLE: LIGHT POLE	DATE: APRIL 2005

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

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

19.2.2.3 Electrical Manholes, Junction Boxes and Pull Boxes

19.2.2.4 Airfield Lighting Control System

19.2.3 Landside Lighting (Parking and Roadways)

All light poles and fixtures shall be specified based on aesthetics, design parameters, and replacement/maintenance considerations. Consultants shall match existing products when modifying and/or expanding existing facilities. A list of lamps that are kept in stock is available to Consultants in the Office of 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. Exising 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'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 20: SIGNAGE AND GRAPHICS

Refer to Appendix I for signage standards.

20.1 EXTERIOR SIGNAGE

20.1.1 Landside/Roadway Signage

20.1.2 Apron/Airfield Signage (DST 94-3)

20.1.2.1 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.

20.2 INTERIOR SIGNAGE (DST 2000-01)

The graphic style for BWI signage is Helvetica Regular. All sign boxes shall be internally lighted. Sign boxes in the Domestic Terminal shall be black and those in the International Terminal shall match Benjamin Moore 1608 Grey. New signs shall match the Airport's Standard.

LED Signs shall match the existing signs manufactured by Winona Lighting, Cole Lighting, or Bergen Art Metal. LED message center shall be manufactured by Salescaster Displays or approved equal.

20.3 DIRECTIONAL SIGNAGE

20.3.1 Gate Signage

20.3.2 Tenant Signage Standards

20.3.3 Door Identification Signs (DST 2001-02)

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.