MARYLAND AVIATION ADMINISTRATION

2013 Design Standards

Volume II of III

BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

MARTIN STATE AIRPORT

OFFICE OF DESIGN & CONSTRUCTION

January 2013

TABLE OF CONTENTS

Volume I of III

TABLE OF CONTENTS CONTINUED

Volume II of III

APPENDICES

Volume III of III

APPENDIX A

AIRPORT CONSTRUCTION PROJECT CHECKLIST

MARTIN STATE AIRPORT

BWI BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

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

AIRPORT CONSTRUCTION PROJECT CHECKLIST
DIVISION OF FACILITIES DESIGN

MAA Project No.: _____

Project Title: _____

FAA Funding? ____ Yes ____ No **FAA Project No**.: _____

Instructions: All projects designed for the Maryland Aviation Administration, Office of Engineering and Construction Management will be performed in accordance with this checklist. The checklist should be completed as design progresses, and must be included with each submission of design documents. In general, any item on the following checklist which is checked "N/A" (not available or not applicable) should include a short explanation of action taken

Items on the checklist are to be completed by the Engineer, except as noted otherwise. Where checklist items call for approval, coordination, or notification of other agencies, including those outside of MAA, documentation shall be made by the Engineer in writing. If information is not transmitted in a timely manner, the Engineer should send a follow-up request. If no response is received, the Engineer should document such non-response and notify the MAA project manager.

Any changes in project scope, design and/or construction costs, or schedule resulting from design reviews or other causes must be approved by the Manager, Design Services in writing before design work may proceed. There will be no exceptions.

For Federally-funded projects, the FAA Project Checklist (see Schedule B) must also be completed.

Yes	No	N/A	
___	___	___	1. Has the Planning Division Checklist been received? Have all items noted in this checklist been addressed and coordinated with the Office of Planning & Environmental Services, and will they have any impact on design? Can design proceed?
___	___	___	2. Have airport property plats and descriptions been reviewed? If the proposed project is not on MAA property, has the project been coordinated with the MAA Division of Real Estate?

Yes	No	N/A	
___	___	___	3. Have past engineer's reports involving the project area and/or scope been reviewed? List reports reviewed. _____ _____
___	___	___	4. Have record plans from the project area been reviewed? List project plans reviewed: _____ _____
___	___	___	5. Does the project area include wetlands or other environmentally sensitive areas that need to be addressed? Have environmental issues been properly coordinated with the Office of Planning and Environmental Services?
___	___	___	6. Has any required environmental documentation been coordinated with and approved by the Office of Planning & Environmental Services? Have necessary approvals been received? Can project proceed if approvals are not received?
___	___	___	7. If required, have appropriate mitigation measures been included in the design?
___	___	___	8. If required, has an FAR Part 77 obstruction survey been conducted? Have possible impacts on the project schedule been evaluated?
___	___	___	9. Does the design call for obstructions to be removed or lighted? Have removal and/or lighting decisions been coordinated with the Office of Planning & Environmental Services and Office of Design and Construction?
___	___	___	10. If required, has an FAA Form 7460-1, "Notice of Proposed Construction or Alteration," been completed, submitted, and approved? Has a companion permit application for MAA Board of Airport Zoning Appeals (BAZA) been completed, submitted, and approved?
___	___	___	11. Have FAR Part 77 and Part 139 obstructions been identified? Have the disposition of all obstructions been coordinated and resolved with MAA Office of Engineering and Construction Management and FAA-WADO?
___	___	___	12. Has an erosion and sediment control and storm water management permit been received from MDE? Application date: _____
___	___	___	13. Has a U.S. Army Corps of Engineers water quality permit been received?

Yes	No	N/A	
___	___	___	14. Have NPDES permit requirements and conditions been coordinated with OPE Environmental Services? Has an NPDES permit been applied for and received?
			Application date: _____
___	___	___	15. Have other required permits been received? List permits and application dates: _____ _____
___	___	___	16. Has BG&E work been coordinated and finalized?
			BG&E representative: _____
___	___	___	17. Has Bell Atlantic work been coordinated and finalized?
			Bell Atlantic representative: _____
___	___	___	18. Has an application for frequency approval been submitted to FCC? Application date: _____
___	___	___	19. Have Anne Arundel County Department of Public Works approvals and permits been received for water and/or sewer hook-ups?
			20. Has work been coordinated with the following agencies?
___	___	___	a. State Highway Administration?
___	___	___	b. Mass Transit Administration?
___	___	___	c. Amtrak and Maryland State Railroad Administration?
___	___	___	d. FAA – Air Traffic Control and Facilities?
___	___	___	e. FAA – Washington Airports District Office?
___	___	___	f. FAA – Eastern Region?
___	___	___	g. Federal Inspection Services (FIS) Agencies?
___	___	___	21. Have surveying and mapping been completed?
___	___	___	22. Has the Pre-Design Meeting been held (at 30%) Design)? In certain cases a Pre-Pre-Design meeting will be required. OPE will provide direction.
___	___	___	23. Have the 30% Design plans, specifications, and construction cost estimate been received, distributed, and reviewed? The 30% submission was distributed to: _____

Yes	No	N/A	
			_____
___	___	___	24. Has the Preliminary Engineer's Report including been completed, distributed, and reviewed (at the 30% Design stage)? Does the report include supporting calculations? The report was distributed to: _____ _____
___	___	___	25. Have the 30% Design review comments been addressed and resolved?
___	___	___	26. Have the 60% Design plans, specifications, and construction cost estimate been received, distributed, and reviewed? The 60% submission was distributed to: _____ _____
___	___	___	27. Have the 60% Design review comments been addressed and resolved?
___	___	___	28. Have the 100% Design plans, specifications, Engineers Report, and construction cost estimate been submitted for review and approval? Does the report include supporting calculations? The 100% submission was distributed to: _____ _____
___	___	___	29. Has the project been approved by the State Fire Marshal?
___	___	___	30. Have the final plans, specifications, and construction cost estimate been submitted? Submission date: _____
___	___	___	31. Have state wage rates been requested and received from the State of MD Dept. of Labor Licensing & Regulation?
___	___	___	32. Have Federal wage rates been requested and received from the Office of Procurement?
___	___	___	33. Has the construction phasing been coordinated with Airport Operations, FAA ATCT, FAA Facilities, Air Transport Association, and other airport tenants and/or users?
___	___	___	34. Have the proper MBE/DBE requirements and goals for the project been included?
___	___	___	35. Do the contract documents include the Technical Provisions (General Information, Technical Specifications, Wage Rates, Standard Provisions Forms, and Interim Standard Provisions), and Bid Forms (Agreement, Performance Bond, Payment Bond, Affidavits, and Proposal)?

Yes	No	N/A	
___	___	___	36. Have the requirements of the Airport Operations Checklist been incorporated into the contract documents? Has the checklist been completed and attached?
___	___	___	37. Have the requirements of the Fire Rescue Services Checklist been incorporated into the contract documents? Has this checklist been completed and attached?
___	___	___	38. Have the requirement of the Maintenance Division Checklist been incorporated into the contract documents? Has this checklist been completed and attached?
___	___	___	39. Have the requirements of the Finance Division Checklist been incorporated into the contract documents?
___	___	___	40. Has schedule A been completed and attached?
___	___	___	41. Have MAA design standards been reviewed and incorporated into the design?

I certify that the referenced project has been completed in accordance with this checklist.

_____

Engineer's Signature Date

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
FACILITIES DEVELOPMENT AND ENGINEERING

AIRPORT CONSTRUCTION PROJECT CHECKLIST
OFFICE OF DESIGN
SCHEDULE A

MAA Project No.: _____

Project Title: _____

Yes	No	N/A	
___	___	___	1. Has the project been coordinated through the Office of Airport Operations with affected tenants?
___	___	___	2. Has the project been coordinated with the Office of Commercial Management where leases and tenant agreements are affected?
			Traffic Control Plan
___	___	___	1. Has the traffic control plan been coordinated with Airport Operations, State Highway Administration, and county government (i.e., detours, temporary pavement marking, lighting, signage, directional arrow board, etc.)?
___	___	___	2. Have temporary markings on airfield pavements been specified to be painted? (The use of temporary tape markings must be approved by Airport Operations.)
___	___	___	3. Is adequate temporary lighting specified?
___	___	___	4. Are adequate customer/pedestrian protection, temporary signs, dust control measures, etc. specified?
			Civil and Landscaping
___	___	___	1. Have adequate storm water management, erosion and sediment control measures during construction been specified?
___	___	___	2. If needed, have special treatments for establishing ground cover (minimum requirement: topsoil, seed, and mulch) been specified?
___	___	___	3. Have landscaping plans been approved by the MAA Maintenance Division?
			Electrical
___	___	___	1. Have Mode II runway and taxiway signs been specified?
___	___	___	2. Have “switch hitter” runway centerline lights been specified?

Yes	No	N/A	
___	___	___	3. Have runway condition sensors been included if specified by MAA?
___	___	___	4. Have any required control tower facsimile panel modifications been included?
			Buildings
___	___	___	1. On major structures, has the Governor's Commission approved the architectural concept?
___	___	___	2. Have the roof specifications been approved by the Department of General Services? Has modified bitumen roof been specified?
___	___	___	3. Have temporary heat and air conditioning been provided?
___	___	___	4. Have temporary water and sanitary sewer service been provided?
___	___	___	5. Is temporary power provided?
___	___	___	6. Have handicapped facilities been provided in accordance with ADA? Have these facilities been reviewed by the MAA Office of Transportation and Terminal Services?
___	___	___	7. If required, have additional FIDS been provided?
___	___	___	8. Have 6" diameter minimum bollards been specified?
___	___	___	9. If required, has a reflectivity study been conducted and approved?
			Safety
___	___	___	1. Has FAA Advisory Circular 150/5300-9 been incorporated?
___	___	___	2. Has FAA Advisory Circular 150/5370-2 been incorporated?
			Aesthetics
___	___	___	1. Is there any need or justification for special treatments for aesthetic reasons?
___	___	___	2. Is there any need for artist's renderings and/or a special aesthetics review?
			Sensitive Security Information
___	___	___	Does the project involve the modification or addition to any of the following four security systems: CASS, CCTV, Flex Response or CAD? If "Yes," then the project probably contains SSI and the scope must be reviewed with the MAA Director of Airport Security and Sole Source System Contractors.

___	___	___	Has the project been reviewed with the MAA Office of Airport Security and Sole Source System Contractors for Sensitive Security Information?

I certify that the referenced project has been completed in accordance with this checklist.

_____

Engineer's Signature Date

FEDERAL AVIATION ADMINISTRATION
PLANS AND SPECIFICATIONS REVIEW CHECKLIST

SCHEDULE B

Airport: _____ **AIP No**.: _____

Yes	**No**	Item
___	___	1. Do the plans and specifications cover all the work included in the tentative allocation? If not, please explain. _____ _____
___	___	2. Do the plans and specifications include any non-eligible development?
___	___	3. Have all coordination (sponsor, users, FAA, etc.) comments been satisfied? If not, please explain. _____ _____
___	___	4. Has an Engineer's Report been submitted to FAA?
___	___	5. For projects containing airport paving, has the FAA Pavement Design Form (FAA Form 5100.1) been submitted to the FAA?
___	___	6. Was a pre-design conference held?
___	___	7. Are there any waivers to FAA standards included in Engineering Report? Have waivers been: Requested: Yes_____ No _____ Approved: Yes_____ No _____
___	___	8. Does the development included in the plans and specifications conform with the approved Airport Layout Plan? If not, please explain. (Note: This can be controlled by including a general layout sheet in the plan set with all grant work items listed in the legend and shown at the location on the airport where it will be constructed. The location and size shown should agree with the approved ALP). _____ _____
___	___	9. Are there any special environmental conditions or requirements that need to be incorporated in the plans and specifications? If yes, please explain. _____ _____

Yes	No	Item
___	___	10. If over $100,000 estimated cost, does specifications include 100% payment, and 100% performance bonds?
___	___	11. Are the current EEO, Davis Bacon Act and DBE provisions in the plans and specifications? (Reference current boilerplate)
___	___	12. Is the current minimum Wage Rate Schedule (U.S. Department of Labor) included verbatim or referenced in specifications?
___	___	13. Does the Wage Rate Schedule include all the worker classifications required?
___	___	14. Are the EEO (minority/women) goals shown in the specifications in accordance with the Department of Labor requirements shown in the Federal Register dated Friday, October 3, 1980, page 65976?
___	___	15. Are the DBE goals shown in the specifications in conformance with sponsor's approved DBE plan?
___	___	16. Has a copy of the invitation for bids been sent to the Minority Business Resource Center for DBE coordination?
___	___	17. Do Plans and Specifications include safety requirements of Advisory Circular 150/5370-2, "Operational Safety on Airports During Construction"?

_____
Signature

_____ _____
Title Date

APPENDIX B

STANDARD FORMS

MARTIN STATE AIRPORT

BWI BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

STANDARD FORMS

- MEETING MINUTES FORM
- ENGINEER'S REPORT GENERAL SUMMARY
- STANDARD COST ESTIMATE
- KNOX BOX ORDER FORMS
- REQUEST FOR VARIANCE – INTERFACE OF FIRE ALARM, LIFE SAFETY AND SECURITY SYSTEMS
- PRE-OCCUPANCY FIRE INSPECTION
- OT STANDARDS AND SPECIFICATIONS – REQUEST FOR VARIANCE
- OT STANDARDS AND SPECIFICATIONS – CHANGE REQUEST
- OT STANDARDS AND SPECIFICATIONS – RESOURCE ALLOCATION PERMIT
- SSI – CONFIDENTIALITY AND NON-DISCLOSURE AGREEMENT (FOR CONSTRUCTION CONTRACT BIDDERS)
- SSI – CONFIDENTIALITY AND NON-DISCLOSURE AGREEMENT (FOR A/E, CMI, TENANT AND SOLE SOURCE PROVIDER)
- SSI – CONTRACTOR REPRESENTATIVE INFORMATION
- MROI – LIST
- MROI – LIST APPROVAL
- MROI – RECORD OF DELIVERY
- CONSTRUCTION SAFETY AND PHASING PLAN REVIEW CHECKLIST (AC 150/5370-2F)

MARTIN STATE AIRPORT

BWI BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

Baker

ENGINEERING & ENERGY

MEETING MINUTES

MEETING DATE		
MEETING LOCATION		
MEETING SUBJECT		
TASK NUMBER & TITLE		
MAA TASK MANAGER		EMAIL:
CONSULTANT TASK MANAGER		EMAIL:
MINUTES PREPARED BY		EMAIL:

INVITED PARTICIPANTS	ATTENDEES	REPRESENTING	EMAIL ADDRESS	PHONE NUMBER

INTRODUCTION AND PURPOSE OF THE MEETING
1.

A	***NEW*** **ACTION/DISCUSSION ITEMS**	**ACTION REQUIRED BY**	**DATE REQUESTED**
B	**OUTSTANDING ITEMS REQUIRING ACTION/DISCUSSION FROM *PREVIOUS* MEETING(S)**	**ACTION REQUIRED BY**	**DATE REQUESTED**
	Action:		

Distribution:
cc:

ENGINEER'S REPORT GENERAL SUMMARY

Date	
Report Phase	☐ Preliminary ☐ Draft ☐ Final
Airport	☐ BWI ☐ Martin
A/E Contract Number	
Task Number	
Task Title	
Construction Contract Number	
Construction Contract Title	
CONSULTANT'S CONTACT INFORMATION	
Prime Consultant	
Consultant's Task Manager	
Task Manager's Phone Number	
Task Manager's Email Address	

Contract Number
Task Number and Title

Date

ESTIMATING LEVEL: ☐ **Budget** ☐ **Concept** ☐ **30%** ☐ **60%** ☐ **100%** ☐ **Bid**

ITEM	DESCRIPTION		UNIT	UNIT COST	QUANTITY	TOTAL	COMMENT
	CONSTRUCTION COST ESTIMATE						
1						$0	
2						$0	
3						$0	
4						$0	
5						$0	
6						$0	
7						$0	
	Special Systems	☐ BAS (Metasys)					
		☐ FAS (Honeywell)					
		☐ CASS					
		☐ CCTV					
		☐ BGE					
		☐ Verizon					
		☐ BHS (Bagage Handling Systems)					
		☐ Other Systems (Specify)					
	SUBTOTAL A					**$0**	
	Design Contingency (15% to 25% of A)				25%	$0	
	SUBTOTAL B					**$0**	
	General Conditions X% of B (If not included in Unit Costs)				10%	$0	
	Contractor O&P X% of B (if not included in Unit Costs)				15%	$0	
	Construction Security Plan (X% of B)				5%	$0	
	SUBTOTAL C					**$0**	
	Construction Quality Control Plan (3% of C)				3%	$0	
	SUBTOTAL D					**$0**	
	Miscellaneous Construction Allowance (5% to 10% of C)				10%	$0	
	Construction Quality Control Plan (3% of Misc. Construction Allow.)				3%	$0	
	TOTAL CONSTRUCTION COST ESTIMATE					$0	
	ADDITIONAL PROGRAM COSTS						
	Estimated Design Fee (8% to 12% of Construction Cost)				12%	$0	
	Estimated CMI Fee (8% to 12% of Construction Cost)				12%	$0	
	TOTAL CAPITAL PROGRAM COST ESTIMATE					$0	
	Escalation Factor (if applicable)				0%	$0	
	GRAND TOTAL					$0	

Level of Accuracy	☐ Quantity Take-Off	☐ General Square Foot	☐ Comparison with other installations/facilities
List of Sole Source Items	1	3	5
Included in this Contract	2	4	6
List of Assumptions			

KNOX

2006 Fire/Law Enforcement Rapid Entry System AUTHORIZATION ORDER FORM

800-552-5669 • 623-687-2300 • Fax: 623-687-2290 • WWW.KNOXBOX.COM

Effective January 1, 2006

Section 1 BILLING INFORMATION - MUST MATCH CREDIT CARD INFORMATION IF USED.

COMPANY / NAME

DATE ORDERED

STREET (NO P.O. BOXES)

SUITE / BUILDING

CITY

STATE

ZIP CODE

CONTACT NAME

PHONE NUMBER

P.O. NUMBER (GOV. AGENCIES ONLY)

Send this form with payment to:
KNOX COMPANY
1601 W. Deer Valley Road,
Phoenix, AZ 85027

ORDER WILL NOT BE PROCESSED
Without Authorized Signature

Section 2

Baltimore - Wash Intl Airport F/Res
State Aviation BWI Fire/Res
PO Box 8766
Baltimore, MD 21240

Authorized Fire Agency Signature and Date

Print Name Clearly

PS-39-026-02-89
System Code

IMPORTANT NOTE - Knox™ Master Keys are provided to authorized fire departments or other registered entities on an as-needed basis solely for use with the Knox Rapid Entry System. No other use of the keys or their associated codes is authorized. Key codes associated with the Knox Master Keys and Keyways remain the property of the Knox Company and are maintained by the Knox Company in Phoenix, Arizona. For questions regarding this policy, contact Knox at 800-552-5669.

Section 3 ORDER PRODUCT HERE

Quantity	Part Number	Amount
		Total $
		Total $
		Total $

Shipping & Handling

1 lb. to 7 lbs.	$7.00
8 lbs. to 25 lbs.	$17.00
26 lbs. to 50 lbs.	$30.00
51 lbs. to 75 lbs.	$40.00

75 lbs.+ call Knox for quote. Alaska, Hawaii, Canada or Priority Shipping, please call for rates.

If required, add $7.00 per submastered item $

Shipping and Handling $

Subtotal $

No St Tax
Sales Tax $

Regd
Pre-payment
Total $

PRE-PAYMENT INFORMATION REQUIRED

USE PRICE LIST ON LAST PAGE

☐ Check or Money Order made payable to: **KNOX COMPANY** **Federal I.D. #95-3617858**

☐ VISA ☐ AMEX ☐ MC ☐ DISC

CARD NUMBER

EXP. DATE (MM / YYYY)

Cardholder Signature

Section 4 INSTALLATION ADDRESS - REQUIRED BY FIRE DEPARTMENT

BUILDING NAME (WHERE ITEM WILL BE INSTALLED) - PLEASE TYPE ADDITIONAL INSTALLATION ADDRESSES ON A SEPARATE SHEET (REQUIRED BY FIRE DEPT.)

ADDRESS

CITY

STATE

ZIP CODE

Fire Department Approval Signature Required to Submaster Items

☐ Check here to Submaster

Authorized Fire Agency Signature
Submaster fee $7.00 per keyed item.

Section 5 SHIP TO ADDRESS IS REQUIRED

O/N

REC'D

SHIP TO CONTACT NAME

COMPANY NAME

STREET ADDRESS (NO P.O. BOXES)

CITY

STATE

ZIP CODE

E-MAIL ADDRESS

CT-KBAUTH-0059-A

Continued Page 1

Section 6 **DUAL LOCK OPTION - For Permitted Dual Lock Products ONLY**

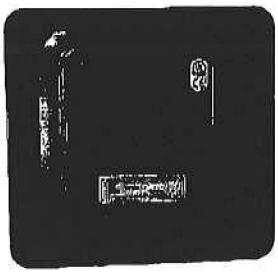
Knox Master Keys are provided to authorized fire departments or other registered entities on an as-needed basis solely for the use with Knox Rapid Entry System. No other use of the keys or their associated codes is authorized. Key codes associated with the Knox Master Keys and Keyways remain the property of the Knox Company. If any replacement keys are needed, the transaction will be handled through the local fire department. Knox Company will send the replacement key to the Knox coordinator at the appropriate Fire Department and the Fire Department representative will give the key to the appropriate property owner representative.

Authorized Dual Lock User Signature

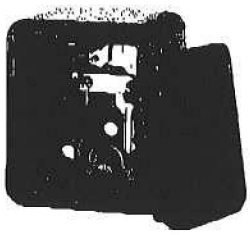
Date

Knox Rapid Entry System Product Catalog

KNOX-BOX® 3200 Series w/ Lift-Off Door - Heavy Duty



#3227 Recessed



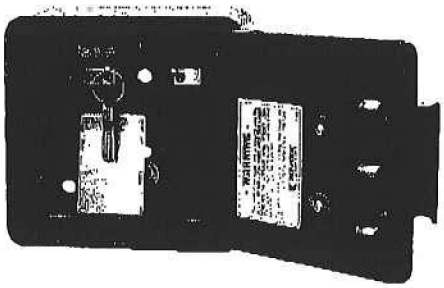
#3208 Surface

- Heavy-duty, high security construction
- Capacity for up to 10 keys and access cards
- 1/2" solid steel door
- Dimensions: Surface 5" H x 4" W x 3-1/4" D
  Recessed 7" H x 7" W Flange
- **Ship Weight: 10 lbs.**
- Colors: Black, Bronze, Aluminum
- Finish: Knox-Coat® Weather resistant proprietary coating system

- Options:
  - Alarm tamper switches
  - Aluminization (additional rust and corrosion protection)
  - Recessed Mounting Kit available for new masonry construction

KNOX-VAULT™ 4400 Series - Heavy Duty

#4444 Recessed



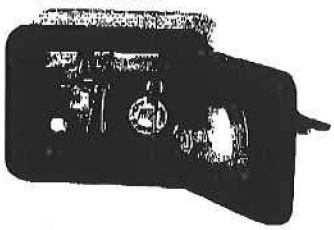
#4414 Surface

- Heavy-duty, high security construction
- 50 key capacity storage, for access cards, floor plan
- 5/8" solid steel door, re-locking mechanism with drill resistant hard-plate lock protector
- Dimensions: Surface 7" H x 7" W x 5" D
  Recessed 9-1/2" H x 9-1/2" W Flange
- **Ship weight: 29 lbs**
- Colors: Black, Bronze, Aluminum
- Finish: Knox-Coat® Weather resistant proprietary coating system

- Options:
  - Alarm tamper switches
  - Single, dual or combination locks
  - Aluminization (additional rust and corrosion protection)
  - Recessed Mounting Kit available for new masonry construction

KNOX-BOX® 3200 Series w/ Hinged Door

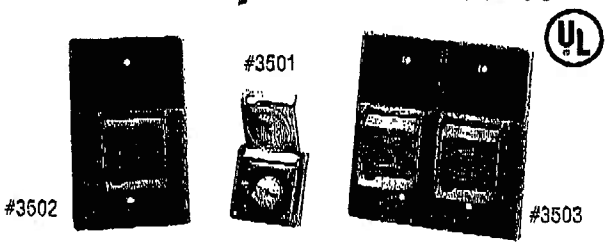
#3275 Recessed



#3266 Surface

- Allows single-handed operation
- Stores both keys and access cards
- Ensures efficient emergency response
- Door attached with hinge, it's all one unit
- Dimensions: Surface 4" H x 5" W x 3-1/4" D
  Recessed 7" H x 7" W Flange
- **Ship Weight: 10 lbs.**
- Colors: Black, Bronze, Aluminum
- Options: Same as 3200 Lift-Off door model above

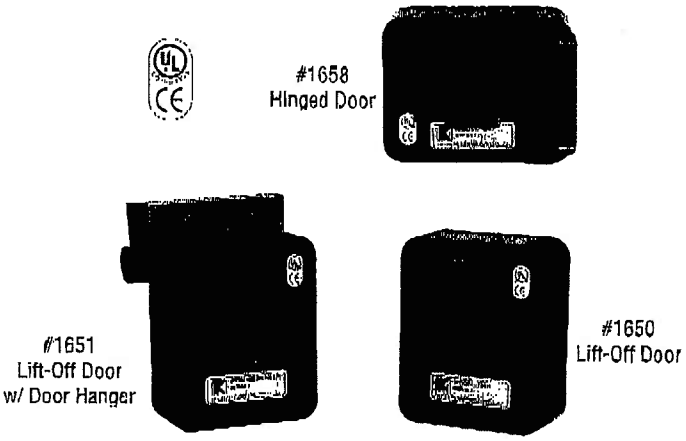
Knox® Key Switch 3500 Series



- Electric override for perimeter gates, parking garages, gated communities, HVAC controls and industrial equipment lockout
- For fire, EMS & law enforcement
- Single or dual-key options
- All stainless steel dust cover
- **Ship Weight: 1 lb.**

Knox® Residential 1650 Series

- For temporary or permanent residential key storage
- 1 to 2 key capacity only
- Surface or door mount
- Dimensions: Lift-Off Door 5" H x 4" W x 2" D
  Hinged Door 4" H x 5" W x 2" D
- **Ship Weight: 7 lbs.**
- Color: Black
- Finish: - Knox-Coat® Weather resistant proprietary coating system
- Option: - Over-the-Door Hanger

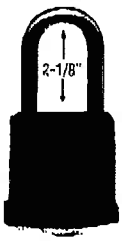


Knox® Padlock

Agency I.D. Label Included

(Lock Core)

Exterior - All Weather Conditions

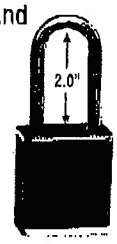


#3753

- Secures perimeter and fire access gates, and other fire department equipment
- Heavy duty brass body, stainless steel 3/8" diameter shackle
- Protective EPDM boot with shackle seal
- Metal keyhole cover

Interior - Light Duty

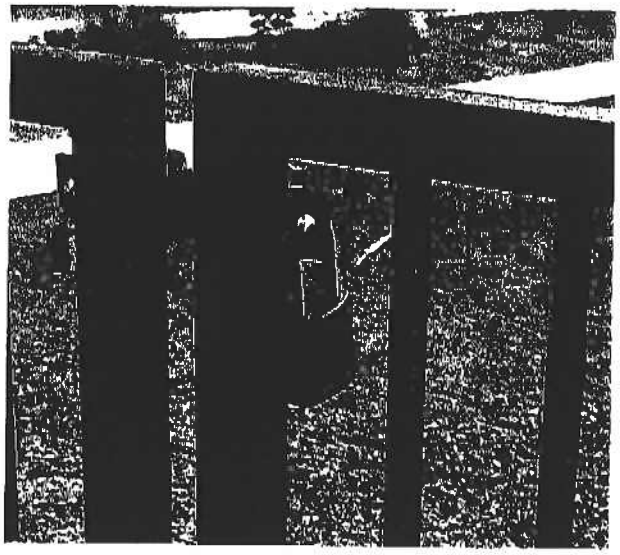
- Steel body and hardened steel 5/16" diameter shackle



#3754

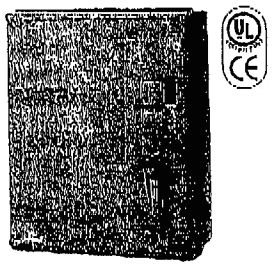
Ship Weight: 1.5 lbs

WARNING: Before ordering, measure hasp fittings to ensure proper shackle size.

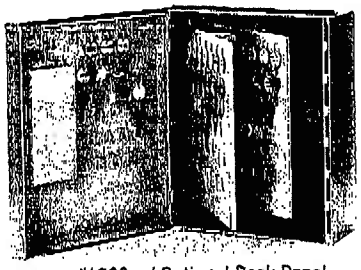


.nox® Master Keys are provided to authorized fire departments or other registered entities on an as-needed basis solely for use ith the Knox Rapid Entry System. No other use of the keys or their associated codes is authorized. Key codes associated with the .nox Master Keys and Keyways remain the property of the Knox Company and are maintained by the Knox Company in Phoenix, Z. For questions regarding this policy, contact Knox at 800-552-5669 or knoxbox.com.

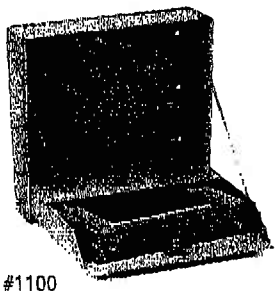
Knox Rapid Entry System Product Catalog



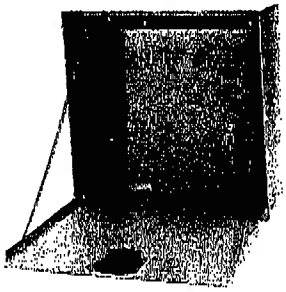
#1307 Dual Lock



#1308 w/ Optional Back Panel and Swing Panels.



#1100
Not suitable for key storage.



#1201 Weather Housing/Rain Shield with #1301 Cabinet Inside. Has latch without lock.

Knox® Cabinet

- **1300 Series** – UL listed high security cabinet
- Stores keys, blueprints, floor plans, MSDS, Haz-Mat information and other entry items
- Available in 5" or 7" depths
- Dimensions: 18" H x 14-1/2"W x 5" or 7"D
- **Ship Weight: 65 lbs**
- Color: Light grey
  Finish: Knox-Coat® Weather resistant proprietary coating system

- **1100 Series** - Document storage cabinet
- Stores blueprints, floor plans, MSDS, Haz-Mat information and other items (Not suitable for key storage)
- Dimensions: 14"H x 14"W x 4-1/4"D
- **Ship Weight: 26 lbs**
- Color: Light grey
  Finish: Knox-Coat® Weather resistant proprietary coating system

- **1201** Weather housing/Rain shield
- Protect Knox cabinet from weather
- Weather housing has latch without lock
- Dimensions: 21" H x 20"W x 13-5/8"D
- **Ship Weight: 75 lbs**
- Color: Light grey
  Finish: Knox-Coat® Weather resistant proprietary coating system

Knox® FDC Plug

- Solid Stainless Steel Construction
- Protect sprinkler system against vandalism
- Prevent frequent cap replacement
- Finish: - All stainless steel with polished, chrome-like stainless face
  - All stainless steel with bright stainless face
- **Ship Weight: 3 lbs**

#3011

#3010

FDC Plugs listed are 2-1/2" male plugs with National Standard Threads. Other sizes and threads available. Call for details.

Knox® FDC Storz Cap

- Secure large diameter connections
- Prevent unauthorized access
- Available in 4", 5" or 6" sizes
- Finish: Dark, hard anodized aluminum
- **Ship Weight: 5 lbs**

#3080

#3090

Knox® Master Keys are provided to authorized fire departments or other registered entities on an as-needed basis solely for use with the Knox Rapid Entry System. No other use of the keys or their associated codes is authorized. Key codes associated with the Knox Master Keys and Keyways remain the property of the Knox Company and are maintained by the Knox Company in Phoenix, AZ. For questions regarding this policy, contact Knox at 800-552-5669 or knoxbox.com.

2006 Price List - Order Online at www.knoxbox.com

Prices and availability subject to change.

● Included
– Not Included

KNOX-BOX®

3200 Series w/ Lift-Off Door Surface Mounted

Part #	Color	Tamper Switch	Aluminization*	Price
3201	Black	–	–	$189.00
3202	Black	●	–	$229.00
3203	Black	–	●	$229.00
3204	Black	●	●	$269.00
3205	Aluminum	–	–	$199.00
3206	Aluminum	●	–	$239.00
3207	Dark Bronze	–	–	$199.00
3208	Dark Bronze	●	–	$239.00

Ship Wt: 10 lbs.

3200 Series w/ Lift-Off Door Recess Mounted

Part #	Color	Tamper Switch	Aluminization*	Price
3220	Black	–	–	$229.00
3221	Black	●	–	$269.00
3222	Black	–	●	$269.00
3223	Black	●	●	$309.00
3224	Aluminum	–	–	$239.00
3225	Aluminum	●	–	$279.00
3226	Dark Bronze	–	–	$239.00
3227	Dark Bronze	●	–	$279.00
3240	3200 Lift-Off Door Recessed Mounting Kit			$69.00

Ship Wt: 10 lbs.

3200 Series w/ Hinged Door Surface Mounted

Part #	Color	Tamper Switch	Aluminization*	Price
3261	Black	–	–	$229.00
3262	Black	●	–	$269.00
3267	Black	–	●	$269.00
3268	Black	●	●	$309.00
3263	Aluminum	–	–	$239.00
3264	Aluminum	●	–	$279.00
3265	Dark Bronze	–	–	$239.00
3266	Dark Bronze	●	–	$279.00

Ship Wt: 10 lbs.

3200 Series w/ Hinged Door Recess Mounted

Part #	Color	Tamper Switch	Aluminization*	Price
3270	Black	–	–	$269.00
3271	Black	●	–	$309.00
3276	Black	–	●	$309.00
3277	Black	●	●	$349.00
3272	Aluminum	–	–	$279.00
3273	Aluminum	●	–	$319.00
3274	Dark Bronze	–	–	$279.00
3275	Dark Bronze	●	–	$319.00
3290	3200 Hinged Recessed Mounting Kit			$69.00

Ship Wt: 10 lbs.

KNOX-VAULT™

4400 Series Surface Mounted

Part #	Color	Lock	Tamper Switch	Aluminization*	Price
4401	Black	Single	–	–	$325.00
4402	Black	Single	●	–	$365.00
4403	Black	Dual	–	–	$385.00
4404	Black	Dual	●	–	$425.00
4405	Black	Single	–	●	$375.00
4406	Black	Single	●	●	$415.00
4407	Black	Dual	–	●	$435.00
4408	Black	Dual	●	●	$475.00
4409	Aluminum	Single	–	–	$335.00
4410	Aluminum	Single	●	–	$375.00
4411	Aluminum	Dual	–	–	$395.00
4412	Aluminum	Dual	●	–	$435.00
4413	Dark Bronze	Single	–	–	$335.00
4414	Dark Bronze	Single	●	–	$375.00
4415	Dark Bronze	Dual	–	–	$395.00
4416	Dark Bronze	Dual	●	–	$435.00

Ship Wt: 29 lbs.

4400 Series Recess Mounted

Part #	Color	Lock	Tamper Switch	Aluminization*	Price
4430	Black	Single	–	–	$375.00
4431	Black	Single	●	–	$415.00
4432	Black	Dual	–	–	$435.00
4433	Black	Dual	●	–	$475.00
4434	Black	Single	–	●	$425.00
4435	Black	Single	●	●	$465.00
4436	Black	Dual	–	●	$485.00
4437	Black	Dual	●	●	$525.00
4439	Aluminum	Single	–	–	$385.00
4440	Aluminum	Single	●	–	$425.00
4441	Aluminum	Dual	–	–	$445.00
4442	Aluminum	Dual	●	–	$485.00
4443	Dark Bronze	Single	–	–	$385.00
4444	Dark Bronze	Single	●	–	$425.00
4445	Dark Bronze	Dual	–	–	$445.00
4446	Dark Bronze	Dual	●	–	$485.00
4470	4400 Recessed Mounting Kit				$85.00

Ship Wt: 29 lbs.

KNOX® KEY SWITCH

Part #	Part (includes all stainless steel dust cover)	Price
3501	Key Switch	$62.00
3502	Key Switch on Mounting Plate	$79.00
3503	Double Key Switch on Mounting Plate	$129.00

Continued on back page

006 Price List - Order Online at www.knoxbox.com

Prices and availability subject to change.

● Included
– Not Included

(NOX® PADLOCK

Part #	Part	Price
	Exterior - All Weather Conditions	
3753	2-1/8"H stainless shackle clearance, 3/8" diameter	$79.00
	Interior - Light Duty	
3754	2"H hardened steel shackle clearance, 5/16" diameter	$58.00

(NOX® RESIDENTIAL (Holds two keys maximum)

Part #	Color	Part	Price
1650	Black	Surface Mount, Lift-Off Door	$139.00
1651	Black	Surface Mount, Lift-Off Door, with Door Hanger Bracket	$150.00
1658	Black	Surface Mount, Hinged Door	$165.00
1659	Black	Surface Mount, Hinged Door, with Door Hanger Bracket	$176.00

KNOX® CABINET

1300 Series - UL Listed

Part #	Color	Lock	Tamper Switch		Depth	Price
1301	Lt. Grey	Single	–	Ship Wt: 65 lbs.	5"	$545.00
1302	Lt. Grey	Single	–		7"	$585.00
1303	Lt. Grey	Single	●		5"	$585.00
1304	Lt. Grey	Single	●		7"	$625.00
1305	Lt. Grey	Dual	–		5"	$605.00
1306	Lt. Grey	Dual	–		7"	$645.00
1307	Lt. Grey	Dual	●		5"	$645.00
1308	Lt. Grey	Dual	●		7"	$685.00

1300 Cabinet Options

Part #	Part	Price
1351	Back Key Hook Panel - 48 Keys	$50.00
1352	Swing Key Hook Panel & Mounting Assembly - 78 Keys	$140.00
1353	2nd Swing Key Hook Panel for 7" Deep Model Only (must already have mounting assembly)	$110.00
1201	Non Locking Weather Housing/Rain Shield (for exterior cabinet protection)	$350.00

1100 Series

Part #	Color	Part	Price
1100	Lt. Grey	Data Storage Cabinet (Not for key storage)	$274.00

ACCESSORIES

Part #	Part	Price
1001	Fire Dept. Reflective Alert Decal	$1.50
1002	Fire Dept. Reflective Single Key Switch Decal (Red)	$3.00
1003	Sheriff Dept. Reflective Single Key Switch Decal (Gold)	$3.00
1004	Police Dept. Reflective Single Key Switch Decal (Blue)	$3.00
1005	Pre-Fire Plan Reflective Decal (8" x 8")	$12.00
1006	Key Tags (Package of 10)	$3.00
1007	One Inch Key Rings (Package of 10)	$3.50
1008	Tamper Seals (Package of 50)	$10.00
1009	Tamper Evident Bags (Package of 10)	$3.00

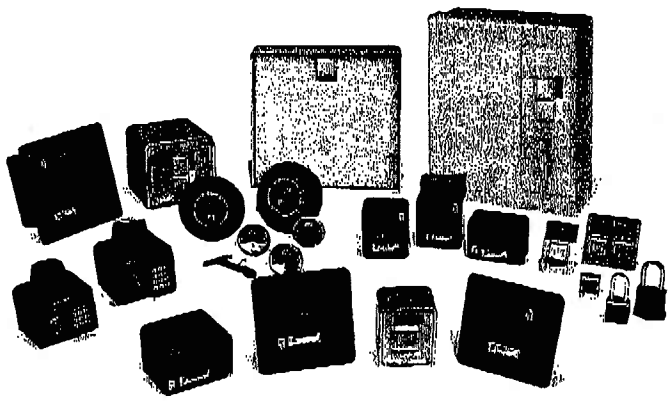
KNOX® LOCKING FDC PLUGS

Part #	Part	Price
3011	All stainless Steel with Bright Stainless Face	$115.00
3010	All stainless Steel with Polished, Chrome-like Stainless Face	$125.00

FDC Plugs listed are 2-1/2" male plugs with National Standard Threads. Other sizes and threads available. Call for details.

KNOX® LOCKING FDC STORZ CAPS

Part #	Part	Price
3080	4" Storz Cap - Dark, Hard Anodized Aluminum	$225.00
3090	5" Storz Cap - Dark, Hard Anodized Aluminum	$245.00
3099	6" Storz Cap - Dark, Hard Anodized Aluminum	$295.00



KNOX®
Serving Fire Departments Since 1975

623-687-2300 • 800-552-5669
Fax 623-687-2299
E-mail: info@knoxbox.com • Web: www.knoxbox.com
1601 W. Deer Valley Road, Phoenix, Arizona 85027

AIRPORT WIDE STANDARD FOR INTERFACE OF FIRE ALARM, LIFE SAFETY AND SECURITY SYSTEMS

REQUEST FOR VARIANCE

Name: _____ Date: _____

Company: _____ Tel. No: _____

Project Name: _____ MAA Contract No: _____

MAA Building Permit No. _____

1. Purpose of Variance Request.

2. Related Code References:

3. Justification for Variance (include discussion of design impact; code interpretation: budget increase/decrease; and other relevant facts). (Attach additional sheets as needed).

4. Design and Construction Cost impact if approved: $ _____ (Design), $ _____ (Construction)

5. Approval/Disapproval of this request is required by: _____ Days (Allow minimum 2 weeks.) .

BELOW THIS LINE IF FOR INTERNAL USE ONLY

A. OFM Comments.

B. Director of Engineering Comments.

C. ☐ Variance approved as submitted.
☐ Variance approved with comments incorporated.
☐ Variance denied.

_____ _____ ____Yes ___
No
OFM Date

_____ _____ ____Yes ___
No
Operations Manager Date

_____ _____ ____Yes ___
No
MAA Director of Design Date

NOTE: This Request for Variance is applicable to this specific project only.

Maryland Aviation Administration

BWI AIRPORT FIRE & RESCUE DEPARTMENT

Fire and Rescue Department
Office of the Fire Marshal
Fire Prevention and Inspection Division
1334-G, Ashton Road, Hanover MD 21076
410-859-7511

PRE-OCCUPANCY FIRE INSPECTION

[ ] Initial Pre-Occupancy Fire Inspection
[ ] Re-Inspection
[ ] Other _____

[ ] New Construction
[ ] Addition
[ ] Interior Alteration or Renovation

MAA / Facility Name _____

Building #, Address _____

City _____, MD ZIP _____

Inspection conducted by A-FM_____ 410-859-7511/ _____

Date and Time of Inspection _____/_____/_____ _____ [ ] AM [ ] PM

Property Use and Occupancy Classification:
[ ]-[ ], _____ Use Group (Example: S-1, Storage)

Area of facility _____ (Square Feet)

Means of Egress (Note: All code references refer to NFPA 101, 2006 unless otherwise noted.)	**Yes**	**No**	**Reference**
Paths of egress and exits are readily visible and identifiable			7.2.1.1.2, 7.5.2, 7.7.3, 7.10.1.2, 4.5.3.3
Exits and means of egress are clear and unobstructed (e.g. – no			7.5.1.1,

carts)			7.5.2, 4.5.3.2, 7.1.10.1
Means of Egress (Note: All code references refer to NFPA 101, 2006 unless otherwise noted.)	**Yes**	**No**	**Reference**
Adequate numbers of exits are provided			13.1.7, 13.2
Remote Exit is available, if required			7.5.1.3.1, 4.5.3.1
Travel distances are within required limits			7.6
Dead-ends are within required limits			7.5.1.5
Doors swing in direction of egress travel, if required			7.2.1.4.2
ADA compliant lever hardware, panic hardware, are provided, where required			7.2.1.7
Doors open and close easily and latches operate properly			7.2.1.4.5, 7.2.1.8
Security gates meet separation requirements			7.2.1.4.1.4
Emergency evacuation plan is posted on site			4.8.1(2)
Other-			
Other-			

Corridors and Concourse	**Yes**	**No**	**Reference**
Adequate minimum width for use and capacity requirements			7.3.1.1, 7.3.4.1
Integrity of separation barriers and partitions CH 7			IBC Ch. 7
Arrangement and width of egress paths (Note: The concourse width is not permitted to be less than 12 or 14 feet during normal flight operating hours.)			DST

Exit Illumination and Signage	**Yes**	**No**	**Reference**
Adequate Emergency White Lighting Levels			7.9
Exit signs [RED on WHITE] visible and illuminated			7.10
Emergency lighting systems pre-tested ___/___/___			7.9.3

Stairways	**Yes**	**No**	**Reference**
Aggregate width (50/50) adequate			7.7.2, 7.7.4
Integrity of walls and doors			7.2.2.5.1
Guardrails / Handrails properly installed – No obstructions			7.2.4.4, 7.2.4.5
Security equipment appropriately placed			7.2.2.5.3.1
Discharge arrangement adequate and clear			7.2.2.1.1
Stairs are: Ventilated [ ], Pressurized [ ], Conditioned [ ]	N/A	N/A	N/A
Other-			

Fire Doors, Fire Walls, Fire and Smoke Separation Walls	Yes	No	Reference
Rating is appropriate for location(s)			IBC Ch.7
Materials properly installed			IBC Ch.7
Other-			
Other-			

HVAC Systems and Controls	Yes	No	Reference
Building zone ceiling has: Ducted Returns [ ], Plenum Returns [ ]	N/A	N/A	N/A
Pre-Testing Balancing Report was provided ____/____/____			N/A
Dampers and Detectors in ducts properly placed			NFPA 90A
A schedule is provided (if more than two systems)			DST
Fire damper types: Wall [ ], Floor [ ], Ceiling [ ]	N/A	N/A	N/A
Kitchen hood systems: UL 300 compliant [ ], Duct wrapped [ ], FA supervised, Cleanout access signage placed [ ]			Various
Other-			

Electrical System	Yes	No	Reference
Panel board clear of storage			9.1.2
Panel board properly labeled			9.1.2
GFCI circuits installed in correct areas and operating properly			9.1.2
Emergency power available: UPS [ ], Generator [ ]			9.1.2
MAA certified electrical inspections completed			DST
Other-			
Other-			

Housekeeping	Yes	No	Reference
Storage properly arranged (18" below AS, with proper signage)			Various
Rubbish and building materials removed			7.1 10.1
Flammable and combustible liquids properly stored			8.7.3
Other-			

Fire Alarm	Yes	No	Reference
Type of system (specify)			N/A
Monitored by _____ Phone #_____ Pin#_____			9.7.2.1
Initiating devices: PS [ ], HD [ ], SD [ ], Water flow[ ], Valve Tamper[ ], Special Systems/MM [ ], Building Notification [ ] Audio/Visual [ ], Other _____[ ]			9.7.2.1
System tested and operational			9.8
Other-			

Fire Extinguishers			
Adequate number [ ], and distribution			9.7.4.1
			NFPA 10
Properly mounted and located			NFPA 10
Other-			

Sprinkler System	Yes	No	Reference
Type of system _____ Number of Zones _____			N/A
Appropriate type for hazards (Kitchens=Class K, 10lb / 4A60BC in FEC, typical)			9.6.7.3
System tested and emergency operational on _____/_____/_____			9.8
Alarm initiation type: Flow Switch [ ], Water motor gong [ ]			N/A
Valve supervision by: Fire alarm [ ], Flow switch [ ], MAA-Old FRD [ ], Padlock/Chain [ ]			9.7.2.1
Other-			

Fire Hydrants	Yes	No	Reference
Are in compliance with NFPA 24			N/A
Threads are compatible with DST requirements			DST
Are operational and maintained in good condition			NFPA 24

Special Fire Protection Systems The Building manager has been advised of testing, maintenance, and document submission requirements for the following special fire protection systems	Yes	No	Reference
[ ] NFPA 72, Fire Alarm Systems			N/A
[ ] NFPA 25, Water Based Fire Protection Systems			N/A
[ ] NFPA 10, Portable Fire Extinguishers			N/A
[ ] NFPA 13, Fire Sprinkler Systems			N/A
[ ] Building Manager advised that all special fire protection system re-submittals, field revisions, conformed graphic plans, and CD copies must be provided to the OFM.			N/A
Other-			

MARYLAND AVIATION ADMINISTRATION
BWI MARSHALL FIRE AND RESCUE DEPARTMENT
FIRE PREVENTION AND INSPECTION DIVISION

PRE-OCCUPANCY FIRE INSPECTION RESULTS

As a result of this inspection, the subject facility, known as

_____

is hereby:

[ ] **APPROVED FOR OCCUPANCY** (See Note 1).

[ ] **APPROVED FOR TEMPORARY OCCUPANCY**, subject to correction of items noted (See conditions of temporary or phased occupancy approval listed below).

[ ] **APPROVED FOR PHASED TEMPORARY** stocking and occupancy only (See Note 2).

[ ] **DENIED** occupancy approval due to the fire code deficiencies noted. The Tenant/Contractor is directed to correct the items noted prior to requesting re-inspection.

Note 1: "Approved for occupancy" indicates a finding that all fire safety criteria set forth at the time and date of the attached inspection has been met in accordance with the applicable adopted codes and standards of the State of Maryland and the Maryland Aviation Administration (MAA) Fire Prevention and Inspection Division at the BWI – Thurgood Marshall Airport. This certificate will only be issued if the building or structure is deemed safe for occupancy. All life safety and fire detection and suppression systems must be in full working operation, including alarm supervision, and alarm transmission requirements.

Note 2: A "phased temporary" approval is hereby granted to STOCK and OCCUPY a substantially completed, permitted portion. This temporary approval will expire within 30 days after completion of work unless a final certificate of occupancy is issued by the MAA-OFM, and the Owner (MAA-Engineer). The portion approved is:

_____

(List Portion(s) approved for Phased Temporary occupancy)

Owner's Representative
MAA Engineer Signature: _____ Date: _____

Inspector's Signature: _____ [FM-__] Date: _____

Tenant's Signature: _____ Date: _____

Sub-Tenant's Signature: _____ Date: _____

Contractor's Signature: _____ Date: _____

The above signatures attest that the parties listed are aware of deficiencies noted (if any), and any listed conditions of approval (if applicable), and agree to diligently correct any deficiencies noted. Failure to abide by a lawful order of the Fire Marshal is a violation of the State Fire Prevention Code, and is punishable in accordance with the provisions therein.

Conditions of Temporary, or Phased, Occupancy Approval These items must be corrected within the time limits listed as a condition of a temporary, or phased, certificate of occupancy. Failure to complete these items within the prescribed time limits will void this temporary approval. The OFM must be notified upon correction of the items listed and a re-inspection must be scheduled.	**10 Days**	**30 Days**	**Other**

[End of Document – Form FM-07-01]

REQUEST FOR VARIANCE

NOTE: This Request for Variance is applicable to this specific project only.

Name:_____ Date: _____

Company: _____ Tel. No.: _____

Project Name: _____ MAA Contract No.:_____

1. Purpose of Variance Request.
2. Related Code References:
3. Justification for Variance (include discussion of design impact; code interpretation; budget increase/decrease; and other relevant facts). (Attach additional sheets as needed)
4. Design and Construction Cost impact if approved: $_____
5. Approval/Disapproval of this request is required by: _____
   (Allow minimum 3 weeks.)

BELOW THIS LINE IF FOR INTERNAL USE ONLY

A. Fire Marshall Comments.(if applicable)

B. □ Variance approved as submitted.
□ Variance approved with comments incorporated.
□ Variance denied.

_____ _____ _____ Yes _____No
Manager, IT Networking Date

_____ _____ _____ Yes _____No
Manager, Telecommunications Date

CHANGE REQUEST

Name:_____ Date: _____

Company: _____ Tel. No.: _____

Date/Revision No. of Standard: _____

1. Section/paragraph to be changed:

2. Justification for change (site technical and code issues):
   (Attach additional sheets as needed)

BELOW THIS LINE IF FOR INTERNAL USE ONLY

CHANGE APPROVAL

_____ _____ _____Yes _____No
Mr. Robert C. Polkiewicz
Manager, Network Engineering Date
Office of Technology

_____ _____ _____Yes _____No
Mr. Timothy A. Watson Date
Manager, Communications Engineering
Office of Technology

_____ _____ _____Yes _____No
Mr. William Lins Date
Director
Office of Technology

Resource Allocation Permit

This Permit is valid for 6 month from date of issue. At the end of the 6 months the resources will become available to others.

Use additional Pages if needed

Name: _____ Date: _____

Company: _____ Tel. No.: _____

E-mail: _____ Requested completion date: _____

Door Number: _____

Resource Requested: _____

Information Required

Indicate what resource you wish to reserve (i.e. fiber, floor space, wall space) . Also include all relevant information like power requirements, BTU out put of equipment, environmental parameter requirements. Scale plans of exactly where you wish to reserve must also be provided

The OT Engineer(s) will evaluate your request for availability of resources. We may ask for additional information if needed for evaluation of request.

Applicant shall review Section 17.2.7 "Services" prior to request and agrees to all stipulations of the permit process

BELOW THIS LINE IF FOR OT USE ONLY

_____ _____ _____Yes _____No
Mr. Dwayne Abrams Date
PDS Administrator

_____ _____ _____Yes _____No
Mr. Robert C. Polkiewicz Date
Manager, Network Engineering

_____ _____ _____Yes _____No
Mr. Timothy A. Watson Date
Manager, Telecommunications

Effective Approval Date: _____

Expiration Date: _____

MAA CONFIDENTIALITY AND NON-DISCLOSURE AGREEMENT
SENSITIVE SECURITY INFORMATION
(For Construction Contract Bidders)

Date _____

_____ _____
Contract or Building Permit Number Contract or Building Permit Name

1. I, _____, an employee of

_____ ("Contractor"), under contract (the "Contract") with Maryland Aviation Administration (referred to herein as "MAA"), is executing the acceptance of its responsibilities for Airport Security at Baltimore/Washington International Thurgood Marshall Airport (referred to herein as "BWI Marshall") and Martin State Airport.

2. Pursuant to the Contractor's work for MAA under the Contract, the Contractor has and will request that MAA provide it with various documents or other records collectively, "documents".

3. I understand the following with respect to any documents, or information therein, that are provided by MAA to me, or which come into my possession pursuant to the Contractor's work for MAA:

A. These documents may be considered Sensitive Security Information ("SSI") under applicable Federal and State regulations;

B. These documents may be protected from disclosure under the Maryland Public Information Act;

C. These documents may be protected from disclosure under the Federal Freedom of Information Act;

D. These documents are considered by MAA to contain information that is vital to the security and safe operation of BWI Marshall Airport and Martin State Airport, whether or not these documents are otherwise classified by any other entity or law as containing such information;

E. These documents are considered by MAA to possibly contain information that is a trade secret.

MAA CONFIDENTIALITY AND NON-DISCLOSURE AGREEMENT
SENSITIVE SECURITY INFORMATION
(For Construction Contract Bidders)

4. I agree to comply with the requirements of Management of Sensitive Security Information (SSI) for MAA Projects and Building Permits at Baltimore/Washington International Thurgood Marshall Airport and Martin State Airport with respect to any SSI documents, or information therein, that are provided by MAA to me, developed by me or which come into my possession pursuant to the Contractor's work for MAA. In addition;

A. I will safeguard these documents and the information therein, to prevent inadvertent disclosure of them by keeping the documents under the control of authorized persons, when in use, and store the documents in a secure container, such as a locked desk, file cabinet or locked room when not in use; and

B. I will not release these documents, or the information therein, to any party, company, person, organization or entity for any reason that does not expressly serve the Contractor's obligations to MAA under its contract with MAA, as determined by the Contractor's employee with appropriate supervisory and decision-making authority; and

C. I will not reproduce any project plans or specifications containing SSI without the authorization of the applicable MAA Project Phase Manager; and

D. Should it become necessary to transmit project plans and/or specifications containing SSI, I will ensure that documents are protected to prevent inadvertent visual disclosure.

E. I will not release these documents, or the information therein, pursuant to a request under the Maryland Public Information Act or the Federal Freedom of Information Act without affording MAA the opportunities under those laws to protect these documents from disclosure; and

F. I will notify MAA if a request is made for these documents, or the information therein; and

G. I shall return these documents following the completion of the agreed upon bid period; and

H. Specifically with regard to SSI, I shall comply, and I shall ensure compliance by any subcontractors and subconsultants assisting or working with me on the preparation of a bid for this project, with the broadest possible interpretation of the federal and local regulations in handling SSI (49 CFR 1520), as amended; and

5. I understand that Failure to return all Plan and Specification sets fully intact, unauthorized reproduction or failure to comply with the requirements of this 'MAA

MAA CONFIDENTIALITY AND NON-DISCLOSURE AGREEMENT
SENSITIVE SECURITY INFORMATION
(For Construction Contract Bidders)

Confidentiality and Non-Disclosure Agreement – Sensitive Security Information' shall result in the forfeiture of my $6,000 deposit and may lead to civil penalties.

My signature below, I hereby affirm and agree to the matters set forth above.

Contractor:	Witnessed:
_____	_____
Signature	Signature
_____	_____
Print Name	Print Name
_____	MAA Project Phase Representative
Title	Title
_____	Maryland Aviation Administration
Company	

MAA CONFIDENTIALITY AND NON-DISCLOSURE AGREEMENT
SENSITIVE SECURITY INFORMATION
(For A/E's, CMI, Tenants and Sole Source Providers)

Date _____

_____ _____
Contract or Building Permit Number Contract or Building Permit Name

_____ _____
Task Number Task Description / Title

1. I, _____, an employee of

_____ ("Contractor"), under contract (the "Contract") with Maryland Aviation Administration (referred to herein as "MAA"), is executing the acceptance of its responsibilities for Airport Security at Baltimore/Washington International Thurgood Marshall Airport (referred to herein as "BWI Marshall") and Martin State Airport.

2. Pursuant to the Contractor's work for MAA under the Contract, the Contractor has and will request that MAA provide it with various documents or other records collectively, "documents".

3. I understand the following with respect to any documents, or information therein, that are provided by MAA to me, or which come into my possession pursuant to the Contractor's work for MAA:

A. These documents may be considered Sensitive Security Information ("SSI") under applicable Federal and State regulations;

B. These documents may be protected from disclosure under the Maryland Public Information Act;

C. These documents may be protected from disclosure under the Federal Freedom of Information Act;

D. These documents are considered by MAA to contain information that is vital to the security and safe operation of BWI Marshall Airport and Martin State Airport, whether or not these documents are otherwise classified by any other entity or law as containing such information;

E. These documents are considered by MAA to possibly contain information that is a trade secret.

4. I agree to comply with the requirements of Management of Sensitive Security Information (SSI) for MAA Projects and Building Permits at Baltimore/Washington International Thurgood Marshall Airport and Martin State Airport, (Design Standard No. 2010-03) with respect to any SSI documents, or information therein, that are provided by MAA to me, developed by me or which come into my possession pursuant to the Contractor's work for MAA. In addition:

A. I will safeguard these documents and the information therein, to prevent inadvertent disclosure of them by keeping the documents under the control of authorized persons, when in use, and store the documents in a secure container, such as a locked desk, file cabinet or locked room when not in use; and

B. I will not release these documents, or the information therein, to any party, company, person, organization or entity for any reason that does not expressly serve my obligations under my contract with MAA; and

C. I will not reproduce any project plans or specifications containing SSI without the authorization of the applicable MAA Project Phase Manager and/or Building Permit Manager; and

D. Should it become necessary to transmit project plans and/or specifications containing SSI, I will ensure that documents are protected to prevent inadvertent visual disclosure.

E. I will not release these documents, or the information therein, pursuant to a request under the Maryland Public Information Act or the Federal Freedom of Information Act without affording MAA the opportunities under those laws to protect these documents from disclosure; and

F. I will notify MAA if a request is made for these documents, or the information therein; and

G. I shall return these documents and any reproductions following the completion of the project or contract; and

H. Specifically with regard to SSI, I shall comply, and I shall ensure compliance by those subcontractors and subconsultants in my employ, with the broadest

possible interpretation of the federal and local regulations in handling SSI (49 CFR 1520), as amended; and

I. If I am a consultant who employs subconsultants, I shall ensure compliance by those in my employ with training, badging and handling requirements associated with SSI and the requirements of the MAA Design Standard for the Management of SSI including completion of a MAA Confidentiality And Non-Disclosure Agreement for each team member; and

J. I shall limit reproduction of this material to subcontractors or subconsultants and shall ensure the destruction of all SSI in accordance with Design Standard No. 2010-03.

5. I further understand that failure to comply with the requirements of this 'MAA Confidentiality and Non-Disclosure Agreement – Sensitive Security Information' may lead to civil penalties.

My signature below, I hereby affirm and agree to the matters set forth above.

Contractor:	Witnessed:
_____	_____
Signature	Signature
_____	_____
Print Name	Print Name
_____	MAA Project Phase Representative
Title	Title
_____	Maryland Aviation Administration
Company	

CONTRACTOR REPRESENTATIVE INFORMATION FORM

Insert Contract Title

Insert Contract No.

Date: _____

Name: _____

Social Security Number: _____

Date of Birth: _____

Drivers License: State: _____

Drivers License No.: _____

Company Name: _____

Telephone No.: _____

Facsimile No.: _____

Email Address: _____

I understand that by signing this form, I grant my consent to allow the Maryland Aviation Administration to perform a Transportation Security Administration (TSA) "No Fly List" Security Verification of my background for the purpose of granting limited SSI privileges unto me. I further consent to comply with the requirements of 49 CFR 1520 and I understand and acknowledge that my failure to comply with the requirements of 49 CFR 1520 could result in civil penalties.

_____

Signature

_____

Print Name

Contract Number:
Project Title:
Airport:

Maintenance, Repair and Operating Items List

Serial Number	Specification Section	Material/Product and Description	Quantity	Units	Unit Price Value (completed by Contractor)	Total Value (completed by Contractor)	Date Delivered (completed by Contractor)

Contract Number:
Project Title:
Airport:

Maintenance, Repair and Operating Items List Approval

Serial Number	Specification Section	Material/Product and Description	Quantity	Units

MAA Representative

Signature: _____ Date: _____
Office of Procurement

Signature: _____ Date: _____
Office of Maintenance and Utilities

Signature: _____ Date: _____
Office of Technology

Signature: _____ Date: _____
Office of Capital Programs

Signature: _____ Date: _____
Office of Design and Construction

Procedures for Delivery of MROI (Maintenance, Repair and Operations Inventory), including Attic Stock, Surplus Materials, Spare Parts, Etc. To the MAA

1. All materials shall be delivered to the MAA Warehouse in the MAC Building, unless the contract specifically requires otherwise. All deliveries shall be coordinated ahead of time with

Phoebe Yost
MAA Procurement
410-859-7001 office
410-859-7323 fax
PYost@bwiairport.com.

2. The contractor shall complete one **Record of Delivery** form (top part only) for each material to be delivered, and submit the form(s) to the Resident Engineer. The contractor may attach internal delivery tickets, transmittals, etc. to the forms.

3. The Resident Engineer will complete the bottom line of the form(s) ("Place where materials would be installed") and fax or email the completed form(s) and attachments to Phoebe Yost and request a delivery date. The "place where materials would be installed" is the location where the materials would ultimately be installed and the person who would need to install them. If you are unsure of this, ask Resident Engineer for clarification. If Phoebe determines that any portion of a form is incomplete or unclear, she may decline to set a delivery date until additional information is provided.

4. When a delivery date is set, the Resident Engineer will direct the contractor to deliver the materials.

5. The Resident Engineer must be present when the materials are delivered. If everything is found to be in order, the Resident Engineer and Phoebe or her designated representative will sign and date each **Record of Delivery** form. The Resident Engineer will make a copy of each signed and dated form, place a copy in the contract files, and email a copy to Alex Noorani, Manager, Division of Construction. If anything is not found to be in order, the Resident Engineer will not sign the form for that material.

RECORD OF DELIVERY

TO MAA MATERIALS MANAGEMENT WAREHOUSE
7005 AVIATION BOULEVARD, GLEN BURNIE, MD 21061

Complete one form for each material to be delivered to the MAA.

Contractor_____ Date_____

Contract Name_____ MAA Contract Number_____

Description of material (If known, include the name of product, manufacturer, product line, part number, model, color or other detailed description)
Type of material (For example: spare part, surplus material, salvaged material, supply, or other)
Required by (For example: specification section, note on plans, DCL, RFI, AWO, or other contract reference)
Quantity (For example: number of items, number of boxes and number of items per box, linear feet, square feet, gallons) **Delivered:** **Specified:** **Explanation of difference:**
Price (For example: invoice, vendor's quote, manufacturer's suggested retail, or other price)

Return the completed form(s) to the Resident Engineer to schedule delivery. Attach any transmittals or tickets.

RECEIVED BY THE RESIDENT ENGINEER:

_____ _____
Signature Date

_____
Printed Name

RECEIVED BY MAA:

_____ _____
Signature Date

_____
Printed Name

Place where materials would be installed _____
Location **MAA contact for installation**

Appendix 3. Safety and Phasing Plan Checklist

This appendix is keyed to Section 2. Plan Requirements. In the electronic version of this AC, clicking on the paragraph designation in the Reference column will access the applicable paragraph. There may be instances where the CSPP requires provisions that are not covered by the list in this appendix.

This checklist is intended as an aid, not as a required submittal.

Coordination	Reference	Addressed			Remarks
General Considerations					
Requirements for predesign, prebid, and preconstruction conferences to introduce the subject of airport operational safety during construction are specified.	205	☐ Yes	☐ No	☐ NA	
Operational safety is a standing agenda item for construction progress meetings.	205	☐ Yes	☐ No	☐ NA	
Scheduling of the construction phases is properly addressed.	206	☐ Yes	☐ No	☐ NA	
Areas and Operations Affected by Construction Activity					
Drawings showing affected areas are included.	207.a	☐ Yes	☐ No	☐ NA	
Closed or partially closed runways, taxiways, and aprons are depicted on drawings.	207.a(1)	☐ Yes	☐ No	☐ NA	
Access routes used by ARFF vehicles affected by the project are addressed.	207.a(2)	☐ Yes	☐ No	☐ NA	
Access routes used by airport and airline support vehicles affected by the project are addressed.	207.a(3)	☐ Yes	☐ No	☐ NA	
Underground utilities, including water supplies for fire fighting and drainage.	207.a(4)	☐ Yes	☐ No	☐ NA	
Approach/departure surfaces affected by heights of temporary objects are addressed.	207.a(5)	☐ Yes	☐ No	☐ NA	
Construction areas, storage areas, and access routes near runways, taxiways, aprons, or helipads are properly depicted on drawings.	207.a	☐ Yes	☐ No	☐ NA	
Temporary changes to taxi operations are addressed.	207.b(1)	☐ Yes	☐ No	☐ NA	

Coordination	Reference	Addressed			Remarks
Detours for ARFF and other airport vehicles are identified.	207.b(2)	☐ Yes	☐ No	☐ NA	
Maintenance of essential utilities and underground infrastructure is addressed.	207.b(3)	☐ Yes	☐ No	☐ NA	
Temporary changes to air traffic control procedures are addressed.	207.b(4)	☐ Yes	☐ No	☐ NA	
NAVAIDS					
Critical areas for NAVAIDs are depicted on drawings.	208	☐ Yes	☐ No	☐ NA	
Effects of construction activity on the performance of NAVAIDS, including unanticipated power outages, are addressed.	208	☐ Yes	☐ No	☐ NA	
Protection of NAVAID facilities is addressed.	208	☐ Yes	☐ No	☐ NA	
The required distance and direction from each NAVAID to any construction activity is depicted on drawings.	208	☐ Yes	☐ No	☐ NA	
Procedures for coordination with FAA ATO/Technical Operations, including identification of points of contact, are included.	208, 213.a, 213.e(3)(a), 218.a	☐ Yes	☐ No	☐ NA	
Contractor Access					
The CSPP addresses areas to which contractor will have access and how the areas will be accessed.	209	☐ Yes	☐ No	☐ NA	
The application of 49 CFR Part 1542 Airport Security, where appropriate, is addressed.	209	☐ Yes	☐ No	☐ NA	
The location of stockpiled construction materials is depicted on drawings.	209.a	☐ Yes	☐ No	☐ NA	
The requirement for stockpiles in the ROFA to be approved by FAA is included.	209.a	☐ Yes	☐ No	☐ NA	
Requirements for proper stockpiling of materials are included.	209.a	☐ Yes	☐ No	☐ NA	

Coordination	Reference	Addressed			Remarks
Construction site parking is addressed.	209.b(1)	☐ Yes	☐ No	☐ NA	
Construction equipment parking is addressed.	209.b(2)	☐ Yes	☐ No	☐ NA	
Access and haul roads are addressed.	209.b(3)	☐ Yes	☐ No	☐ NA	
A requirement for marking and lighting of vehicles to comply with AC 150/5210-5, Painting, Marking and Lighting of Vehicles Used on an Airport, is included.	209.b(4)	☐ Yes	☐ No	☐ NA	
Proper vehicle operations, including requirements for escorts, are described.	209.b(5), 209.b(6)	☐ Yes	☐ No	☐ NA	
Training requirements for vehicle drivers are addressed.	209.b(7)	☐ Yes	☐ No	☐ NA	
Two-way radio communications procedures are described.	209.b(9)	☐ Yes	☐ No	☐ NA	
Maintenance of the secured area of the airport is addressed.	209.b(10)	☐ Yes	☐ No	☐ NA	
Wildlife Management					
The airport operator's wildlife management procedures are addressed.	210	☐ Yes	☐ No	☐ NA	
Foreign Object Debris Management					
The airport operator's FOD management procedures are addressed.	211	☐ Yes	☐ No	☐ NA	
Hazardous Materials Management					
The airport operator's hazardous materials management procedures are addressed.	212	☐ Yes	☐ No	☐ NA	
Notification of Construction Activities					
Procedures for the immediate notification of airport user and local FAA of any conditions adversely affecting the operational safety of the airport are detailed.	213	☐ Yes	☐ No	☐ NA	

Coordination	Reference	Addressed			Remarks
Maintenance of a list by the airport operator of the responsible representatives/points of contact for all involved parties and procedures for contacting them 24 hours a day, seven days a week is specified.	213.a	☐ Yes	☐ No	☐ NA	
A list of local ATO/Technical Operations personnel is included.	213.a	☐ Yes	☐ No	☐ NA	
A list of ATCT managers on duty is included.	213.a	☐ Yes	☐ No	☐ NA	
A list of authorized representatives to the OCC is included.	213.b	☐ Yes	☐ No	☐ NA	
Procedures for coordinating, issuing, maintaining and cancelling by the airport operator of NOTAMS about airport conditions resulting from construction are included.	208, 213.b, 218.b(4)(i)	☐ Yes	☐ No	☐ NA	
Provision of information on closed or hazardous conditions on airport movement areas by the airport operator to the OCC is specified.	213.b	☐ Yes	☐ No	☐ NA	
Emergency notification procedures for medical, fire fighting, and police response are addressed.	213.c	☐ Yes	☐ No	☐ NA	
Coordination with ARFF personnel for non-emergency issues is addressed.	213.d	☐ Yes	☐ No	☐ NA	
Notification to the FAA under 14 CFR parts 77 and 157 is addressed.	213.e	☐ Yes	☐ No	☐ NA	
Reimbursable agreements for flight checks and/or design and construction for FAA owned NAVAIDs are addressed.	213.e(3)(b)	☐ Yes	☐ No	☐ NA	
Inspection Requirements					
Daily inspections by both the airport operator and contractor are specified.	214.a	☐ Yes	☐ No	☐ NA	
Final inspections at certificated airports are specified when required.	214.b	☐ Yes	☐ No	☐ NA	
Underground Utilities					
Procedures for protecting existing underground facilities in excavation areas are described.	215	☐ Yes	☐ No	☐ NA	

Coordination	Reference	Addressed			Remarks
Penalties					
Penalty provisions for noncompliance with airport rules and regulations and the safety plans are detailed.	216	☐ Yes	☐ No	☐ NA	
Special Conditions					
Any special conditions that affect the operation of the airport or require the activation of any special procedures are addressed.	217	☐ Yes	☐ No	☐ NA	
Runway and Taxiway Visual Aids - Marking, Lighting, Signs, and Visual NAVAIDs					
The proper securing of temporary airport markings, lighting, signs, and visual NAVAIDs is addressed.	218.a	☐ Yes	☐ No	☐ NA	
Frangibility of airport markings, lighting, signs, and visual NAVAIDs is specified.	218.a, 218.c, 219, 220.b(4)	☐ Yes	☐ No	☐ NA	
The requirement for markings to be in compliance with AC 150/5340-1, Standards for Airport Markings is specified.	218.b	☐ Yes	☐ No	☐ NA	
The requirement for lighting to conform to AC 150/5340-30, Design and Installation Details for Airport Visual Aids, AC 150/5345-50, Specification for Portable Runway and Taxiway Lights , and AC 150/5345-53 Airport Lighting Certification Program, is specified.	218.b(1)(f)	☐ Yes	☐ No	☐ NA	
The use of a lighted X is specified where appropriate.	218.b(1)(b), 218.b(3)	☐ Yes	☐ No	☐ NA	
The requirement for signs to conform to AC 150/5345-44, Specification for Runway and Taxiway Signs, AC 50/5340-18, Standards for Airport Sign Systems, and AC 150/5345-53, Airport Lighting Certification Program, is specified.	218.c	☐ Yes	☐ No	☐ NA	
Marking and Signs For Access Routes					
The CSPP specifies that pavement markings and signs intended for construction personnel should conform to AC 150/5340-18 and, to the extent practicable, with the MUTCD and/or State highway specifications.	219	☐ Yes	☐ No	☐ NA	
Hazard Marking and Lighting					
Prominent, comprehensible warning indicators for any area affected by construction that is normally accessible to aircraft, personnel, or vehicles are specified.	220.a	☐ Yes	☐ No	☐ NA	

Coordination	Reference	Addressed			Remarks
Hazard marking and lighting are specified to identify open manholes, small areas under repair, stockpiled material, and waste areas.	220.a	☐ Yes	☐ No	☐ NA	
The CSPP considers less obvious construction-related hazards.	220.a	☐ Yes	☐ No	☐ NA	
Equipment that poses the least danger to aircraft but is sturdy enough to remain in place when subjected to typical winds, prop wash and jet blast is specified.	220.b(1)	☐ Yes	☐ No	☐ NA	
The spacing of barricades is specified such that a breach is physically prevented barring a deliberate act.	220.b(1)	☐ Yes	☐ No	☐ NA	
Red lights meeting the luminance requirements of the State Highway Department are specified.	220.b(2)	☐ Yes	☐ No	☐ NA	
Barricades, temporary markers, and other objects placed and left in areas adjacent to any open runway, taxiway, taxi lane, or apron are specified to be as low as possible to the ground, and no more than 18 in high.	220.b(4)	☐ Yes	☐ No	☐ NA	
Barricades marked with diagonal, alternating orange and white stripes are specified to indicate construction locations in which no part of an aircraft may enter.	220.b(4)	☐ Yes	☐ No	☐ NA	
Highly reflective barriers with lights are specified to barricade taxiways leading to closed runways.	220.b(5)	☐ Yes	☐ No	☐ NA	
Markings for temporary closures are specified.	220.b(5)	☐ Yes	☐ No	☐ NA	
The provision of a contractor's representative on call 24 hours a day for emergency maintenance of airport hazard lighting and barricades is specified.	220.b(7)	☐ Yes	☐ No	☐ NA	
Protection of Runway and Taxiway Safety Areas					
The CSPP clearly states that no construction may occur within a safety area while the associated runway or taxiway is open for aircraft operations.	221.a(1), 221.c(1)	☐ Yes	☐ No	☐ NA	
The CSPP specifies that the airport operator coordinates the adjustment of RSA or TSA dimensions with the ATCT and the appropriate FAA Airports Regional or District Office and issues a local NOTAM.	221.a(2), 221.c(2)	☐ Yes	☐ No	☐ NA	

Coordination	Reference	Addressed			Remarks
Procedures for ensuring adequate distance for protection from blasting operations, if required by operational considerations, are detailed.	221.c(3)	☐ Yes	☐ No	☐ NA	
The CSPP specifies that open trenches or excavations are not permitted within a safety area while the associated runway or taxiway is open.	221.a(4)	☐ Yes	☐ No	☐ NA	
Appropriate covering of excavations in the RSA or TSA that cannot be backfilled before the associated runway or taxiway is open is detailed.	221.a(4)	☐ Yes	☐ No	☐ NA	
The CSPP includes provisions for prominent marking of open trenches and excavations at the construction site.	221.a(4)	☐ Yes	☐ No	☐ NA	
Grading and soil erosion control to maintain RSA/TSA standards are addressed.	221.c(5)	☐ Yes	☐ No	☐ NA	
The CSPP specifies that equipment is to be removed from the ROFA when not in use.	221.b	☐ Yes	☐ No	☐ NA	
The CSPP clearly states that no construction may occur within a taxiway safety area while the taxiway is open for aircraft operations.	221.c	☐ Yes	☐ No	☐ NA	
Appropriate details are specified for any construction work to be accomplished in a taxiway object free area.	221.d	☐ Yes	☐ No	☐ NA	
Measures to ensure that personnel, material, and/or equipment do not penetrate the OFZ or threshold siting surfaces while the runway is open for aircraft operations are included.	221.e	☐ Yes	☐ No	☐ NA	
Provisions for protection of runway approach/departure areas and clearways are included.	221.f	☐ Yes	☐ No	☐ NA	
Other Limitations on Construction					
The CSPP prohibits the use of open flame welding or torches unless adequate fire safety precautions are provided and the airport operator has approved their use.	222.a(2)	☐ Yes	☐ No	☐ NA	
The CSPP prohibits the use of flare pots within the AOA at any time.	222.a(4)	☐ Yes	☐ No	☐ NA	
The CSPP prohibits the use of electrical blasting caps on or within 1,000 ft (300 m) of the airport property.	222.a(3)	☐ Yes	☐ No	☐ NA	

APPENDIX C

MAA STANDARD CONTRACT DRAWINGS

MARTIN STATE AIRPORT

BWI BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

MAA Standard Contract Drawings

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

MARTIN STATE AIRPORT

BWI BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

GENERAL CONSTRUCTION NOTES

1. THIS PROJECT IS FOR WORK AT BALTIMORE/WASHINGTON INTERNATIONAL THURGOOD MARSHALL AIRPORT, HEREAFTER REFERRED TO AS 'THE AIRPORT' OR 'BWI'.

2. THIS PROJECT SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE CONTRACT PLANS AND SPECIFICATIONS AND ANY RULES, REGULATIONS, STANDARDS, OR SPECIFICATIONS REFERENCED THEREIN. THE PROJECT IS SUBJECT TO INSPECTION BY REPRESENTATIVES OF THE MARYLAND AVIATION ADMINISTRATION (MAA), THE FEDERAL AVIATION ADMINISTRATION (FAA), AND OTHER GOVERNING AGENCIES.

3. PROJECT PHASING – THE PROJECT IS TO BE COMPLETED IN CLOSE CONFORMANCE WITH THE PHASING PLANS AND NOTES AS CONTAINED IN THE CONTRACT DOCUMENTS. CHANGES TO THE PHASING PLANS SHALL BE COORDINATED WITH THE ENGINEER AND REVIEWED WITH THE DESIGNER PRIOR TO IMPLEMENTATION.

4. PROJECT COMPLETION TIMES – THE CONTRACTOR IS EXPECTED TO COMPLETE CRITICAL PORTIONS OF THE PROJECT WITHIN THE SPECIFIED TIMEFRAMES AND TO COMPLETE THE ENTIRE PROJECT ON TIME. LIQUIDATED DAMAGES WILL BE ASSESSED SHOULD THE TIMEFRAME BE EXCEEDED.

5. CONSTRUCTION LIMITS – ALL CONTRACTOR VEHICLES SHALL REMAIN WITHIN THE DESIGNATED CONSTRUCTION LIMITS OR HAUL ROUTES (UNLESS OTHERWISE AUTHORIZED).

6. DIMENSIONS IDENTIFIED ON THE PLANS SHALL BE VERIFIED IN THE FIELD. IN GENERAL, SMALL-SCALE DRAWINGS WITH GREATER RESOLUTION (I.E. 1"=50') GOVERN OVER LARGER SCALE DRAWINGS OF LESS RESOLUTION (I.E. 1"=500'), WRITTEN NOTES GOVERN OVER GRAPHIC REPRESENTATION AND SPECIFICATIONS GOVERN OVER DRAWINGS. ANY DISCREPANCIES SHALL BE REPORTED TO THE ENGINEER FOR CLARIFICATION.

7. THE CONTRACTOR SHALL PROVIDE COLLAPSIBLE BARRICADES MARKED WITH DIAGONAL ALTERNATING ORANGE AND WHITE STRIPES, AND WITH FLASHING RED LIGHTS, AS SHOWN ON THE DRAWINGS TO DELINEATE THE WORK AREAS WHEN CLOSED TO AIRPORT TRAFFIC. ALL BARRICADES PLACED ADJACENT TO AN OPEN RUNWAY, TAXIWAY, OR TAXILANE MUST BE AS LOW AS POSSIBLE TO THE GROUND, OF LOW MASS, EASILY COLLAPSIBLE UPON IMPACT WITH AN AIRCRAFT, AND WEIGHTED OR STURDILY ATTACHED TO THE SURFACE TO PREVENT DISPLACEMENTS FROM PROP WASH, JET BLAST, WING VORTEX, OR OTHER SURFACE WIND CURRENTS. IF AFFIXED TO THE SURFACE, THE BARRICADES MUST BE FRANGIBLE AT GRADE LEVEL OR AS LOW AS POSSIBLE, BUT NO GREATER THAN THREE INCHES ABOVE THE GROUND.

8. OPEN TRENCHES, EXCAVATIONS, AND STOCKPILED MATERIAL LOCATED IN THE AIR OPERATIONS AREA (AOA) (I.E., THE SECURE PORTION OF THE AIRPORT) SHALL BE PROMINENTLY MARKED WITH ORANGE FLAGS AND LIGHTED BY APPROVED LIGHT UNITS DURING HOURS OF LIMITED VISIBILITY AND DARKNESS. THE CONTRACTOR SHALL CONTINUOUSLY MAINTAIN LIGHTS IN OPERATING CONDITION AND REPLACE BATTERIES, BULBS, ETC. AS NEEDED SO THAT THEY MAY ALWAYS BE LIGHTED IN HOURS OF DARKNESS.

9. EXISTING TOPOGRAPHIC FIELD SURVEYS WERE PROVIDED BY SURVEYORS NAME AND DATE. THE CONTROL ON THIS PROJECT IS TIED TO THE NAD 83/2007 HORIZONTAL DATUM AND NAVD 88 VERTICAL DATUM. SURVEY UNITS SHALL BE IN U.S. SURVEY FOOT. PROJECT BENCHMARKS ARE SHOWN ON THE GENERAL PROJECT LAYOUT.

10. EXISTING AIRFIELD LIGHTING SYSTEMS – INTERRUPTION OF EXISTING AIRFIELD LIGHTING SYSTEMS NOT IDENTIFIED ON THE CONSTRUCTION DOCUMENTS SHALL NOT BE PERMITTED. ALL AIRFIELD LIGHTING CIRCUITS AFFECTED BY THIS PROJECT SHALL BE TEMPORARILY MAINTAINED BY THE CONTRACTOR DURING OPERATIONAL PERIODS.

11. THE CONTRACTOR SHALL PROVIDE AN ADEQUATE NUMBER OF WATER TRUCKS TO CONTROL DUST IN THE PROJECT WORK AREA, STAGING AREA, STORAGE AREAS, HAUL ROUTES AND THE WASTE SITE.

12. ALL THE PERMITS AND LICENSES REQUIRED FOR THE PROJECT WORK SHALL BE OBTAINED AT THE CONTRACTOR'S EXPENSE.

13. IN ACCORDANCE WITH THE SPECIFICATIONS, FEDERAL WAGE RATES SHALL BE POSTED OUTSIDE THE SITE FIELD OFFICE(S) IN A WEATHERPROOF ENCLOSURE. [FOR FEDERALLY FUNDED PROJECTS ONLY]

14. ALL CONSTRUCTION EQUIPMENT SHALL BE MARKED/LIGHTED IN ACCORDANCE WITH ADVISORY CIRCULAR 70/7460-1K, "OBSTRUCTION MARKING AND LIGHTING".

GENERAL AIRFIELD SAFETY DURING CONSTRUCTION

1. THE CONTRACTOR SHALL ACQUAINT SUPERVISORS AND EMPLOYEES WITH ACTIVITY AND OPERATIONS THAT ARE INHERENT TO THE AIRPORT AND SHALL CONDUCT CONSTRUCTION ACTIVITIES TO CONFORM TO ALL ROUTINE AND EMERGENCY AIR TRAFFIC REQUIREMENTS AND GUIDELINES FOR SAFETY SPECIFIED HEREIN.

2. THE CONTRACTOR AND HIS/HER SUBCONTRACTOR(S) SHALL PROTECT WORKERS, MAA AND AIRPORT TENANT EMPLOYEES, AND THE GENERAL PUBLIC. THE CONTRACTOR SHALL ALSO ENSURE THAT PROPERTY OR EQUIPMENT, UNRELATED TO WORK, WHICH BELONGS TO MAA OR AIRPORT TENANTS IS NOT DAMAGED DURING CONSTRUCTION.

3. THE CONTRACTOR SHALL NOT ALLOW EMPLOYEES, SUBCONTRACTORS, SUPPLIERS, OR ANY OTHER UNAUTHORIZED PERSON TO ENTER OR REMAIN IN ANY AIRPORT AREA WHICH WOULD BE HAZARDOUS TO PERSONS OR TO AIRCRAFT OPERATIONS.

4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ALL NECESSARY PROTECTIVE GEAR AND EQUIPMENT REQUIRED FOR THE PROTECTION OF THE CONTRACTOR'S PERSONNEL DURING CONSTRUCTION.

5. DURING PERFORMANCE OF THIS CONTRACT, THE AIRPORT RUNWAYS, TAXIWAYS, AND AIRCRAFT PARKING APRONS SHALL REMAIN IN USE BY AIRCRAFT TO THE MAXIMUM EXTENT POSSIBLE. ALL AIRCRAFT TRAFFIC ON THESE SURFACES SHALL HAVE PRIORITY OVER CONTRACTOR'S TRAFFIC. WHILE USE OF AREAS NEAR THE CONTRACTOR'S WORK MAY BE CONTROLLED TO MINIMIZE DISTURBANCE TO THE CONTRACTOR'S OPERATION, THE OWNER RESERVES THE RIGHT TO ORDER THE CONTRACTOR, AT ANY TIME, TO VACATE ANY AREA NECESSARY TO MAINTAIN SAFE AIRCRAFT OPERATIONS.

6. ALL WORK TO BE PERFORMED WITHIN CERTAIN LIMITS OF AN ACTIVE RUNWAY, TAXIWAY, OR APRON UNDER OPERATIONAL CONDITIONS SHALL BE PERFORMED WHEN THE RUNWAY, TAXIWAY OR APRON IS NOT IN USE. SUCH WORK SHALL ONLY BE ACCOMPLISHED WITH PRIOR PERMISSION FROM THE ENGINEER AND MAA OPERATIONS. REFER TO **PROJECT COORDINATION** SECTION OF THESE NOTES FOR ADDITIONAL INFORMATION ON COORDINATING CLOSURES.

7. THE CONTRACTOR SHALL INSPECT ALL CONSTRUCTION AND STORAGE AREAS AS OFTEN AS NECESSARY AND PROMPTLY TAKE ALL STEPS NECESSARY TO PREVENT OR REMEDY ANY UNSAFE OR POTENTIALLY UNSAFE CONDITIONS OR ACTIVITIES DISCOVERED.

8. THE CONTRACTOR SHALL BE AWARE OF THE FOLLOWING TYPES OF SAFETY PROBLEMS AND/OR HAZARDS:

   a. TRENCHES, HOLES, OR EXCAVATION ON OR ADJACENT TO ANY OPEN RUNWAY OR IN SAFETY AREAS.

   b. PAVEMENT DROP-OFFS OR PAVEMENT TURF-LIPS GREATER THAN 1½ INCHES WHETHER PERMANENT OR TEMPORARY.

   c. UNMARKED/UNLIGHTED HOLES OR EXCAVATION IN ANY APRON, OPEN TAXIWAY, OPEN TAXILANE, OR RELATED SAFETY AREA.

   d. MOUNDS OR PILES OF EARTH, CONSTRUCTION MATERIALS, TEMPORARY STRUCTURES, OR OTHER OBJECTS IN THE VICINITY OF ANY OPEN RUNWAY, TAXIWAY, TAXILANE, OR IN A RELATED SAFETY AREA, APPROACH, OR DEPARTURE AREA.

   e. VEHICLES OR EQUIPMENT, WHETHER OPERATING OR IDLE, ON ANY OPEN RUNWAY, TAXIWAY, TAXILANE, OR IN ANY RELATED SAFETY AREA, APPROACH, OR DEPARTURE AREA.

   f. VEHICLES, EQUIPMENT, EXCAVATION, STOCKPILES, OR OTHER MATERIALS WHICH COULD DEGRADE OR OTHERWISE INTERFERE WITH ELECTRONIC SIGNALS FROM RADIOS OR ELECTRONIC NAVIGATIONAL AIDS (NAVAIDS).

   g. UNMARKED UTILITY, NAVAID, WEATHER SERVICE, RUNWAY LIGHTING, OR OTHER POWER OR SIGNAL CABLES THAT COULD BE DAMAGED DURING CONSTRUCTION.

   h. OBJECTS, WHETHER OR NOT MARKED OR FLAGGED, OR ACTIVITIES ANYWHERE ON OR IN THE VICINITY OF THE AIRPORT WHICH COULD BE DISTRACTING, CONFUSING, OR ALARMING TO PILOTS DURING AIRCRAFT OPERATIONS.

   i. UNFLAGGED/UNLIGHTED LOW VISIBILITY ITEMS SUCH AS TALL CRANES, DRILLS, ETC. ANYWHERE IN THE VICINITY OF ACTIVE RUNWAYS OR IN ANY APPROACH OR DEPARTURE AREA. SUCH EQUIPMENT SHALL BE PARKED IN THE CONTRACTOR'S STAGING AREA AND THE BOOM(S) LOWERED TO THE GROUND WHEN NOT IN USE.

   j. MISLEADING OR MALFUNCTIONING LIGHTS OR UNLIGHTED/UNMARKED OBSTRUCTIONS IN THE APPROACH TO ANY ACTIVE RUNWAY.

   k. INADEQUATE APPROACH OR DEPARTURE SURFACES (THESE SURFACES ARE NEEDED TO ASSURE ADEQUATE LANDING OR TAKEOFF CLEARANCE OVER OBSTRUCTIONS, INCLUDING THE CONTRACTOR'S WORK AND STORAGE AREAS).

   l. MARKING AND LIGHTING OF RUNWAYS, TAXIWAYS OR TAXILANES THAT COULD BE CONFUSING OR MISLEADING TO PILOTS, INCLUDING IMPROPERLY MARKED DISPLACED OR RELOCATED THRESHOLDS.

   m. INADEQUATE OR IMPROPER METHODS OF MARKING, BARRICADING, AND LIGHTING OF TEMPORARILY CLOSED PORTIONS OF THE AIRPORT AOA.

   n. WATER, SNOW, DIRT, DEBRIS, OR OTHER TRANSIENT ACCUMULATION WHICH TEMPORARILY OBSCURES PAVEMENT MARKINGS OR PAVEMENT EDGES, OR DIMINISHES THE VISIBILITY OF RUNWAY OR TAXIWAY LIGHTING.

   o. BIRD ATTRACTANTS SUCH AS EDIBLES (FOOD SCRAPS, ETC.), MISCELLANEOUS TRASH, OR PONDED WATER. FOOD SCRAPS AND MISCELLANEOUS TRASH SHALL BE SECURED BY THE CONTRACTOR AND DISPOSED OF USING PROPER SANITARY METHODS.

   p. FOREIGN OBJECT DEBRIS:

      i. DEBRIS, WASTE, LOOSE MATERIAL (INCLUDING DUST AND DIRT), TRASH OR OTHER MATERIALS WHETHER ON RUNWAYS, TAXIWAYS, APRONS, OR IN RELATED SAFETY AREAS IS CONSIDERED FOREIGN OBJECT DEBRIS AND PRESENTS THE POTENTIAL FOR DAMAGE TO AIRCRAFT. SUCH MATERIAL SHALL NOT BE ALLOWED ON ANY AIRCRAFT MOVEMENT AREAS (REGARDLESS OF WHETHER THE AREA IS OPEN OR CLOSED) OR ADJACENT GRASSED AREAS. ANY DEBRIS (WHETHER CAUSED BY THE CONTRACTOR OR NOT) OBSERVED TO BE WITHIN THESE AREAS SHALL BE REMOVED IMMEDIATELY AND CONTINUOUSLY BY THE CONTRACTOR.

      ii. THE CONTRACTOR SHALL BE REQUIRED TO HAVE A VACUUM SWEEPER WITH PLASTIC BRUSHES (NOT STEEL) AND OPERATOR ON SITE AND READY AT ALL TIMES DURING CONSTRUCTION ACTIVITY.

      iii. WHERE TRAVEL ON OR ACROSS RUNWAYS, RAMP AREAS, TAXIWAYS, OR AIRCRAFT APRONS IS REQUIRED, THE CONTRACTOR SHALL PROVIDE ADEQUATE PERSONNEL AND EQUIPMENT TO KEEP SUCH SURFACES CLEAR OF DEBRIS.

      iv. ALL MATERIALS THAT COULD BLOW ACROSS ANY PAVEMENTS SHALL BE SECURED BY THE CONTRACTOR AND DISPOSED OF USING PROPER SANITARY METHODS.

   q. INADEQUATE BARRICADING OR OTHER MARKING WHICH IS PLACED TO SEPARATE CONSTRUCTION OR MAINTENANCE AREAS FROM OPEN AIRCRAFT OPERATING AREAS.

   r. FAILURE TO CONTROL UNAUTHORIZED VEHICLE AND HUMAN ACCESS THROUGH ACTIVE AIRCRAFT OPERATING AREAS. REFER TO **VEHICLE ACCESS, RADIO COMMUNICATIONS, AND SECURITY REQUIREMENTS** SECTION OF THESE NOTES FOR MORE INFORMATION.

   s. FAILURE TO MAINTAIN RADIO COMMUNICATION BETWEEN CONSTRUCTION AND MAINTENANCE VEHICLES AND ATCT. REFER TO **VEHICLE ACCESS, RADIO COMMUNICATIONS, AND SECURITY REQUIREMENTS** SECTION OF THESE NOTES FOR MORE INFORMATION.

   t. CONSTRUCTION AND MAINTENANCE ACTIVITIES OR MATERIALS WHICH COULD HAMPER THE RESPONSE OF AIRCRAFT RESCUE AND FIRE FIGHTING EQUIPMENT FROM REACHING AIRCRAFT, ALL OR ANY PART OF THE RUNWAY/TAXIWAY SYSTEM, RUNWAY APPROACH AND DEPARTURE AREAS, AND AIRCRAFT PARKING LOCATIONS.

9. FOR RUNWAY CLOSURES, THE CONTRACTOR MAY OBTAIN LIGHTED X'S FROM MAA FIELD MAINTENANCE.

SITE ACCESS, CONTRACTOR STAGING, HAUL ROUTES, AND MATERIAL STORAGE

1. ACCESS TO THE SITE – THE CONTRACTOR'S ACCESS POINTS TO THE SITE SHALL BE AS SHOWN ON THE SECURITY BID PLAN. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL VEHICLES AND PERSONNEL WHO ENTER THE AIRPORT THROUGH THESE ACCESS POINTS. THE CONTRACTOR IS RESPONSIBLE FOR TRANSPORTING EMPLOYEES TO AND FROM THE JOB SITE. PERSONAL VEHICLES SHALL NOT BE PARKED ANYWHERE WITHIN THE AIRPORT OPERATIONS AREA. REFER TO **VEHICLE ACCESS, RADIO COMMUNICATIONS, AND SECURITY REQUIREMENTS** SECTION OF THESE NOTES FOR ADDITIONAL INFORMATION.

2. ALL OFF-SITE HAUL ROUTES SHALL BE SELECTED TO MINIMIZE DISTURBANCE TO THE PUBLIC. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO COORDINATE OFF-SITE HAUL ROUTES (STATE HIGHWAYS, COUNTY ROADS, OR CITY STREETS) WITH THE APPROPRIATE OWNER WHO HAS JURISDICTION OVER THE AFFECTED ROUTE. THE CONTRACTOR'S ON-AIRPORT HAUL ROUTES ARE INDICATED ON THE SECURITY BID PLAN. THESE SHALL BE EXISTING HAUL ROADS, WHERE AVAILABLE, OR ALONG TAXIWAY/TAXILANE PAVEMENTS UNLESS OTHERWISE INDICATED IN THE CONTRACT DRAWINGS.

3. ON-SITE ROADS AND OTHER AIRFIELD PAVEMENTS USED AS HAUL ROUTES SHALL BE MAINTAINED BY THE CONTRACTOR AND SHALL BE RESTORED AT THE CONTRACTOR'S EXPENSE TO THEIR ORIGINAL CONDITION UPON COMPLETION OF BEING USED AS A HAUL ROUTE, UNLESS OTHERWISE DIRECTED BY THE CONTRACT DOCUMENTS OR BY THE ENGINEER. THE BEFORE AND AFTER CONDITION OF ALL ON-SITE HAUL ROUTES (TEMPORARY OR PERMANENT) SHALL BE JOINTLY INSPECTED AND DETERMINED BY THE CONTRACTOR AND THE ENGINEER THROUGH THE USE OF DIGITAL PHOTOGRAPHY AND/OR VIDEO. THE CONTRACTOR MAY NEED TO COORDINATE HAUL ROUTE USAGE WITH OTHER CONTRACTORS WORKING ON THE AIRPORT.

4. FENCING, DRAINAGE, GRADING AND OTHER MISCELLANEOUS CONSTRUCTION REQUIRED TO CONSTRUCT OR RESTORE TEMPORARY OR PERMANENT HAUL ROUTES OR ACCESS POINTS ON THE AIRPORT WILL BE THE CONTRACTOR'S RESPONSIBILITY AND SHALL BE APPROVED BY THE ENGINEER PRIOR TO COMMENCING THE WORK.

5. ALL ON-SITE ACCESS ROADS TO AIRPORT FACILITIES SHALL REMAIN OPEN AND MAINTAINED AT ALL TIMES.

6. CONTRACTOR'S STAGING AREA – AN AREA WILL BE MADE AVAILABLE FOR CONTRACTOR'S MOBILIZATION AND STORAGE. THE CONTRACTOR'S STAGING AREA SHALL BE FREE OF DEBRIS. IF DIRECTED BY THE ENGINEER, THE CONTRACTOR WILL BE REQUIRED TO STAKE OUT AND FLAG THE STAGING AREA LIMITS. NO STAGING WILL BE PERMITTED WITHIN ACTIVE RUNWAY/TAXIWAY/TAXILANE SAFETY AREAS, RUNWAY/TAXIWAY/TAXILANE OBJECT FREE AREAS, OR RUNWAY PROTECTION ZONES. UPON COMPLETION OF THE PROJECT, THE STAGING AREA SHALL BE RESTORED TO ITS ORIGINAL CONDITION.

7. ALL MATERIALS AND EQUIPMENT (INCLUDING STOCKPILED MATERIAL) WHEN NOT IN USE SHALL BE PLACED IN APPROVED AREAS WHERE THEY WILL NOT CONSTITUTE A HAZARD TO AIRCRAFT OPERATIONS AND NOT PENETRATE CLEARANCE SURFACES SHOWN ON THE GENERAL CONSTRUCTION AND SAFETY NOTES II.

   - THE OBSTACLE FREE ZONE (OFZ) GOVERNS EQUIPMENT CLEARANCE DURING CONSTRUCTION ADJACENT TO AN ACTIVE RUNWAY. UNDER NO CIRCUMSTANCES SHALL ANY MEN OR EQUIPMENT PENETRATE THESE SURFACES UNLESS PRIOR ARRANGEMENTS HAVE BEEN MADE WITH AIRPORT OPERATIONS.
   - THE FAR PART 77 APPROACH, PRIMARY, AND TRANSITIONAL SURFACES GOVERN STOCKPILES AND PARKED EQUIPMENT. UNDER NO CIRCUMSTANCES SHALL STOCKPILES, PARKED EQUIPMENT, OR OTHER CONSTRUCTION ITEMS PENETRATE THESE SURFACES ADJACENT TO AN ACTIVE RUNWAY.
   - EQUIPMENT SHALL BE PARKED AT THE CONTRACTOR'S STAGING AREA WHEN NOT IN USE. TALL EQUIPMENT SUCH AS CRANES SHALL BE LOWERED TO THE GROUND WHEN NOT IN USE. STOCKPILED MATERIAL SHALL BE CONSTRAINED IN A MANNER TO PREVENT MOVEMENT RESULTING FROM AIRCRAFT JET BLAST OR WIND CONDITIONS IN EXCESS OF 10 KNOTS.

VEHICLE ACCESS, RADIO COMMUNICATIONS, AND SECURITY REQUIREMENTS

1. THE CONTRACT DOCUMENTS INCLUDE THE PROJECT SECURITY BID PLAN/S AND SPECIFICATION SECTION X-1, SECURITY REQUIREMENTS DURING CONSTRUCTION. THE CONTRACTOR SHALL REFER TO THESE DOCUMENTS FOR ADDITIONAL SECURITY REQUIREMENTS.

2. MOVEMENT AREA ACCESS REQUIREMENTS:

   a. DEFINITION – MOVEMENT AREA: THE MOVEMENT AREA DESIGNATION INCLUDES RUNWAYS, TAXIWAYS, AND OTHER AREAS WITHIN THE AIR OPERATIONS AREA OF THE AIRPORT THAT ARE USED FOR TAXIING, HOVER-TAXIING, AIR-TAXIING, TAKEOFF, AND LANDING OF AIRCRAFT, EXCLUSIVE OF LOADING RAMPS AND AIRCRAFT PARKING AREAS.

   b. MOVEMENT AREA MARKINGS ARE DESIGNATED BY TWO PARALLEL LINES, ONE SOLID AND ONE DASHED, ON THE PAVEMENT.

   c. NOTE THAT AOA DRIVING PRIVILEGES ARE FOR NON MOVEMENT AREAS ONLY. ALL UNESCORTED ACCESS TO THE AIRFIELD MOVEMENT AREAS WILL REQUIRE CONTRACTOR PERSONNEL TO COMPLETE THE BWI AIRPORT MOVEMENT AREA TRAINING PROGRAM PROVIDED BY AIRPORT OPERATIONS. IF MOVEMENT AREA TRAINING IS REQUIRED TO ALLOW THE CONTRACTOR ACCESS TO THE AIRFIELD WITHOUT AN ESCORT, A LETTER SHOULD BE SUBMITTED TO MAA'S DIRECTOR OF AIRPORT OPERATIONS IDENTIFYING: THE NAMES OF THE PERSONNEL TO BE TRAINED, THE REASON AIRFIELD ACCESS IS NEEDED, THE DURATION THAT ACCESS IS NEEDED, AND THE NUMBER OF TIMES ACCESS IS NEEDED DURING THAT DURATION. BASED ON THE INFORMATION IN THE LETTER, MAA OPS WILL EITHER OFFER A CLASS FOR TRAINING OF CONTRACTOR PERSONNEL OR HAVE AN OPS ESCORT AVAILABLE FOR AIRFIELD ACCESS. THE CONTRACTOR SHALL PROVIDE THE LETTER TO MAA'S DIRECTOR OF OPERATIONS THIRTY CALENDAR DAYS IN ADVANCE OF THE TRAINING. ONCE TRAINING IS SUCCESSFULLY COMPLETED, ONLY THOSE AUTHORIZED BY AIRPORT OPERATIONS WILL BE ALLOWED TO REQUEST COMMUNICATIONS CLEARANCE FROM THE ATCT TO ACCESS MOVEMENT AREAS, TAXIWAYS OR CLOSED RUNWAYS. PERSONNEL AND VEHICLES REQUIRING ACCESS TO CROSS OPEN OR ACTIVE RUNWAYS MUST BE ESCORTED BY AN AUTHORIZED INDIVIDUAL WITH A PROPERLY EQUIPPED VEHICLE.

3. MOTORIZED VEHICLES WITHIN THE ACTIVE AIRCRAFT OPERATIONS AREA (AOA):

   a. ANY VEHICLE TO BE USED ON THE AIRPORT INCLUDING ALL CONTRACTOR EQUIPMENT AND MACHINERY CAPABLE OF BEING DRIVEN SHALL BE INSPECTED AND MUST DISPLAY A VALID AIRFIELD REGISTRATION DECAL. ALL OTHER (UNREGISTERED) VEHICLES MUST REMAIN UNDER CONTINUOUS ESCORT WHILE IN THE WORKSITE AND WHILE TRAVELING IN THE RESTRICTED AREAS OR TO AND FROM THE WORKSITE. IT IS THE CONTRACTOR'S RESPONSIBILITY TO ENSURE THAT VEHICLES ARE REGISTERED IN A TIMELY MANNER AS NOT TO DELAY THE PROJECT.

   b. ONLY VEHICLES REGISTERED BY THE MAA AND OPERATED BY APPROPRIATELY BADGED DRIVERS MAY PROCEED ON THE AIRFIELD WITHOUT AN ESCORT. UNREGISTERED VEHICLES MUST BE ESCORTED AT ALL TIMES BY A REGISTERED VEHICLE. APPROPRIATELY BADGED INDIVIDUALS OPERATING REGISTERED VEHICLES MAY ESCORT NO MORE THAN THREE VEHICLES AT ONE TIME. IF IT BECOMES NECESSARY TO ESCORT MORE THAN THREE VEHICLES, THE ESCORT SHOULD BE PERFORMED AS A MOTORCADE WITH ONE REGISTERED VEHICLE LEADING THE ESCORTED VEHICLES AND A SECOND REGISTERED VEHICLE COMPRISING THE REAR OF THE MOTORCADE.

   c. ALL PERMITTED VEHICLES SHALL BE MAINTAINED IN ACCORDANCE WITH ALL AIRPORT STANDARD OPERATING PROCEDURES.

   d. ALL PERMITTED VEHICLES SHALL BE CLEARLY MARKED WITH THE COMPANY NAME, LOGO, OR OTHER IDENTIFICATION ACCEPTABLE TO THE MAA. VEHICLE IDENTIFICATION SHALL BE IN ACCORDANCE WITH BWI TENANT DIRECTIVE 200.2, VEHICLE REGISTRATION PROGRAM. PERMITTED CONSTRUCTION VEHICLES SHALL, WHEN REQUESTED, DISPLAY IN FULL VIEW, ABOVE THE VEHICLE, A 3-FOOT X 3-FOOT, OR LARGER, ORANGE AND WHITE CHECKERBOARD PLASTIC FLAG. EACH CHECKERBOARD COLOR SHALL BE 1-FOOT SQUARE.

   e. EACH VEHICLE OPERATING ON A TAXIWAY OR RUNWAY DURING THE HOURS OF DARKNESS SHALL BE EQUIPPED WITH FLASHING OR NON-FLASHING IDENTIFICATION LIGHTS ON TOP OF THE VEHICLE AND OF SUCH INTENSITY TO CONFORM TO LOCAL CODES FOR MAINTENANCE VEHICLES. DARKNESS SHALL BE DEFINED AS ONE HOUR BEFORE OFFICIAL SUNSET UNTIL ONE HOUR AFTER SUNRISE.

   f. REFER TO SPECIFICATIONS ITEM X-1 FOR SECURITY ACCESS INFORMATION.

4. RADIO COMMUNICATIONS – FOR THOSE AUTHORIZED TO OPERATE OR WORK IN THE AIRFIELD MOVEMENT AREA, RADIO COMMUNICATION WITH THE FAA CONTROL TOWER IS REQUIRED AT ALL TIMES. ALL VEHICULAR MOVEMENTS IN THE MOVEMENT AREA ARE UNDER THE DIRECT CONTROL OF THE ATCT AND REQUESTS FOR MOVEMENT MUST BE APPROVED BY THE ATCT VIA RADIO COMMUNICATION PRIOR TO ENTERING OR MOVING WITHIN THE MOVEMENT AREA. RADIOS SHALL BE FURNISHED BY THE CONTRACTOR AND SHALL BE CAPABLE OF TRANSMITTING AND RECEIVING AT A GROUND FREQUENCY OF 121.9 MHZ. THIS FREQUENCY IS TO BE UTILIZED WHEN CROSSING ACTIVE FACILITIES. SUFFICIENT RADIOS SHALL BE ON SITE AND OPERATING AT ALL TIMES SO THAT INSTRUCTIONS OR COMMUNICATIONS MAY BE DISPATCHED TO ALL CREWS WITHIN AN ACTIVE AOA WITHIN ONE MINUTE AFTER RECEIPT OF DIRECTION FROM THE TOWER.

   USE OF CITIZEN'S BAND (CB) RADIOS ARE PROHIBITED ON THE AIRFIELD. CB RADIO TRANSMISSIONS INTERFERE WITH AIR TRAFFIC CONTROL TOWER COMMUNICATIONS.

COMPANY NAME

COMPANY NAME
COMPANY ADDRESS
CITY, STATE ZIP CODE
COMPANY PHONE NO. COMPANY FAX NO.

DESIGNED: ---
DRAWN: ---
CHECKED: ---
APPROVED: ---

"PROFESSIONAL CERTIFICATION:

I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND."

LICENSE NO. _____
EXPIRATION DATE: _____

REVISION NO.	REVISION DATE	DESCRIPTIONS

BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION

OFFICE OF DESIGN AND CONSTRUCTION

PROJECT TITLE: PROJECT TITLE

SHEET TITLE: GENERAL CONSTRUCTION AND SAFETY NOTES I – SIDA

SCALE: NONE
DATE: DATE

CONTRACT NO.: MAA-CO-XX-XXX

SHEET NO.: ---

PATH/FILENAME

PROJECT COORDINATION

1. ALL COORDINATION BETWEEN THE CONTRACTOR AND MAA OFFICES SHALL BE DONE THROUGH THE ENGINEER EXCEPT AS NOTED UNDER **EMERGENCY CONTACT INFORMATION** SECTION OF THESE NOTES.

2. THE CONTRACTOR SHALL PROVIDE THE ENGINEER WITH A CURRENT LIST OF ALL EMPLOYEES WORKING ON THE AIRPORT INCLUDING SUBCONTRACTORS. THE LIST SHALL BE MAINTAINED CURRENT BY THE CONTRACTOR.

3. CONTRACTOR COORDINATION – CONSTRUCTION AND MAINTENANCE OPERATIONS BY OTHERS MAY OCCUR CONCURRENTLY AND IN THE VICINITY OF CONSTRUCTION ASSOCIATED WITH THIS PROJECT. THE CONTRACTOR SHALL COORDINATE OPERATIONS AND COOPERATE WITH MAINTENANCE CREWS AND OTHER CONTRACTORS WORKING ON THE AIRPORT.

4. COORDINATION WITH BWI AIRPORT FIRE RESCUE SERVICE (VIA THE ENGINEER):

   a. THE CONTRACTOR SHALL COMPLY WITH MARYLAND FIRE LAWS, NFPA 1 – UNIFORM FIRE CODE, ; CHAPTER 16, 'SAFETY DURING CONSTRUCTION AND DEMOLITION OPERATIONS' (CURRENT EDITIONS) AND CHAPTER 21, 'AIRPORTS'.

   b. OPEN FLAME, WELDING OR TORCH CUTTING OPERATIONS ARE PROHIBITED WITHOUT FIRST OBTAINING A BWI AIRPORT WELDING AND BURNING PERMIT. THE PERMIT IS AVAILABLE AT THE BWI FIRE MARSHAL'S OFFICE, 991 CORPORATE BLVD, LINTHICUM, MD 21090. THE PERMIT MAY BE REQUESTED FOR A PERIOD NOT TO EXCEED THIRTY DAYS. PRIOR TO COMMENCING WORK, ANY PERSON CONDUCTING OPEN FLAME/HOT WORK OPERATIONS SHALL BE FAMILIAR WITH THE LATEST EDITION OF NFPA 51B STANDARD FOR FIRE PREVENTION DURING WELDING, CUTTING, AND OTHER HOT WORK. ADEQUATE FIRE AND SAFETY PRECAUTIONS MUST BE TAKEN AND THE PROCEDURE APPROVED PRIOR TO COMMENCEMENT OF WORK. A FIRE WATCH IS REQUIRED.

   c. A HYDRANT USE PERMIT IS REQUIRED PRIOR TO CONNECTION TO ANY AIRPORT FIRE HYDRANT.

5. AIRPORT OPERATIONS COORDINATION (VIA THE ENGINEER):

   a. THE AIRPORT WILL BE IN OPERATION DURING THE CONSTRUCTION OF THIS PROJECT. THE CONTRACTOR SHALL BE REQUIRED TO COORDINATE ALL CONSTRUCTION ACTIVITIES WITH AIRPORT OPERATIONS AND COMPLY WITH ANY AND ALL RESTRICTIONS AND INSTRUCTIONS PROVIDED BY AIRPORT OPERATIONS.

   b. THE CONTRACTOR SHALL NOT BE ALLOWED TO IMPACT ANY NORMAL AIRPORT OPERATION WITHOUT PRIOR APPROVAL OF AIRPORT OPERATIONS.

   c. AT LEAST FOURTEEN CALENDAR DAYS BEFORE ACTUAL COMMENCEMENT OF CONSTRUCTION ACTIVITY, THE CONTRACTOR SHALL CONFIRM WITH THE ENGINEER, IN WRITING, THE PROPOSED TIME, DATE, AND AREA THAT CONSTRUCTION IS TO OCCUR.

   d. PORTABLE FLOODLIGHTING – USE OF PORTABLE FLOODLIGHTING SHALL BE COORDINATED WITH AIRPORT OPERATIONS AND THE ENGINEER TO ENSURE THAT THE LIGHTING DOES NOT COMPROMISE THE CONTROL TOWER'S VISIBILITY OR THAT IT IS NOT POSITIONED SUCH THAT IT FACES INTO ANY RUNWAY APPROACH WHERE IT MIGHT CAUSE CONFUSION TO PILOTS. THE CONTRACTOR SHALL PROVIDE PORTABLE FLOODLIGHTING AS REQUIRED FOR NIGHT CONSTRUCTION OPERATIONS.

   e. FLAGMEN AND VEHICLE ESCORTS –

   - THE CONTRACTOR SHALL FURNISH FLAGMEN AS NECESSARY TO CONTROL CONSTRUCTION TRAFFIC UNLESS OTHERWISE DIRECTED BY THE ENGINEER OR AIRPORT OPERATIONS.
   - ALL CONTRACTOR VEHICLES THAT ARE REQUIRED TO CROSS ACTIVE RUNWAYS AND RUNWAY SAFETY AREAS SHALL DO SO UNDER A DIRECT CONTROL ESCORT FROM AIRPORT OPERATIONS PERSONNEL.
   - CONTRACTOR VEHICLES THAT ARE REQUIRED TO CROSS ACTIVE TAXIWAYS MUST BE EITHER ESCORTED BY AN AUTHORIZED INDIVIDUAL WITH A PROPERLY EQUIPPED VEHICLE OR HAVE COMPLETED THE BWI MOVEMENT AREA TRAINING PROGRAM AND BE AUTHORIZED TO OPERATE VEHICLES IN THE MOVEMENT AREA.
   - VEHICLES REQUIRED TO OPERATE ON TAXIWAYS OR CLOSED RUNWAYS SHALL DO SO UNDER THE DIRECT CONTROL OF A COMPETENT FLAGMAN WHO HAS COMPLETED MOVEMENT AREA TRAINING AND WHO IS IN DIRECT CONTACT WITH THE FAA AIR TRAFFIC CONTROL TOWER (ATCT) GROUND CONTROL.
   - VEHICLES REQUIRED TO OPERATE ON TAXILANES, APRONS, OR NON-MOVEMENT AREA HAUL ROUTES SHALL DO SO UNDER THE DIRECT CONTROL OF A COMPETENT FLAGMAN.

   f. FACILITY CLOSURES – REQUESTS FOR FACILITY CLOSURES SHALL BE MADE AT LEAST FOURTEEN CALENDAR DAYS IN ADVANCE OF THE PROPOSED CLOSING TO ALLOW AIRPORT OPERATIONS TIME TO ISSUE A TENANT INFORMATION ADVISORY. CLOSURES SHALL BE CONFIRMED FOUR WORKING DAYS PRIOR TO THE CLOSURE. THE CONTRACTOR MAY BE REQUIRED TO MEET WITH AIRPORT OPERATIONS AND THE FAA TO EVALUATE AND ESTABLISH ANY RUNWAY AND TAXIWAY CLOSURE TIMES AND DURATIONS. TO THE EXTENT POSSIBLE, THE CONTRACTOR SHALL COORDINATE CONSTRUCTION TO COINCIDE WITH RUNWAY AND TAXIWAY CLOSURES ALREADY SCHEDULED FOR CONSTRUCTION AND MAINTENANCE OPERATIONS BY OTHERS.

   g. UPON COMPLETION OF ANY STAGE OR PHASE OF WORK, THE ENGINEER WILL ARRANGE A PHYSICAL INSPECTION OF THE AREA WITH AIRPORT OPERATIONS PERSONNEL PRIOR TO THE OPENING OF ANY TAXIWAY, RUNWAY, RAMP AREA OR AIRPORT ROADWAY THAT HAS BEEN CLOSED FOR WORK OR USED FOR A CROSSING POINT OR HAUL ROUTE BY THE CONTRACTOR.

   h. UPON COMPLETION OF WORK AND RETURN OF ALL RELATED AREAS TO STANDARD CONDITIONS, THE CONTRACTOR SHALL NOTIFY MAA (IN WRITING) AND DESCRIBE THE AREA THAT IS COMPLETE AND AVAILABLE FOR NORMAL AIRPORT OPERATIONS.

6. UTILITIES:

   a. UNDERGROUND UTILITIES – LOCATIONS OF KNOWN UNDERGROUND UTILITIES SHOWN ON THE PLANS ARE APPROXIMATE. ALL UTILITY LOCATIONS SHALL BE FIELD VERIFIED BY THE CONTRACTOR PRIOR TO COMMENCING CONSTRUCTION. THE CONTRACTOR IS REQUIRED TO COMPLETE A DIGGING AUTHORIZATION FORM, AS SUPPLIED BY THE ENGINEER, PRIOR TO ANY AND ALL GROUND DISTURBANCE.

   b. REPAIR OF UTILITIES DAMAGED DURING CONSTRUCTION MUST BE STARTED IMMEDIATELY AND CONTINUE UNTIL COMPLETED.

      i. ALL SUCH REPAIRS SHALL BE IN ACCORDANCE WITH THE CONTRACT SPECIFICATIONS OR AS DIRECTED BY THE ENGINEER AND SHALL BE AT THE CONTRACTOR'S EXPENSE.

      ii. IF FAA CABLES ARE DAMAGED, REPAIRS SHALL BE DONE IN ACCORDANCE WITH FAA REQUIREMENTS AND IN THE PRESENCE OF AN FAA REPRESENTATIVE. THE FAA MAY ELECT TO HAVE THE REPAIR PERFORMED BY OTHERS IN WHICH CASE THE CONTRACTOR SHALL BE RESPONSIBLE FOR PAYING THE INCURRED COSTS OF REPAIRS.

   c. UTILITIES NOTIFICATION – AT LEAST FOURTEEN DAYS PRIOR TO COMMENCING CONSTRUCTION OPERATIONS IN AN AREA WHICH MAY INVOLVE UNDERGROUND UTILITIES AND/OR TEMPORARY SUSPENSION OF SERVICES, THE CONTRACTOR SHALL NOTIFY THE ENGINEER TO ISSUE A TENANT INFORMATION ADVISORY.

      THE FOLLOWING LIST INCLUDES POSSIBLE UTILITIES WITHIN THE CONSTRUCTION LIMITS. ADDITIONAL UTILITIES NOT LISTED BELOW MAY ALSO BE ON-SITE.

      UTILITY OWNERSHIP:

MISS UTILITY CENTER	1-800-257-7777
BGE	(410) 685-0123 (410) 234-5000 1-800-685-0123
VERIZON REPAIR BURIED CABLE	(410) 954-2222 1-800-275-2355
FAA AIRWAY FACILITIES SSC	(410) 859-7252
COMCAST	(410) 931-4600 (410) 729-8000
MILLENIUM DIGITAL MEDIA	(410) 987-9300
ANNE ARUNDEL COUNTY UTILITY OPERATIONS BUREAU (WATER SUPPLY FROM AIRPORT PERIMETER TO METER)	
EMERGENCIES	(410) 222-8400
GENERAL INFORMATION	(410) 222-7520
COLONIAL PIPELINE	1-800-926-2728 (24/7)

   d. UTILITIES IDENTIFICATION – THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING UTILITY IDENTIFICATION MARKINGS THROUGHOUT THE DURATION OF THE PROJECT.

EMERGENCY CONTACT INFORMATION

1. EXCEPT FOR EMERGENCIES, ALL CONTACT WITH AIRPORT PERSONNEL SHALL BE MADE THROUGH THE ENGINEER. FOR EMERGENCIES INVOLVING SAFETY (INJURIES, FIRES, SECURITY BREACHES, ETC.) THE CONTRACTOR SHALL MAKE DIRECT CONTACT WITH AIRPORT OPERATIONS FOLLOWED BY NOTIFICATION TO THE ENGINEER AS SOON AS POSSIBLE.

2. THE PROJECT SUPERVISORS SHALL HAVE THE FOLLOWING TELEPHONE NUMBERS WITH THEM AT ALL TIMES:

i.	MAA FIRE MARSHAL	(410) 859-7815/7511
ii.	BWI FIRE/RESCUE/MEDICAL EMERGENCY	(410) 859-7222
iii.	BWI POLICE EMERGENCY	(410) 859-7040
iv.	BWI DUTY AIRPORT OPERATIONS MGR	(410) 859-7018
v.	CONSOLIDATED DISPATCH CENTER	(410) 859-7117
vi.	BWI OFFICE OF AIRPORT SECURITY	(410) 859-7162
vii.	FAA ATCT	(410) 859-7636
viii.	FAA AIRWAY FACILITIES SSC	(410) 859-7252
ix.	MDE OIL CONTROL PROGRAM (COMPLIANCE AND REMEDIATION)	(410) 537-3442

3. THE CONTRACTOR SHALL PROVIDE THE PHONE NUMBERS OF THREE PERSONNEL, INCLUDING THE PROJECT SUPERINTENDENT, WHO MAY BE CONTACTED IN AN EMERGENCY. PERSONNEL SHALL BE ON CALL 24 HOURS PER DAY FOR MAINTAINING AIRPORT HAZARD LIGHTING AND BARRICADES.

4. THE CONTRACTOR SHALL PROVIDE THE NAME AND PHONE NUMBERS OF THE PROJECT SECURITY COORDINATOR AND THE DESIGNATED ALTERNATE WHO SHALL BE ON CALL 24 HOURS PER DAY FOR CONTACT REGARDING SECURITY ISSUES.

RELATED DOCUMENTS

1. FAA ADVISORY CIRCULARS (AC's), ORDERS AND FEDERAL AVIATION REGULATIONS (FAR's) – THE FOLLOWING PUBLICATIONS CONTAIN DEFINITIONS OR DESCRIPTIONS OF CRITICAL AIRPORT OPERATING AREAS. COPIES OF THESE PUBLICATIONS ARE AVAILABLE THROUGH THE FAA AT WWW.FAA.GOV AND CAN BE REVIEWED AT THE OFFICES OF THE MAA.

   THE ITEMS OUTLINED BELOW PERTAIN TO AIRFIELD SAFETY REQUIREMENTS AND ARE REFERENCED THROUGHOUT THE CONTRACT DOCUMENTS.

   a. AC 150/5370-2, 'OPERATIONAL SAFETY ON AIRPORTS DURING CONSTRUCTION', CURRENT EDITION, SETS FORTH GUIDELINES TO ASSIST AIRPORT OPERATORS IN COMPLYING WITH FAR PART 139, "CERTIFICATION OF AIRPORTS" AND WITH THE REQUIREMENTS OF FEDERALLY FUNDED AIRPORT CONSTRUCTION PROJECTS.

   b. FAR PART 77 'SAFE, EFFICIENT USE, AND PRESERVATION OF THE NAVIGABLE AIRSPACE', CURRENT EDITION:

      i. ESTABLISHES STANDARDS FOR DETERMINING OBSTRUCTIONS TO NAVIGABLE AIRSPACE. IMAGINARY SURFACES ARE DEFINED IN THE PUBLICATION AND ARE SHOWN ON THIS SHEET.

      ii. ESTABLISHES REQUIREMENTS FOR FILING NOTICE TO THE FAA FOR CERTAIN PROPOSED CONSTRUCTION OR ALTERATION PROPOSALS. COMPLETION OF THE 'NOTICE OF PROPOSED CONSTRUCTION OR ALTERATION' FORM (FAA FORM 7460-1) IS DISCUSSED IN AC 70/7460-1 'OBSTRUCTION MARKING AND LIGHTING', CURRENT EDITION.

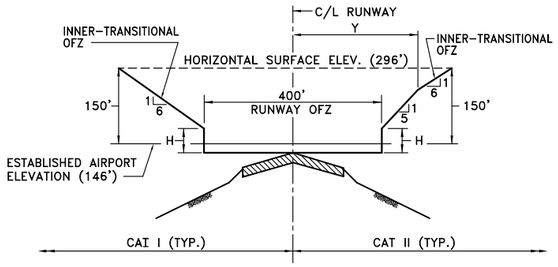
   c. REFER TO EQUIPMENT HEIGHT PLAN (SHEET X.XXX) [CHANGE TO APPROPRIATE SHEET TITLE FOR PROJECTS WITHOUT AN EQUIPMENT HEIGHT PLAN] FOR CONSTRUCTION HEIGHT LIMITATIONS. IF CONTRACTOR REQUIRES EQUIPMENT HEIGHTS GREATER THAN THOSE OUTLINED ON EQUIPMENT HEIGHT PLAN [CHANGE TO APPROPRIATE SHEET TITLE FOR PROJECTS WITHOUT AN EQUIPMENT HEIGHT PLAN] , CONTACT MAA'S DIVISION OF AIRPORT FACILITIES PLANNING (410-859-7089). THE FAA WILL NEED TO APPROVE ANY CHANGES IN ELEVATION, AND IT MAY TAKE UP TO 90 DAYS TO PROCESS SUCH REQUESTS.

   d. AC 150/5300-13, 'AIRPORT DESIGN', CURRENT EDITION, ESTABLISHES DESIGN, OPERATIONAL, AND MAINTENANCE STANDARDS FOR AIRPORTS. STANDARD TERMS USED IN THE CONTRACT PLANS AND SPECIFICATIONS ARE DEFINED BELOW.

      i. OBSTACLE FREE ZONE (OFZ) – A VOLUME OF SPACE WHICH IS FREE OF ALL FIXED OBJECTS AND CLEAR OF VEHICLES IN THE PROXIMITY OF AN AIRPLANE CONDUCTING AN APPROACH, MISSED APPROACH, LANDING, TAKEOFF, OR DEPARTURE. AN OFZ TYPICAL SECTION IS SHOWN ON THIS SHEET.

      ii. OBJECT FREE AREA (OFA) – A TWO DIMENSIONAL GROUND AREA SURROUNDING RUNWAYS, TAXIWAYS, AND TAXILANES WHICH IS CLEAR OF OBJECTS EXCEPT FOR OBJECTS WHOSE LOCATION IS FIXED BY FUNCTION.

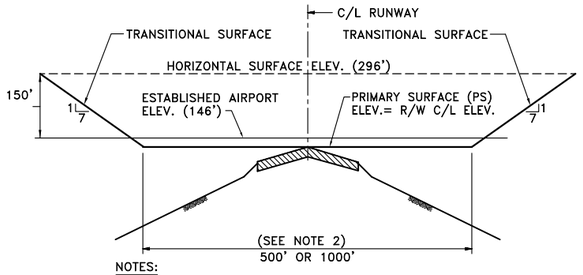
      iii. SAFETY AREA – THE SURFACE ADJACENT TO RUNWAYS, TAXIWAYS, AND TAXILANES OVER WHICH AIRCRAFT SHOULD, IN DRY WEATHER, BE ABLE TO CROSS AT NORMAL SPEEDS WITHOUT INCURRING ANY SIGNIFICANT DAMAGE. A SAFETY AREA IS GRADED, DRAINED AND COMPACTED. IT IS FREE OF ANY HOLES, TRENCHES, BUMPS OR OTHER SIGNIFICANT SURFACE VARIATIONS OR OBJECTS OTHER THAN THOSE WHICH MUST BE THERE BECAUSE OF THEIR ESSENTIAL AERONAUTICAL FUNCTION. THE SAFETY AREA REQUIRES THE CAPABILITY OF SUPPORTING MAINTENANCE VEHICLES AND AIRCRAFT RESCUE AND FIRE FIGHTING VEHICLES UNDER NORMAL (DRY) CONDITIONS.



RUNWAY	TYPE OF RUNWAY	H (FEET)	Y (FEET)
10	PRECISION (CAT III)	25.5	667.8
28	PRECISION (CAT II)	41.3	200
15R-33L	PRECISION (CAT I)	50.3	200
15L-33R	PRECISION (CAT I)	41.3	200
4-22	VISUAL	*	–

*VERTICAL TO A HEIGHT OF 150' ABOVE ESTABLISHED AIRPORT ELEVATION
**15R-33L IS A CAT II FOR TAKEOFF

TYPICAL SECTION
OBSTACLE FREE ZONE (OFZ)
NOT TO SCALE



NOTES:
1. SEE "CONTRACTOR'S SAFETY REQUIREMENTS DURING CONSTRUCTION" AS CONTAINED IN THE PLANS REGARDING RESTRICTED AREAS IN THE VICINITY OF ACTIVE RUNWAYS AND TAXIWAYS.
2. IMAGINARY SURFACE REQUIREMENTS FOR EXISTING ACTIVE RUNWAYS (R/W) ARE SIMILAR EXCEPT PRIMARY SURFACES (PS) DIMENSIONS VARY:
   R/W 4-22 – 500' PS (250' LT. & RT. OF C/L)
   R/W 10-28 – 1000' PS (500' LT. & RT. OF C/L)
   R/W 15R-33L – 1000' PS (500' LT. & RT. OF C/L)
   R/W 15L-33R – 1000' PS (500' LT. & RT. OF C/L)

TYPICAL SECTION
F A R PART 77 IMAGINARY SURFACES
NOT TO SCALE

RUNWAY END	ELEVATION	APPROACH SLOPE
10	139.0	50:1
28	126.2	50:1
15R	138.6	50:1
33L	129.2	50:1
4	146.0	34:1
22	137.7	34:1
15L	141.5	50:1
33R	114.1	50:1

TYPICAL APPROACH PROFILE
F A R PART 77 IMAGINARY SURFACES
NOT TO SCALE

COMPANY NAME

COMPANY NAME
COMPANY ADDRESS
CITY, STATE ZIP CODE
COMPANY PHONE NO. COMPANY FAX NO.

DESIGNED: ---
DRAWN: ---
CHECKED: ---
APPROVED: ---

"PROFESSIONAL CERTIFICATION:
I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND."
LICENSE NO. _____
EXPIRATION DATE: _____

REVISION NO.	REVISION DATE	DESCRIPTIONS

BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
OFFICE OF DESIGN AND CONSTRUCTION

PROJECT TITLE: PROJECT TITLE
SHEET TITLE: GENERAL CONSTRUCTION AND SAFETY NOTES II – SIDA
SCALE: NONE
DATE: DATE

CONTRACT NO.: MAA-CO-XX-XXX
SHEET NO.: ---

PATH/FILENAME

GENERAL CONSTRUCTION NOTES

1. THIS PROJECT IS FOR WORK AT BALTIMORE/WASHINGTON INTERNATIONAL THURGOOD MARSHALL AIRPORT, HEREAFTER REFERRED TO AS 'THE AIRPORT' OR 'BWI'.

2. THIS PROJECT SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE CONTRACT PLANS AND SPECIFICATIONS AND ANY RULES, REGULATIONS, STANDARDS, OR SPECIFICATIONS REFERENCED THEREIN. THE PROJECT IS SUBJECT TO INSPECTION BY REPRESENTATIVES OF THE MARYLAND AVIATION ADMINISTRATION (MAA), THE FEDERAL AVIATION ADMINISTRATION (FAA), AND OTHER GOVERNING AGENCIES.

3. PROJECT PHASING – THE PROJECT IS TO BE COMPLETED IN CLOSE CONFORMANCE WITH THE PHASING PLANS AND NOTES AS CONTAINED IN THE CONTRACT DOCUMENTS. CHANGES TO THE PHASING PLANS SHALL BE COORDINATED WITH THE ENGINEER AND REVIEWED WITH THE DESIGNER PRIOR TO IMPLEMENTATION.

4. PROJECT COMPLETION TIMES – THE CONTRACTOR IS EXPECTED TO COMPLETE CRITICAL PORTIONS OF THE PROJECT WITHIN THE SPECIFIED TIMEFRAMES AND TO COMPLETE THE ENTIRE PROJECT ON TIME. LIQUIDATED DAMAGES WILL BE ASSESSED SHOULD THE TIMEFRAME BE EXCEEDED.

5. CONSTRUCTION LIMITS – ALL CONTRACTOR VEHICLES SHALL REMAIN WITHIN THE DESIGNATED CONSTRUCTION LIMITS OR HAUL ROUTES (UNLESS OTHERWISE AUTHORIZED).

6. DIMENSIONS IDENTIFIED ON THE PLANS SHALL BE VERIFIED IN THE FIELD. IN GENERAL, SMALL-SCALE DRAWINGS WITH GREATER RESOLUTION (I.E. 1"=50') GOVERN OVER LARGER SCALE DRAWINGS OF LESS RESOLUTION (I.E. 1"=500'), WRITTEN NOTES GOVERN OVER GRAPHIC REPRESENTATION AND SPECIFICATIONS GOVERN OVER DRAWINGS. ANY DISCREPANCIES SHALL BE REPORTED TO THE ENGINEER FOR CLARIFICATION.

7. EXISTING TOPOGRAPHIC FIELD SURVEYS WERE PROVIDED BY SURVEYORS NAME AND DATE. THE CONTROL ON THIS PROJECT IS TIED TO THE NAD 83/2007 HORIZONTAL DATUM AND NAVD 88 VERTICAL DATUM. SURVEY UNITS SHALL BE IN U.S. SURVEY FOOT. PROJECT BENCHMARKS ARE SHOWN ON THE GENERAL PROJECT LAYOUT.

8. ALL THE PERMITS AND LICENSES REQUIRED FOR THE PROJECT WORK SHALL BE OBTAINED AT THE CONTRACTOR'S EXPENSE.

9. IN ACCORDANCE WITH THE SPECIFICATIONS, FEDERAL WAGE RATES SHALL BE POSTED OUTSIDE THE SITE FIELD OFFICE(S) IN A WEATHERPROOF ENCLOSURE. [FOR FEDERALLY FUNDED PROJECTS ONLY]

GENERAL AIRFIELD SAFETY DURING CONSTRUCTION

1. THE CONTRACTOR SHALL ACQUAINT SUPERVISORS AND EMPLOYEES WITH ACTIVITY AND OPERATIONS THAT ARE INHERENT TO THE AIRPORT AND SHALL CONDUCT CONSTRUCTION ACTIVITIES TO CONFORM TO ALL ROUTINE AND EMERGENCY AIR TRAFFIC REQUIREMENTS AND GUIDELINES FOR SAFETY SPECIFIED HEREIN.

2. THE CONTRACTOR AND HIS/HER SUBCONTRACTOR(S) SHALL PROTECT WORKERS, MAA AND AIRPORT TENANT EMPLOYEES, AND THE GENERAL PUBLIC. THE CONTRACTOR SHALL ALSO ENSURE THAT PROPERTY OR EQUIPMENT, UNRELATED TO WORK, WHICH BELONGS TO MAA OR AIRPORT TENANTS IS NOT DAMAGED DURING CONSTRUCTION.

3. THE CONTRACTOR SHALL NOT ALLOW EMPLOYEES, SUBCONTRACTORS, SUPPLIERS, OR ANY OTHER UNAUTHORIZED PERSON TO ENTER OR REMAIN IN ANY AIRPORT AREA WHICH WOULD BE HAZARDOUS TO PERSONS OR TO AIRCRAFT OPERATIONS.

4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ALL NECESSARY PROTECTIVE GEAR AND EQUIPMENT REQUIRED FOR THE PROTECTION OF THE CONTRACTOR'S PERSONNEL DURING CONSTRUCTION.

5. THE CONTRACTOR SHALL INSPECT ALL CONSTRUCTION AND STORAGE AREAS AS OFTEN AS NECESSARY AND PROMPTLY TAKE ALL STEPS NECESSARY TO PREVENT OR REMEDY ANY UNSAFE OR POTENTIALLY UNSAFE CONDITIONS OR ACTIVITIES DISCOVERED.

SITE ACCESS, CONTRACTOR STAGING, HAUL ROUTES, AND MATERIAL STORAGE

1. ACCESS TO THE SITE – THE CONTRACTOR'S ACCESS POINTS TO THE SITE SHALL BE AS SHOWN ON THE SECURITY BID PLAN. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL VEHICLES AND PERSONNEL WHO ENTER THE AIRPORT THROUGH THESE ACCESS POINTS. THE CONTRACTOR IS RESPONSIBLE FOR TRANSPORTING EMPLOYEES TO AND FROM THE JOB SITE. PERSONAL VEHICLES SHALL NOT BE PARKED ANYWHERE WITHIN THE AIRPORT OPERATIONS AREA.

2. ALL OFF-SITE HAUL ROUTES SHALL BE SELECTED TO MINIMIZE DISTURBANCE TO THE PUBLIC. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO COORDINATE OFF-SITE HAUL ROUTES (STATE HIGHWAYS, COUNTY ROADS, OR CITY STREETS) WITH THE APPROPRIATE OWNER WHO HAS JURISDICTION OVER THE AFFECTED ROUTE. THE CONTRACTOR'S ON-AIRPORT HAUL ROUTES ARE INDICATED ON THE SECURITY BID PLAN (CHANGE TO APPROPRIATE SHEET TITLE FOR PROJECTS WITHOUT A SECURITY BID PLAN).

3. ON-SITE ROADS AND OTHER AIRFIELD PAVEMENTS USED AS HAUL ROUTES SHALL BE MAINTAINED BY THE CONTRACTOR AND SHALL BE RESTORED AT THE CONTRACTOR'S EXPENSE TO THEIR ORIGINAL CONDITION UPON COMPLETION OF BEING USED AS A HAUL ROUTE, UNLESS OTHERWISE DIRECTED BY THE CONTRACT DOCUMENTS OR BY THE ENGINEER. THE BEFORE AND AFTER CONDITION OF ALL ON-SITE HAUL ROUTES (TEMPORARY OR PERMANENT) SHALL BE JOINTLY INSPECTED AND DETERMINED BY THE CONTRACTOR AND THE ENGINEER THROUGH THE USE OF DIGITAL PHOTOGRAPHY AND/OR VIDEO. THE CONTRACTOR MAY NEED TO COORDINATE HAUL ROUTE USAGE WITH OTHER CONTRACTORS WORKING ON THE AIRPORT.

4. FENCING, DRAINAGE, GRADING AND OTHER MISCELLANEOUS CONSTRUCTION REQUIRED TO CONSTRUCT OR RESTORE TEMPORARY OR PERMANENT HAUL ROUTES OR ACCESS POINTS ON THE AIRPORT WILL BE THE CONTRACTOR'S RESPONSIBILITY AND SHALL BE APPROVED BY THE ENGINEER PRIOR TO COMMENCING THE WORK.

5. ALL ON-SITE ACCESS ROADS TO AIRPORT FACILITIES SHALL REMAIN OPEN AND MAINTAINED AT ALL TIMES.

6. CONTRACTOR'S STAGING AREA – AN AREA WILL BE MADE AVAILABLE FOR CONTRACTOR'S MOBILIZATION AND STORAGE. THE CONTRACTOR'S STAGING AREA SHALL BE FREE OF DEBRIS. IF DIRECTED BY THE ENGINEER, THE CONTRACTOR WILL BE REQUIRED TO STAKE OUT AND FLAG THE STAGING AREA LIMITS. UPON COMPLETION OF THE PROJECT, THE STAGING AREA SHALL BE RESTORED TO ITS ORIGINAL CONDITION.

7. ALL MATERIALS AND EQUIPMENT (INCLUDING STOCKPILED MATERIAL) WHEN NOT IN USE SHALL BE PLACED IN APPROVED AREAS.

PROJECT COORDINATION

1. ALL COORDINATION BETWEEN THE CONTRACTOR AND MAA OFFICES SHALL BE DONE THROUGH THE ENGINEER EXCEPT AS NOTED UNDER **EMERGENCY CONTACT INFORMATION** SECTION OF THESE NOTES.

2. THE CONTRACTOR SHALL PROVIDE THE ENGINEER WITH A CURRENT LIST OF ALL EMPLOYEES WORKING ON THE AIRPORT INCLUDING SUBCONTRACTORS. THE LIST SHALL BE MAINTAINED CURRENT BY THE CONTRACTOR.

3. CONTRACTOR COORDINATION – CONSTRUCTION AND MAINTENANCE OPERATIONS BY OTHERS MAY OCCUR CONCURRENTLY AND IN THE VICINITY OF CONSTRUCTION ASSOCIATED WITH THIS PROJECT. THE CONTRACTOR SHALL COORDINATE OPERATIONS AND COOPERATE WITH MAINTENANCE CREWS AND OTHER CONTRACTORS WORKING ON THE AIRPORT.

4. COORDINATION WITH BWI AIRPORT FIRE RESCUE SERVICE (VIA THE ENGINEER):

   a. THE CONTRACTOR SHALL COMPLY WITH MARYLAND FIRE LAWS, NFPA 1 – UNIFORM FIRE CODE, ; CHAPTER 16, 'SAFETY DURING CONSTRUCTION AND DEMOLITION OPERATIONS' (CURRENT EDITIONS) AND CHAPTER 21, 'AIRPORTS'.

   b. OPEN FLAME, WELDING OR TORCH CUTTING OPERATIONS ARE PROHIBITED WITHOUT FIRST OBTAINING A BWI AIRPORT WELDING AND BURNING PERMIT. THE PERMIT IS AVAILABLE AT THE BWI FIRE MARSHAL'S OFFICE, 991 CORPORATE BLVD, LINTHICUM, MD 21090. THE PERMIT MAY BE REQUESTED FOR A PERIOD NOT TO EXCEED THIRTY DAYS. PRIOR TO COMMENCING WORK, ANY PERSON CONDUCTING OPEN FLAME/HOT WORK OPERATIONS SHALL BE FAMILIAR WITH THE LATEST EDITION OF NFPA 51B STANDARD FOR FIRE PREVENTION DURING WELDING, CUTTING, AND OTHER HOT WORK. ADEQUATE FIRE AND SAFETY PRECAUTIONS MUST BE TAKEN AND THE PROCEDURE APPROVED PRIOR TO COMMENCEMENT OF WORK. A FIRE WATCH IS REQUIRED.

   c. A HYDRANT USE PERMIT IS REQUIRED PRIOR TO CONNECTION TO ANY AIRPORT FIRE HYDRANT.

5. AIRPORT OPERATIONS COORDINATION (VIA THE ENGINEER):

   a. THE AIRPORT WILL BE IN OPERATION DURING THE CONSTRUCTION OF THIS PROJECT. THE CONTRACTOR SHALL BE REQUIRED TO COORDINATE ALL CONSTRUCTION ACTIVITIES WITH AIRPORT OPERATIONS AND COMPLY WITH ANY AND ALL RESTRICTIONS AND INSTRUCTIONS PROVIDED BY AIRPORT OPERATIONS.

   b. THE CONTRACTOR SHALL NOT BE ALLOWED TO IMPACT ANY NORMAL AIRPORT OPERATION WITHOUT PRIOR APPROVAL OF AIRPORT OPERATIONS.

   c. AT LEAST FOURTEEN CALENDAR DAYS BEFORE ACTUAL COMMENCEMENT OF CONSTRUCTION ACTIVITY, THE CONTRACTOR SHALL CONFIRM WITH THE ENGINEER, IN WRITING, THE PROPOSED TIME, DATE, AND AREA THAT CONSTRUCTION IS TO OCCUR.

6. UTILITIES:

   a. UNDERGROUND UTILITIES – LOCATIONS OF KNOWN UNDERGROUND UTILITIES SHOWN ON THE PLANS ARE APPROXIMATE. ALL UTILITY LOCATIONS SHALL BE FIELD VERIFIED BY THE CONTRACTOR PRIOR TO COMMENCING CONSTRUCTION. THE CONTRACTOR IS REQUIRED TO COMPLETE A DIGGING AUTHORIZATION FORM, AS SUPPLIED BY THE ENGINEER, PRIOR TO ANY AND ALL GROUND DISTURBANCE.

   b. REPAIR OF UTILITIES DAMAGED DURING CONSTRUCTION MUST BE STARTED IMMEDIATELY AND CONTINUE UNTIL COMPLETED.

      i. ALL SUCH REPAIRS SHALL BE IN ACCORDANCE WITH THE CONTRACT SPECIFICATIONS OR AS DIRECTED BY THE ENGINEER AND SHALL BE AT THE CONTRACTOR'S EXPENSE.

      ii. IF FAA CABLES ARE DAMAGED, REPAIRS SHALL BE DONE IN ACCORDANCE WITH FAA REQUIREMENTS AND IN THE PRESENCE OF AN FAA REPRESENTATIVE. THE FAA MAY ELECT TO HAVE THE REPAIR PERFORMED BY OTHERS IN WHICH CASE THE CONTRACTOR SHALL BE RESPONSIBLE FOR PAYING THE INCURRED COSTS OF REPAIRS.

   c. UTILITIES NOTIFICATION – AT LEAST FOURTEEN DAYS PRIOR TO COMMENCING CONSTRUCTION OPERATIONS IN AN AREA WHICH MAY INVOLVE UNDERGROUND UTILITIES AND/OR TEMPORARY SUSPENSION OF SERVICES, THE CONTRACTOR SHALL NOTIFY THE ENGINEER TO ISSUE A TENANT INFORMATION ADVISORY.

      THE FOLLOWING LIST INCLUDES POSSIBLE UTILITIES WITHIN THE CONSTRUCTION LIMITS. ADDITIONAL UTILITIES NOT LISTED BELOW MAY ALSO BE ON-SITE.

      UTILITY OWNERSHIP:

MISS UTILITY CENTER	1-800-257-7777
BGE	(410) 685-0123 (410) 234-5000 1-800-685-0123
VERIZON REPAIR BURIED CABLE	(410) 954-2222 1-800-275-2355
FAA AIRWAY FACILITIES SSC	(410) 859-7252
COMCAST	(410) 931-4600 (410) 729-8000
MILLENIUM DIGITAL MEDIA	(410) 987-9300
ANNE ARUNDEL COUNTY UTILITY OPERATIONS BUREAU (WATER SUPPLY FROM AIRPORT PERIMETER TO METER)	
EMERGENCIES	(410) 222-8400
GENERAL INFORMATION	(410) 222-7520
COLONIAL PIPELINE	1-800-926-2728 (24/7)

   d. UTILITIES IDENTIFICATION – THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING UTILITY IDENTIFICATION MARKINGS THROUGHOUT THE DURATION OF THE PROJECT.

EMERGENCY CONTACT INFORMATION

1. EXCEPT FOR EMERGENCIES, ALL CONTACT WITH AIRPORT PERSONNEL SHALL BE MADE THROUGH THE ENGINEER. FOR EMERGENCIES INVOLVING SAFETY (INJURIES, FIRES, SECURITY BREACHES, ETC.) THE CONTRACTOR SHALL MAKE DIRECT CONTACT WITH AIRPORT OPERATIONS FOLLOWED BY NOTIFICATION TO THE ENGINEER AS SOON AS POSSIBLE.

2. THE PROJECT SUPERVISORS SHALL HAVE THE FOLLOWING TELEPHONE NUMBERS WITH THEM AT ALL TIMES:

i.	MAA FIRE MARSHAL	(410) 859-7815/7511
ii.	BWI FIRE/RESCUE/MEDICAL EMERGENCY	(410) 859-7222
iii.	BWI POLICE EMERGENCY	(410) 859-7040
iv.	BWI DUTY AIRPORT OPERATIONS MGR	(410) 859-7018
v.	CONSOLIDATED DISPATCH CENTER	(410) 859-7117
vi.	BWI OFFICE OF AIRPORT SECURITY	(410) 859-7162
vii.	MDE OIL CONTROL PROGRAM (COMPLIANCE AND REMEDIATION)	(410) 537-3442

3. THE CONTRACTOR SHALL PROVIDE THE PHONE NUMBERS OF THREE PERSONNEL, INCLUDING THE PROJECT SUPERINTENDENT, WHO MAY BE CONTACTED IN AN EMERGENCY.

4. THE CONTRACTOR SHALL PROVIDE THE NAME AND PHONE NUMBERS OF THE PROJECT SECURITY COORDINATOR AND THE DESIGNATED ALTERNATE WHO SHALL BE ON CALL 24 HOURS PER DAY FOR CONTACT REGARDING SECURITY ISSUES.

COMPANY NAME

COMPANY NAME
COMPANY ADDRESS
CITY, STATE ZIP CODE
COMPANY PHONE NO. COMPANY FAX NO.

DESIGNED: ---
DRAWN: ---
CHECKED: ---
APPROVED: ---

"PROFESSIONAL CERTIFICATION:

I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND."

LICENSE NO. _____
EXPIRATION DATE: _____

REVISION NO.	REVISION DATE	DESCRIPTIONS

BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION

OFFICE OF DESIGN AND CONSTRUCTION

PROJECT TITLE: PROJECT TITLE

SHEET TITLE: GENERAL CONSTRUCTION AND SAFETY NOTES – STERILE BUILDING AREAS

SCALE: NONE
DATE: DATE

CONTRACT NO.: MAA-CO-XX-XXX

SHEET NO.: ---

PATH/FILENAME

GENERAL CONSTRUCTION NOTES

1. THIS PROJECT IS FOR WORK AT BALTIMORE/WASHINGTON INTERNATIONAL THURGOOD MARSHALL AIRPORT, HEREAFTER REFERRED TO AS 'THE AIRPORT' OR 'BWI'.

2. THIS PROJECT SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE CONTRACT PLANS AND SPECIFICATIONS AND ANY RULES, REGULATIONS, STANDARDS, OR SPECIFICATIONS REFERENCED THEREIN. THE PROJECT IS SUBJECT TO INSPECTION BY REPRESENTATIVES OF THE MARYLAND AVIATION ADMINISTRATION (MAA), THE FEDERAL AVIATION ADMINISTRATION (FAA), AND OTHER GOVERNING AGENCIES.

3. PROJECT PHASING – THE PROJECT IS TO BE COMPLETED IN CLOSE CONFORMANCE WITH THE PHASING PLANS AND NOTES AS CONTAINED IN THE CONTRACT DOCUMENTS. CHANGES TO THE PHASING PLANS SHALL BE COORDINATED WITH THE ENGINEER AND REVIEWED WITH THE DESIGNER PRIOR TO IMPLEMENTATION.

4. PROJECT COMPLETION TIMES – THE CONTRACTOR IS EXPECTED TO COMPLETE CRITICAL PORTIONS OF THE PROJECT WITHIN THE SPECIFIED TIMEFRAMES AND TO COMPLETE THE ENTIRE PROJECT ON TIME. LIQUIDATED DAMAGES WILL BE ASSESSED SHOULD THE TIMEFRAME BE EXCEEDED.

5. CONSTRUCTION LIMITS – ALL CONTRACTOR VEHICLES SHALL REMAIN WITHIN THE DESIGNATED CONSTRUCTION LIMITS OR HAUL ROUTES (UNLESS OTHERWISE AUTHORIZED).

6. DIMENSIONS IDENTIFIED ON THE PLANS SHALL BE VERIFIED IN THE FIELD. IN GENERAL, SMALL-SCALE DRAWINGS WITH GREATER RESOLUTION (I.E. 1"=50') GOVERN OVER LARGER SCALE DRAWINGS OF LESS RESOLUTION (I.E. 1"=500'), WRITTEN NOTES GOVERN OVER GRAPHIC REPRESENTATION AND SPECIFICATIONS GOVERN OVER DRAWINGS. ANY DISCREPANCIES SHALL BE REPORTED TO THE ENGINEER FOR CLARIFICATION.

7. EXISTING TOPOGRAPHIC FIELD SURVEYS WERE PROVIDED BY SURVEYORS NAME AND DATE. THE CONTROL ON THIS PROJECT IS TIED TO THE NAD 83/2007 HORIZONTAL DATUM AND NAVD 88 VERTICAL DATUM. SURVEY UNITS SHALL BE IN U.S. SURVEY FOOT. PROJECT BENCHMARKS ARE SHOWN ON THE GENERAL PROJECT LAYOUT.

8. THE CONTRACTOR SHALL PROVIDE AN ADEQUATE NUMBER OF WATER TRUCKS TO CONTROL DUST IN THE PROJECT WORK AREA, STAGING AREA, STORAGE AREAS, HAUL ROUTES AND THE WASTE SITE.

9. ALL THE PERMITS AND LICENSES REQUIRED FOR THE PROJECT WORK SHALL BE OBTAINED AT THE CONTRACTOR'S EXPENSE.

10. IN ACCORDANCE WITH THE SPECIFICATIONS, FEDERAL WAGE RATES SHALL BE POSTED OUTSIDE THE SITE FIELD OFFICE(S) IN A WEATHERPROOF ENCLOSURE. [FOR FEDERALLY FUNDED PROJECTS ONLY]

GENERAL AIRFIELD SAFETY DURING CONSTRUCTION

1. THE CONTRACTOR SHALL ACQUAINT SUPERVISORS AND EMPLOYEES WITH ACTIVITY AND OPERATIONS THAT ARE INHERENT TO THE AIRPORT AND SHALL CONDUCT CONSTRUCTION ACTIVITIES TO CONFORM TO ALL ROUTINE AND EMERGENCY AIR TRAFFIC REQUIREMENTS AND GUIDELINES FOR SAFETY SPECIFIED HEREIN.

2. THE CONTRACTOR AND HIS/HER SUBCONTRACTOR(S) SHALL PROTECT WORKERS, MAA AND AIRPORT TENANT EMPLOYEES, AND THE GENERAL PUBLIC. THE CONTRACTOR SHALL ALSO ENSURE THAT PROPERTY OR EQUIPMENT, UNRELATED TO WORK, WHICH BELONGS TO MAA OR AIRPORT TENANTS IS NOT DAMAGED DURING CONSTRUCTION.

3. THE CONTRACTOR SHALL NOT ALLOW EMPLOYEES, SUBCONTRACTORS, SUPPLIERS, OR ANY OTHER UNAUTHORIZED PERSON TO ENTER OR REMAIN IN ANY AIRPORT AREA WHICH WOULD BE HAZARDOUS TO PERSONS OR TO AIRCRAFT OPERATIONS.

4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ALL NECESSARY PROTECTIVE GEAR AND EQUIPMENT REQUIRED FOR THE PROTECTION OF THE CONTRACTOR'S PERSONNEL DURING CONSTRUCTION.

5. THE CONTRACTOR SHALL INSPECT ALL CONSTRUCTION AND STORAGE AREAS AS OFTEN AS NECESSARY AND PROMPTLY TAKE ALL STEPS NECESSARY TO PREVENT OR REMEDY ANY UNSAFE OR POTENTIALLY UNSAFE CONDITIONS OR ACTIVITIES DISCOVERED.

6. THE CONTRACTOR SHALL BE AWARE OF THE FOLLOWING TYPES OF SAFETY PROBLEMS AND/OR HAZARDS:

   a. UNMARKED UTILITY, NAVAID, WEATHER SERVICE, RUNWAY LIGHTING, OR OTHER POWER OR SIGNAL CABLES THAT COULD BE DAMAGED DURING CONSTRUCTION.

   b. OBJECTS, WHETHER OR NOT MARKED OR FLAGGED, OR ACTIVITIES ANYWHERE ON OR IN THE VICINITY OF THE AIRPORT WHICH COULD BE DISTRACTING, CONFUSING, OR ALARMING TO PILOTS DURING AIRCRAFT OPERATIONS.

   c. UNFLAGGED/UNLIGHTED LOW VISIBILITY ITEMS SUCH AS TALL CRANES, DRILLS, ETC. ANYWHERE IN THE VICINITY OF ACTIVE RUNWAYS OR IN ANY APPROACH OR DEPARTURE AREA. SUCH EQUIPMENT SHALL BE PARKED IN THE CONTRACTOR'S STAGING AREA AND THE BOOM(S) LOWERED TO THE GROUND WHEN NOT IN USE.

   d. MISLEADING OR MALFUNCTIONING LIGHTS OR UNLIGHTED/UNMARKED OBSTRUCTIONS IN THE APPROACH TO ANY ACTIVE RUNWAY.

   e. BIRD ATTRACTANTS SUCH AS EDIBLES (FOOD SCRAPS, ETC.), MISCELLANEOUS TRASH, OR PONDED WATER. FOOD SCRAPS AND MISCELLANEOUS TRASH SHALL BE SECURED BY THE CONTRACTOR AND DISPOSED OF USING PROPER SANITARY METHODS.

SITE ACCESS, CONTRACTOR STAGING, HAUL ROUTES, AND MATERIAL STORAGE

1. ACCESS TO THE SITE – THE CONTRACTOR'S ACCESS POINTS TO THE SITE SHALL BE AS SHOWN ON THE SECURITY BID PLAN (CHANGE TO APPROPRIATE SHEET TITLE FOR PROJECTS WITHOUT A SECURITY BID PLAN). THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL VEHICLES AND PERSONNEL WHO ENTER THE AIRPORT THROUGH THESE ACCESS POINTS. THE CONTRACTOR IS RESPONSIBLE FOR TRANSPORTING EMPLOYEES TO AND FROM THE JOB SITE. PERSONAL VEHICLES SHALL NOT BE PARKED ANYWHERE WITHIN THE AIRPORT OPERATIONS AREA.

2. ALL OFF-SITE HAUL ROUTES SHALL BE SELECTED TO MINIMIZE DISTURBANCE TO THE PUBLIC. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO COORDINATE OFF-SITE HAUL ROUTES (STATE HIGHWAYS, COUNTY ROADS, OR CITY STREETS) WITH THE APPROPRIATE OWNER WHO HAS JURISDICTION OVER THE AFFECTED ROUTE. THE CONTRACTOR'S ON-AIRPORT HAUL ROUTES ARE INDICATED ON THE SECURITY BID PLAN (CHANGE TO APPROPRIATE SHEET TITLE FOR PROJECTS WITHOUT A SECURITY BID PLAN).

3. ON-SITE ROADS AND OTHER AIRFIELD PAVEMENTS USED AS HAUL ROUTES SHALL BE MAINTAINED BY THE CONTRACTOR AND SHALL BE RESTORED AT THE CONTRACTOR'S EXPENSE TO THEIR ORIGINAL CONDITION UPON COMPLETION OF BEING USED AS A HAUL ROUTE, UNLESS OTHERWISE DIRECTED BY THE CONTRACT DOCUMENTS OR BY THE ENGINEER. THE BEFORE AND AFTER CONDITION OF ALL ON-SITE HAUL ROUTES (TEMPORARY OR PERMANENT) SHALL BE JOINTLY INSPECTED AND DETERMINED BY THE CONTRACTOR AND THE ENGINEER THROUGH THE USE OF DIGITAL PHOTOGRAPHY AND/OR VIDEO. THE CONTRACTOR MAY NEED TO COORDINATE HAUL ROUTE USAGE WITH OTHER CONTRACTORS WORKING ON THE AIRPORT.

4. FENCING, DRAINAGE, GRADING AND OTHER MISCELLANEOUS CONSTRUCTION REQUIRED TO CONSTRUCT OR RESTORE TEMPORARY OR PERMANENT HAUL ROUTES OR ACCESS POINTS ON THE AIRPORT WILL BE THE CONTRACTOR'S RESPONSIBILITY AND SHALL BE APPROVED BY THE ENGINEER PRIOR TO COMMENCING THE WORK.

5. ALL ON-SITE ACCESS ROADS TO AIRPORT FACILITIES SHALL REMAIN OPEN AND MAINTAINED AT ALL TIMES.

6. CONTRACTOR'S STAGING AREA – AN AREA WILL BE MADE AVAILABLE FOR CONTRACTOR'S MOBILIZATION AND STORAGE. THE CONTRACTOR'S STAGING AREA SHALL BE FREE OF DEBRIS. IF DIRECTED BY THE ENGINEER, THE CONTRACTOR WILL BE REQUIRED TO STAKE OUT AND FLAG THE STAGING AREA LIMITS. UPON COMPLETION OF THE PROJECT, THE STAGING AREA SHALL BE RESTORED TO ITS ORIGINAL CONDITION.

7. ALL MATERIALS AND EQUIPMENT (INCLUDING STOCKPILED MATERIAL) WHEN NOT IN USE SHALL BE PLACED IN APPROVED AREAS WHERE THEY WILL NOT CONSTITUTE A HAZARD TO AIRCRAFT OPERATIONS AND NOT PENETRATE CLEARANCE SURFACES SHOWN ON THE GENERAL CONSTRUCTION AND SAFETY NOTES.

   - THE FAR PART 77 APPROACH, PRIMARY, AND TRANSITIONAL SURFACES GOVERN STOCKPILES AND PARKED EQUIPMENT. UNDER NO CIRCUMSTANCES SHALL STOCKPILES, PARKED EQUIPMENT, OR OTHER CONSTRUCTION ITEMS PENETRATE THESE SURFACES ADJACENT TO AN ACTIVE RUNWAY.

   - EQUIPMENT SHALL BE PARKED AT THE CONTRACTOR'S STAGING AREA WHEN NOT IN USE. TALL EQUIPMENT SUCH AS CRANES SHALL BE LOWERED TO THE GROUND WHEN NOT IN USE. STOCKPILED MATERIAL SHALL BE CONSTRAINED IN A MANNER TO PREVENT MOVEMENT RESULTING FROM WIND CONDITIONS IN EXCESS OF 10 KNOTS.

PROJECT COORDINATION

1. ALL COORDINATION BETWEEN THE CONTRACTOR AND MAA OFFICES SHALL BE DONE THROUGH THE ENGINEER EXCEPT AS NOTED UNDER **EMERGENCY CONTACT INFORMATION** SECTION OF THESE NOTES.

2. THE CONTRACTOR SHALL PROVIDE THE ENGINEER WITH A CURRENT LIST OF ALL EMPLOYEES WORKING ON THE AIRPORT INCLUDING SUBCONTRACTORS. THE LIST SHALL BE MAINTAINED CURRENT BY THE CONTRACTOR.

3. CONTRACTOR COORDINATION – CONSTRUCTION AND MAINTENANCE OPERATIONS BY OTHERS MAY OCCUR CONCURRENTLY AND IN THE VICINITY OF CONSTRUCTION ASSOCIATED WITH THIS PROJECT. THE CONTRACTOR SHALL COORDINATE OPERATIONS AND COOPERATE WITH MAINTENANCE CREWS AND OTHER CONTRACTORS WORKING ON THE AIRPORT.

4. COORDINATION WITH BWI AIRPORT FIRE RESCUE SERVICE (VIA THE ENGINEER):

   a. THE CONTRACTOR SHALL COMPLY WITH MARYLAND FIRE LAWS, NFPA 1 – UNIFORM FIRE CODE, ; CHAPTER 16, 'SAFETY DURING CONSTRUCTION AND DEMOLITION OPERATIONS' (CURRENT EDITIONS) AND CHAPTER 21, 'AIRPORTS'.

   b. OPEN FLAME, WELDING OR TORCH CUTTING OPERATIONS ARE PROHIBITED WITHOUT FIRST OBTAINING A BWI AIRPORT WELDING AND BURNING PERMIT. THE PERMIT IS AVAILABLE AT THE BWI FIRE MARSHAL'S OFFICE, 991 CORPORATE BLVD, LINTHICUM, MD 21090. THE PERMIT MAY BE REQUESTED FOR A PERIOD NOT TO EXCEED THIRTY DAYS. PRIOR TO COMMENCING WORK, ANY PERSON CONDUCTING OPEN FLAME/HOT WORK OPERATIONS SHALL BE FAMILIAR WITH THE LATEST EDITION OF NFPA 51B STANDARD FOR FIRE PREVENTION DURING WELDING, CUTTING, AND OTHER HOT WORK. ADEQUATE FIRE AND SAFETY PRECAUTIONS MUST BE TAKEN AND THE PROCEDURE APPROVED PRIOR TO COMMENCEMENT OF WORK. A FIRE WATCH IS REQUIRED.

   c. A HYDRANT USE PERMIT IS REQUIRED PRIOR TO CONNECTION TO ANY AIRPORT FIRE HYDRANT.

5. PORTABLE FLOODLIGHTING – USE OF PORTABLE FLOODLIGHTING SHALL BE COORDINATED WITH AIRPORT OPERATIONS AND THE ENGINEER TO ENSURE THAT THE LIGHTING DOES NOT COMPROMISE THE CONTROL TOWER'S VISIBILITY OR THAT IT IS NOT POSITIONED SUCH THAT IT FACES INTO ANY RUNWAY APPROACH WHERE IT MIGHT CAUSE CONFUSION TO PILOTS. THE CONTRACTOR SHALL PROVIDE PORTABLE FLOODLIGHTING AS REQUIRED FOR NIGHT CONSTRUCTION OPERATIONS.

6. FLAGMEN AND VEHICLE ESCORTS – THE CONTRACTOR SHALL FURNISH FLAGMEN AS NECESSARY TO CONTROL CONSTRUCTION TRAFFIC UNLESS OTHERWISE DIRECTED BY THE ENGINEER OR AIRPORT OPERATIONS.

7. UTILITIES:

   a. UNDERGROUND UTILITIES – LOCATIONS OF KNOWN UNDERGROUND UTILITIES SHOWN ON THE PLANS ARE APPROXIMATE. ALL UTILITY LOCATIONS SHALL BE FIELD VERIFIED BY THE CONTRACTOR PRIOR TO COMMENCING CONSTRUCTION. THE CONTRACTOR IS REQUIRED TO COMPLETE A DIGGING AUTHORIZATION FORM, AS SUPPLIED BY THE ENGINEER, PRIOR TO ANY AND ALL GROUND DISTURBANCE.

   b. REPAIR OF UTILITIES DAMAGED DURING CONSTRUCTION MUST BE STARTED IMMEDIATELY AND CONTINUE UNTIL COMPLETED.

      i. ALL SUCH REPAIRS SHALL BE IN ACCORDANCE WITH THE CONTRACT SPECIFICATIONS OR AS DIRECTED BY THE ENGINEER AND SHALL BE AT THE CONTRACTOR'S EXPENSE.

      ii. IF FAA CABLES ARE DAMAGED, REPAIRS SHALL BE DONE IN ACCORDANCE WITH FAA REQUIREMENTS AND IN THE PRESENCE OF AN FAA REPRESENTATIVE. THE FAA MAY ELECT TO HAVE THE REPAIR PERFORMED BY OTHERS IN WHICH CASE THE CONTRACTOR SHALL BE RESPONSIBLE FOR PAYING THE INCURRED COSTS OF REPAIRS.

   c. UTILITIES NOTIFICATION – AT LEAST FOURTEEN DAYS PRIOR TO COMMENCING CONSTRUCTION OPERATIONS IN AN AREA WHICH MAY INVOLVE UNDERGROUND UTILITIES AND/OR TEMPORARY SUSPENSION OF SERVICES, THE CONTRACTOR SHALL NOTIFY THE ENGINEER TO ISSUE A TENANT INFORMATION ADVISORY.

   THE FOLLOWING LIST INCLUDES POSSIBLE UTILITIES WITHIN THE CONSTRUCTION LIMITS. ADDITIONAL UTILITIES NOT LISTED BELOW MAY ALSO BE ON-SITE.

   UTILITY OWNERSHIP:

MISS UTILITY CENTER	1-800-257-7777
BGE	(410) 685-0123 (410) 234-5000 1-800-685-0123
VERIZON REPAIR BURIED CABLE	(410) 954-2222 1-800-275-2355
FAA AIRWAY FACILITIES SSC	(410) 859-7252
COMCAST	(410) 931-4600 (410) 729-8000
MILLENIUM DIGITAL MEDIA	(410) 987-9300
ANNE ARUNDEL COUNTY UTILITY OPERATIONS BUREAU (WATER SUPPLY FROM AIRPORT PERIMETER TO METER)	
EMERGENCIES	(410) 222-8400
GENERAL INFORMATION	(410) 222-7520
COLONIAL PIPELINE	1-800-926-2728 (24/7)

   d. UTILITIES IDENTIFICATION – THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING UTILITY IDENTIFICATION MARKINGS THROUGHOUT THE DURATION OF THE PROJECT.

EMERGENCY CONTACT INFORMATION

1. EXCEPT FOR EMERGENCIES, ALL CONTACT WITH AIRPORT PERSONNEL SHALL BE MADE THROUGH THE ENGINEER. FOR EMERGENCIES INVOLVING SAFETY (INJURIES, FIRES, SECURITY BREACHES, ETC.) THE CONTRACTOR SHALL MAKE DIRECT CONTACT WITH AIRPORT OPERATIONS FOLLOWED BY NOTIFICATION TO THE ENGINEER AS SOON AS POSSIBLE.

2. THE PROJECT SUPERVISORS SHALL HAVE THE FOLLOWING TELEPHONE NUMBERS WITH THEM AT ALL TIMES:

i.	MAA FIRE MARSHAL	(410) 859-7815/7511
ii.	BWI FIRE/RESCUE/MEDICAL EMERGENCY	(410) 859-7222
iii.	BWI POLICE EMERGENCY	(410) 859-7040
iv.	BWI DUTY AIRPORT OPERATIONS MGR	(410) 859-7018
v.	CONSOLIDATED DISPATCH CENTER	(410) 859-7117
vi.	BWI OFFICE OF AIRPORT SECURITY	(410) 859-7162
vii.	FAA AIR TRAFFIC CONTROL TOWER	(410) 859-7636
viii.	MDE OIL CONTROL PROGRAM (COMPLIANCE AND REMEDIATION)	(410) 537-3442

3. THE CONTRACTOR SHALL PROVIDE THE PHONE NUMBERS OF THREE PERSONNEL, INCLUDING THE PROJECT SUPERINTENDENT, WHO MAY BE CONTACTED IN AN EMERGENCY.

4. THE CONTRACTOR SHALL PROVIDE THE NAME AND PHONE NUMBERS OF THE PROJECT SECURITY COORDINATOR AND THE DESIGNATED ALTERNATE WHO SHALL BE ON CALL 24 HOURS PER DAY FOR CONTACT REGARDING SECURITY ISSUES (REMOVE NOTE IF NOT APPLICABLE).

RELATED DOCUMENTS

1. FAA ADVISORY CIRCULARS (AC's), ORDERS AND FEDERAL AVIATION REGULATIONS (FAR's) – THE FOLLOWING PUBLICATIONS CONTAIN DEFINITIONS OR DESCRIPTIONS OF CRITICAL AIRPORT OPERATING AREAS. COPIES OF THESE PUBLICATIONS ARE AVAILABLE THROUGH THE FAA AT WWW.FAA.GOV AND CAN BE REVIEWED AT THE OFFICES OF THE MAA.

   THE ITEMS OUTLINED BELOW PERTAIN TO AIRFIELD SAFETY REQUIREMENTS AND ARE REFERENCED THROUGHOUT THE CONTRACT DOCUMENTS.

   a. AC 150/5370-2, 'OPERATIONAL SAFETY ON AIRPORTS DURING CONSTRUCTION', CURRENT EDITION, SETS FORTH GUIDELINES TO ASSIST AIRPORT OPERATORS IN COMPLYING WITH FAR PART 139, "CERTIFICATION OF AIRPORTS" AND WITH THE REQUIREMENTS OF FEDERALLY FUNDED AIRPORT CONSTRUCTION PROJECTS.

   b. FAR PART 77 'SAFE, EFFICIENT USE, AND PRESERVATION OF THE NAVIGABLE AIRSPACE', CURRENT EDITION:

      i. ESTABLISHES STANDARDS FOR DETERMINING OBSTRUCTIONS TO NAVIGABLE AIRSPACE. IMAGINARY SURFACES ARE DEFINED IN THE PUBLICATION AND ARE SHOWN ON THIS SHEET.

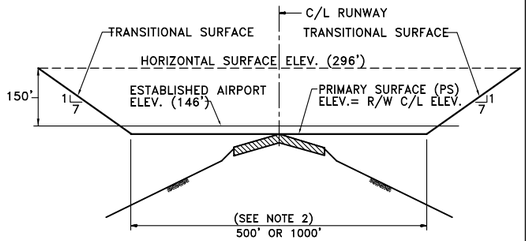
      ii. ESTABLISHES REQUIREMENTS FOR FILING NOTICE TO THE FAA FOR CERTAIN PROPOSED CONSTRUCTION OR ALTERATION PROPOSALS. COMPLETION OF THE 'NOTICE OF PROPOSED CONSTRUCTION OR ALTERATION' FORM (FAA FORM 7460-1) IS DISCUSSED IN AC 70/7460-1 'OBSTRUCTION MARKING AND LIGHTING', CURRENT EDITION.

   c. REFER TO EQUIPMENT HEIGHT PLAN (SHEET X.XXX) [CHANGE TO APPROPRIATE SHEET TITLE FOR PROJECTS WITHOUT AN EQUIPMENT HEIGHT PLAN] FOR CONSTRUCTION HEIGHT LIMITATIONS. IF CONTRACTOR REQUIRES EQUIPMENT HEIGHTS GREATER THAN THOSE OUTLINED ON EQUIPMENT HEIGHT PLAN [CHANGE TO APPROPRIATE SHEET TITLE FOR PROJECTS WITHOUT AN EQUIPMENT HEIGHT PLAN], CONTACT MAA'S DIVISION OF AIRPORT FACILITIES PLANNING (410-859-7089). THE FAA WILL NEED TO APPROVE ANY CHANGES IN ELEVATION, AND IT MAY TAKE UP TO 90 DAYS TO PROCESS SUCH REQUESTS.

   d. AC 150/5300-13, 'AIRPORT DESIGN', CURRENT EDITION, ESTABLISHES DESIGN, OPERATIONAL, AND MAINTENANCE STANDARDS FOR AIRPORTS. STANDARD TERMS USED IN THE CONTRACT PLANS AND SPECIFICATIONS ARE DEFINED BELOW.

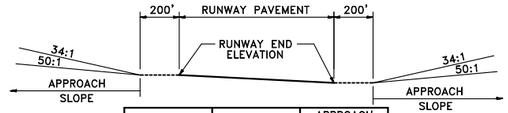
      i. OBJECT FREE AREA (OFA) – A TWO DIMENSIONAL GROUND AREA SURROUNDING RUNWAYS, TAXIWAYS, AND TAXILANES WHICH IS CLEAR OF OBJECTS EXCEPT FOR OBJECTS WHOSE LOCATION IS FIXED BY FUNCTION.

      ii. SAFETY AREA – THE SURFACE ADJACENT TO RUNWAYS, TAXIWAYS, AND TAXILANES OVER WHICH AIRCRAFT SHOULD, IN DRY WEATHER, BE ABLE TO CROSS AT NORMAL SPEEDS WITHOUT INCURRING ANY SIGNIFICANT DAMAGE. A SAFETY AREA IS GRADED, DRAINED AND COMPACTED. IT IS FREE OF ANY HOLES, TRENCHES, BUMPS OR OTHER SIGNIFICANT SURFACE VARIATIONS OR OBJECTS OTHER THAN THOSE WHICH MUST BE THERE BECAUSE OF THEIR ESSENTIAL AERONAUTICAL FUNCTION. THE SAFETY AREA REQUIRES THE CAPABILITY OF SUPPORTING MAINTENANCE VEHICLES AND AIRCRAFT RESCUE AND FIRE FIGHTING VEHICLES UNDER NORMAL (DRY) CONDITIONS.



NOTES:
1. SEE "CONTRACTOR'S SAFETY REQUIREMENTS DURING CONSTRUCTION" AS CONTAINED IN THE PLANS REGARDING RESTRICTED AREAS IN THE VICINITY OF ACTIVE RUNWAYS AND TAXIWAYS.
2. IMAGINARY SURFACE REQUIREMENTS FOR EXISTING ACTIVE RUNWAYS (R/W) ARE SIMILAR EXCEPT PRIMARY SURFACES (PS) DIMENSIONS VARY:
   R/W 4–22 – 500' PS (250' LT. & RT. OF C/L)
   R/W 10–28 – 1000' PS (500' LT. & RT. OF C/L)
   R/W 15R–33L – 1000' PS (500' LT. & RT. OF C/L)
   R/W 15L–33R – 1000' PS (500' LT. & RT. OF C/L)

TYPICAL SECTION
F A R PART 77 IMAGINARY SURFACES
NOT TO SCALE



RUNWAY END	ELEVATION	APPROACH SLOPE
10	139.0	50:1
28	126.2	50:1
15R	138.6	50:1
33L	129.2	50:1
4	146.0	34:1
22	137.7	34:1
15L	141.5	50:1
33R	114.1	50:1

TYPICAL APPROACH PROFILE
F A R PART 77 IMAGINARY SURFACES
NOT TO SCALE

COMPANY NAME COMPANY NAME COMPANY ADDRESS CITY, STATE ZIP CODE COMPANY PHONE NO. COMPANY FAX NO.	DESIGNED: --- DRAWN: --- CHECKED: --- APPROVED: ---	"PROFESSIONAL CERTIFICATION: I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND." LICENSE NO. _____ EXPIRATION DATE: _____	REVISION NO. / REVISION DATE / DESCRIPTIONS	BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT	MARYLAND DEPARTMENT OF TRANSPORTATION MARYLAND AVIATION ADMINISTRATION OFFICE OF DESIGN AND CONSTRUCTION	PROJECT TITLE: PROJECT TITLE SHEET TITLE: GENERAL CONSTRUCTION AND SAFETY NOTES – NON-SECURE AREAS SCALE: NONE / DATE: DATE	CONTRACT NO.: MAA-CO-XX-XXX SHEET NO.: ---

PATH/FILENAME

GENERAL CONSTRUCTION NOTES

1. THIS PROJECT IS FOR WORK AT MARTIN STATE AIRPORT (MTN), HEREAFTER REFERRED TO AS 'THE AIRPORT'.

2. THIS PROJECT SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE CONTRACT PLANS AND SPECIFICATIONS AND ANY RULES, REGULATIONS, STANDARDS, OR SPECIFICATIONS REFERENCED THEREIN. THE PROJECT IS SUBJECT TO INSPECTION BY REPRESENTATIVES OF THE MARYLAND AVIATION ADMINISTRATION (MAA), THE FEDERAL AVIATION ADMINISTRATION (FAA), AND OTHER GOVERNING AGENCIES.

3. PROJECT PHASING – THE PROJECT IS TO BE COMPLETED IN CLOSE CONFORMANCE WITH THE PHASING PLANS AND NOTES AS CONTAINED IN THE CONTRACT DOCUMENTS. UPON COMPLETION OF ANY STAGE OR PHASE OF WORK, THE ENGINEER WILL ARRANGE A PHYSICAL INSPECTION OF THE AREA WITH AIRPORT OPERATIONS PERSONNEL PRIOR TO THE OPENING OF ANY TAXIWAY, RUNWAY, RAMP AREA OR AIRPORT ROADWAY THAT HAS BEEN CLOSED FOR WORK OR USED FOR A CROSSING POINT OR HAUL ROUTE BY THE CONTRACTOR.

4. PROJECT COMPLETION TIMES – THE CONTRACTOR IS EXPECTED TO COMPLETE CRITICAL PORTIONS OF THE PROJECT WITHIN THE SPECIFIED TIMEFRAMES AND TO COMPLETE THE ENTIRE PROJECT ON TIME. LIQUIDATED DAMAGES, IF SPECIFIED, WILL BE ASSESSED SHOULD THE TIMEFRAME BE EXCEEDED.

5. AIRPORT OPERATIONS – THE AIRPORT WILL BE IN OPERATION DURING THE CONSTRUCTION OF THIS PROJECT. RUNWAY 15–33 WILL OPERATE AS A 3,000 FOOT RUNWAY DAWN TO DUSK DAILY. COORDINATION OF WORK WITH AIRPORT OPERATIONS IS MANDATORY TO MINIMIZE IMPACTS TO AIRPORT USERS.

6. CONTRACTOR COORDINATION – CONSTRUCTION AND MAINTENANCE OPERATIONS BY OTHERS MAY OCCUR CONCURRENTLY AND IN THE VICINITY OF CONSTRUCTION ASSOCIATED WITH THIS PROJECT. THE CONTRACTOR SHALL COORDINATE OPERATIONS AND COOPERATE WITH MAINTENANCE CREWS AND OTHER CONTRACTORS WORKING AT THE AIRPORT. CONTRACTOR COORDINATION WITH APPROPRIATE GOVERNMENT AND UTILITY AGENCIES IS ALSO REQUIRED PRIOR TO AND DURING CONSTRUCTION.

7. FACILITY CLOSURES – PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL ARRANGE TO MEET WITH AIRPORT OPERATIONS, THE FAA, AND THE ENGINEER TO EVALUATE AND ESTABLISH ANY RUNWAY AND TAXIWAY CLOSURE TIMES AND DURATIONS. TO THE EXTENT POSSIBLE, THE CONTRACTOR SHALL COORDINATE CONSTRUCTION TO COINCIDE WITH RUNWAY AND TAXIWAY CLOSURES ALREADY SCHEDULED FOR CONSTRUCTION AND MAINTENANCE OPERATIONS BY OTHERS.

8. WASTE MATERIALS (i.e. TREES, STUMPS, EXCESS SOIL, ETC.) SHALL BE DISPOSED OF OFF AIRPORT PROPERTY. TRASH (i.e. CUPS, CANS, BOTTLES, PAPER, ETC.) SHALL BE DISPOSED OF THROUGH PROPER SANITARY METHODS.

9. EXISTING AIRFIELD LIGHTING SYSTEMS – INTERRUPTION OF EXISTING AIRFIELD LIGHTING SYSTEMS NOT INCLUDED IN THIS PROJECT SHALL NOT BE PERMITTED. ALL AIRFIELD LIGHTING CIRCUITS AFFECTED BY THIS PROJECT SHALL BE TEMPORARILY MAINTAINED BY THE CONTRACTOR DURING OPERATIONAL PERIODS.

10. PORTABLE FLOODLIGHTING – THE CONTRACTOR SHALL PROVIDE PORTABLE FLOODLIGHTING AS REQUIRED FOR NIGHT CONSTRUCTION OPERATIONS. THE CONTRACTOR SHALL PROVIDE SUFFICIENT UNITS SO THAT ALL WORK AREAS ARE ILLUMINATED TO A LEVEL OF FIVE (5) HORIZONTAL FOOT CANDLES. THE LIGHTING LEVELS SHALL BE CALCULATED AND MEASURED IN ACCORDANCE WITH THE CURRENT STANDARDS OF THE ILLUMINATION ENGINEERING SOCIETY. THE CONTRACTOR SHALL COORDINATE THE USE OF FLOODLIGHTING WITH THE CONTROL TOWER TO ENSURE THAT THE LIGHTING DOES NOT COMPROMISE THE CONTROL TOWER'S VISIBILITY OR CAUSE CONFUSION TO PILOTS.

11. THE CONTRACTOR SHALL PROVIDE TIMBER AND BUCKET TYPE CONSTRUCTION BARRICADES WITH FLASHING RED LIGHTS AS SHOWN ON THE DRAWINGS TO DELINEATE THE WORK AREAS WHEN CLOSED TO AIRPORT TRAFFIC. OPEN TRENCHES, EXCAVATIONS AND STOCKPILE MATERIAL LOCATED IN THE AOA SHALL BE PROMINENTLY MARKED WITH ORANGE FLAGS AND LIGHTED BY APPROVED LIGHT UNITS DURING HOURS OF LIMITED VISIBILITY AND DARKNESS.

12. THE CONTRACTOR SHALL PROVIDE AN ADEQUATE NUMBER OF WATER TRUCKS TO CONTROL DUST IN THE PROJECT WORK AREA, STAGING/STORAGE AREAS, HAUL ROUTES AND THE WASTE SITE.

13. ALL THE PERMITS AND LICENSES REQUIRED FOR THE PROJECT WORK SHALL BE OBTAINED AT THE CONTRACTOR'S EXPENSE.

14. EXISTING TOPOGRAPHIC FIELD SURVEYS AND UTILITY SURVEYS FOR THIS PROJECT WERE PERFORMED BY SURVEYOR NAME AND DATE PERFORMED. THE CONTROL ON THIS PROJECT IS TIED TO THE NAD 83/91 HORIZONTAL DATUM AND NAVD 88 VERTICAL DATUM.

15. IN ACCORDANCE WITH THE SPECIFICATIONS, FEDERAL WAGE RATES SHALL BE POSTED OUTSIDE THE SITE FIELD OFFICE(S) IN A WEATHERPROOF ENCLOSURE. (FOR FEDERALLY FUNDED PROJECTS ONLY.)

GENERAL AIRFIELD SAFETY DURING CONSTRUCTION

1. THE CONTRACTOR SHALL ACQUAINT SUPERVISORS AND EMPLOYEES WITH ACTIVITY AND OPERATIONS THAT ARE INHERENT TO THE AIRPORT AND SHALL CONDUCT CONSTRUCTION ACTIVITIES TO CONFORM TO ALL ROUTINE AND EMERGENCY AIR TRAFFIC REQUIREMENTS AND GUIDELINES FOR SAFETY SPECIFIED HEREIN.

2. THE CONTRACTOR AND HIS/HER SUBCONTRACTOR(S) SHALL PROTECT WORKERS, MAA AND AIRPORT TENANT EMPLOYEES, AND THE GENERAL PUBLIC. THE CONTRACTOR SHALL ALSO ENSURE THAT PROPERTY OR EQUIPMENT, UNRELATED TO WORK, WHICH BELONGS TO MAA OR AIRPORT TENANTS IS NOT DAMAGED DURING CONSTRUCTION.

3. THE CONTRACTOR SHALL NOT ALLOW EMPLOYEES, SUBCONTRACTORS, SUPPLIERS, OR ANY OTHER UNAUTHORIZED PERSON TO ENTER OR REMAIN IN ANY AIRPORT AREA WHICH WOULD BE HAZARDOUS TO PERSONS OR TO AIRCRAFT OPERATIONS.

4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ALL NECESSARY PROTECTIVE GEAR AND EQUIPMENT REQUIRED FOR THE PROTECTION OF THE CONTRACTOR'S PERSONNEL DURING CONSTRUCTION.

5. DURING PERFORMANCE OF THIS CONTRACT, THE AIRPORT RUNWAYS, TAXIWAYS, AND AIRCRAFT PARKING APRONS SHALL REMAIN IN USE BY AIRCRAFT TO THE MAXIMUM EXTENT POSSIBLE. ALL AIRCRAFT TRAFFIC ON THESE SURFACES SHALL HAVE PRIORITY OVER CONTRACTOR'S TRAFFIC. WHILE USE OF AREAS NEAR THE CONTRACTOR'S WORK MAY BE CONTROLLED TO MINIMIZE DISTURBANCE TO THE CONTRACTOR'S OPERATION, THE OWNER RESERVES THE RIGHT TO ORDER THE CONTRACTOR, AT ANY TIME, TO VACATE ANY AREA NECESSARY TO MAINTAIN SAFE AIRCRAFT OPERATIONS.

6. ALL WORK TO BE PERFORMED WITHIN CERTAIN LIMITS OF AN ACTIVE RUNWAY, TAXIWAY, OR APRON UNDER OPERATIONAL CONDITIONS SHALL BE PERFORMED WHEN THE RUNWAY, TAXIWAY OR APRON IS NOT IN USE. SUCH WORK SHALL ONLY BE ACCOMPLISHED WITH PRIOR PERMISSION FROM THE ENGINEER. REQUESTS FOR RUNWAY CLOSURES SHALL BE MADE AT LEAST 7 DAYS IN ADVANCE. REQUESTS FOR TAXIWAY OR APRON CLOSURES SHALL BE MADE AT LEAST 96 HOURS IN ADVANCE.

7. THE CONTRACTOR SHALL INSPECT ALL CONSTRUCTION AND STORAGE AREAS AS OFTEN AS NECESSARY AND PROMPTLY TAKE ALL STEPS NECESSARY TO PREVENT OR REMEDY ANY UNSAFE OR POTENTIALLY UNSAFE CONDITIONS OR ACTIVITIES DISCOVERED.

8. THE CONTRACTOR SHALL BE AWARE OF THE FOLLOWING TYPES OF SAFETY PROBLEMS AND/OR HAZARDS:

   a. TRENCHES, HOLES, OR EXCAVATION ON OR ADJACENT TO ANY OPEN RUNWAY OR IN SAFETY AREAS.

   b. PAVEMENT DROP–OFFS OR PAVEMENT TURF–LIPS GREATER THAN 1½ INCHES WHETHER PERMANENT OR TEMPORARY.

   c. UNMARKED/UNLIGHTED HOLES OR EXCAVATION IN ANY APRON, OPEN TAXIWAY, OPEN TAXILANE, OR RELATED SAFETY AREA.

   d. MOUNDS OR PILES OF EARTH, CONSTRUCTION MATERIALS, TEMPORARY STRUCTURES, OR OTHER OBJECTS IN THE VICINITY OF ANY OPEN RUNWAY, TAXIWAY, TAXILANE, OR IN A RELATED SAFETY AREA, APPROACH, OR DEPARTURE AREA.

   e. VEHICLES OR EQUIPMENT, WHETHER OPERATING OR IDLE, ON ANY OPEN RUNWAY, TAXIWAY, TAXILANE, OR IN ANY RELATED SAFETY AREA, APPROACH, OR DEPARTURE AREA.

   f. VEHICLES, EQUIPMENT, EXCAVATION, STOCKPILES, OR OTHER MATERIALS WHICH COULD DEGRADE OR OTHERWISE INTERFERE WITH ELECTRONIC SIGNALS FROM RADIOS OR ELECTRONIC NAVIGATIONAL AIDS (NAVAIDS).

   g. UNMARKED UTILITY, NAVAID, WEATHER SERVICE, RUNWAY LIGHTING, OR OTHER POWER OR SIGNAL CABLES THAT COULD BE DAMAGED DURING CONSTRUCTION.

   h. OBJECTS, WHETHER OR NOT MARKED OR FLAGGED, OR ACTIVITIES ANYWHERE ON OR IN THE VICINITY OF THE AIRPORT WHICH COULD BE DISTRACTING, CONFUSING, OR ALARMING TO PILOTS DURING AIRCRAFT OPERATIONS.

   i. UNFLAGGED/UNLIGHTED LOW VISIBILITY ITEMS SUCH AS TALL CRANES, DRILLS, ETC. ANYWHERE IN THE VICINITY OF ACTIVE RUNWAYS OR IN ANY APPROACH OR DEPARTURE AREA. SUCH EQUIPMENT SHALL BE PARKED IN THE CONTRACTOR'S STAGING AREA AND THE BOOM(S) LOWERED TO THE GROUND WHEN NOT IN USE.

   j. MISLEADING OR MALFUNCTIONING LIGHTS OR UNLIGHTED/UNMARKED OBSTRUCTIONS IN THE APPROACH TO ANY ACTIVE RUNWAY.

   k. INADEQUATE APPROACH OR DEPARTURE SURFACES (THESE SURFACES ARE NEEDED TO ASSURE ADEQUATE LANDING OR TAKEOFF CLEARANCE OVER OBSTRUCTIONS, INCLUDING THE CONTRACTOR'S WORK AND STORAGE AREAS).

   l. MARKING AND LIGHTING OF RUNWAYS, TAXIWAYS OR TAXILANES THAT COULD BE CONFUSING OR MISLEADING TO PILOTS, INCLUDING IMPROPERLY MARKED DISPLACED OR RELOCATED THRESHOLDS.

   m. INADEQUATE OR IMPROPER METHODS OF MARKING, BARRICADING, AND LIGHTING OF TEMPORARILY CLOSED PORTIONS OF THE AIRPORT AOA.

   n. WATER, SNOW, DIRT, DEBRIS, OR OTHER TRANSIENT ACCUMULATION WHICH TEMPORARILY OBSCURES PAVEMENT MARKINGS OR PAVEMENT EDGES, OR DIMINISHES THE VISIBILITY OF RUNWAY OR TAXIWAY LIGHTING.

   o. BIRD ATTRACTANTS SUCH AS EDIBLES (FOOD SCRAPS, ETC.), MISCELLANEOUS TRASH, OR PONDED WATER. FOOD SCRAPS AND MISCELLANEOUS TRASH SHALL BE SECURED BY THE CONTRACTOR AND DISPOSED OF USING PROPER SANITARY METHODS.

   p. FOREIGN OBJECTS DEBRIS:

   i. DEBRIS, WASTE, LOOSE MATERIAL (INCLUDING DUST AND DIRT), TRASH OR OTHER MATERIALS WHETHER ON RUNWAYS, TAXIWAYS, APRONS, OR IN RELATED SAFETY AREAS IS CONSIDERED FOREIGN OBJECT DEBRIS AND PRESENTS THE POTENTIAL FOR DAMAGE TO AIRCRAFT. SUCH MATERIAL SHALL NOT BE ALLOWED ON ANY AIRCRAFT MOVEMENT AREAS (REGARDLESS OF WHETHER THE AREA IS OPEN OR CLOSED) OR ADJACENT GRASSED AREAS. ANY DEBRIS (WHETHER CAUSED BY THE CONTRACTOR OR NOT) OBSERVED TO BE WITHIN THESE AREAS SHALL BE REMOVED IMMEDIATELY AND CONTINUOUSLY BY THE CONTRACTOR.

   ii. THE CONTRACTOR SHALL BE REQUIRED TO HAVE A VACUUM SWEEPER WITH PLASTIC BRUSHES (NOT STEEL) AND OPERATOR ON SITE AND READY AT ALL TIMES DURING CONSTRUCTION ACTIVITY.

   iii. WHERE TRAVEL ON OR ACROSS RUNWAYS, RAMP AREAS, TAXIWAYS, OR AIRCRAFT APRONS IS REQUIRED, THE CONTRACTOR SHALL PROVIDE ADEQUATE PERSONNEL AND EQUIPMENT TO KEEP SUCH SURFACES CLEAR OF DEBRIS.

   iv. ALL MATERIALS THAT COULD BLOW ACROSS ANY PAVEMENTS SHALL BE SECURED BY THE CONTRACTOR AND DISPOSED OF USING PROPER SANITARY METHODS.

   q. INADEQUATE BARRICADING OR OTHER MARKING WHICH IS PLACED TO SEPARATE CONSTRUCTION OR MAINTENANCE AREAS FROM OPEN AIRCRAFT OPERATING AREAS.

   r. FAILURE TO CONTROL UNAUTHORIZED VEHICLE AND HUMAN ACCESS THROUGH ACTIVE AIRCRAFT OPERATING AREAS.

   s. FAILURE TO MAINTAIN RADIO COMMUNICATION BETWEEN CONSTRUCTION AND MAINTENANCE VEHICLES AND ATCT.

   t. CONSTRUCTION AND MAINTENANCE ACTIVITIES OR MATERIALS WHICH COULD HAMPER THE RESPONSE OF AIRCRAFT RESCUE AND FIRE FIGHTING EQUIPMENT FROM REACHING AIRCRAFT, ALL OR ANY PART OF THE RUNWAY/TAXIWAY SYSTEM, RUNWAY APPROACH AND DEPARTURE AREAS, AND AIRCRAFT PARKING LOCATIONS.

9. THE CONTRACTOR SHALL CONDUCT ACTIVITIES SO AS NOT TO VIOLATE ANY SAFETY STANDARDS CONTAINED HEREIN. THE CONTRACTOR SHALL INSPECT ALL CONSTRUCTION AND STORAGE AREAS AS OFTEN AS NECESSARY AND PROMPTLY TAKE ALL STEPS NECESSARY TO PREVENT OR REMEDY ANY UNSAFE OR POTENTIALLY UNSAFE CONDITIONS OR ACTIVITIES DISCOVERED.

10. AT LEAST 48 HOURS BEFORE ACTUAL COMMENCEMENT OF CONSTRUCTION ACTIVITY, THE CONTRACTOR SHALL NOTIFY MAA, IN WRITING, INDICATING THE PROPOSED TIME, DATE, AND AREA OF WHICH COMMENCEMENT IS TO OCCUR. UPON COMPLETION OF WORK AND RETURN OF ALL RELATED AREAS TO STANDARD CONDITIONS, THE CONTRACTOR SHALL AGAIN NOTIFY MAA, IN WRITING, AND DESCRIBE THE AREA THAT IS COMPLETE AND AVAILABLE FOR NORMAL AIRPORT OPERATIONS. MAA REQUIRES THIS INFORMATION SO THEY MAY ISSUE APPROPRIATE NOTICE TO AIRMEN (NOTAM) CONCERNING CONSTRUCTION ACTIVITY ON THE AIRFIELD.

11. MOTORIZED VEHICLES – THIS PROJECT INCLUDES WORK WITHIN THE ACTIVE AIRCRAFT OPERATIONS AREA (AOA) (i.e. THE SECURE PORTION OF THE AIRPORT). ALL PERMITTED VEHICLES SHALL DISPLAY IN FULL VIEW ABOVE THE VEHICLE A 3 FOOT BY 3 FOOT OR LARGER, ORANGE AND WHITE CHECKERBOARD, PLASTIC FLAG. EACH CHECKERBOARD COLOR SHALL BE 1 FOOT SQUARE. ANY VEHICLE OPERATING IN THE AOA DURING THE HOURS OF DARKNESS SHOULD BE EQUIPPED WITH A FLASHING AMBER (YELLOW) DOME–TYPE LIGHT, MOUNTED ON TOP OF THE VEHICLE AND OF SUCH INTENSITY TO CONFORM TO LOCAL CODES FOR MAINTENANCE AND EMERGENCY VEHICLES. DARKNESS SHALL BE DEFINED AS ONE HOUR BEFORE OFFICIAL SUNSET UNTIL ONE HOUR AFTER SUNRISE. ALL VEHICLES OPERATING WITHIN THE AIRFIELD BOUNDARY SHALL BE IDENTIFIED WITH A SIGN ON EACH SIDE OF THE VEHICLE BEARING THE CONTRACTOR'S NAME WITH A 12 INCH MINIMUM LETTER HEIGHT.

12. RADIO COMMUNICATIONS – RADIO COMMUNICATIONS ARE REQUIRED BETWEEN THE CONTRACTOR'S REPRESENTATIVE AND THE AIR TRAFFIC CONTROL TOWER (ATCT). RADIO CONTACT IS REQUIRED AT ALL TIMES WHILE THE CONTRACTOR HAS PERSONNEL AND EQUIPMENT ON THE PROJECT SITE AND WHILE THEY ARE IN AN ACTIVE AIR OPERATIONS AREA (AOA). RADIOS SHALL BE FURNISHED BY THE CONTRACTOR AND SHALL BE CAPABLE OF TRANSMITTING AND RECEIVING AT A GROUND CONTROL FREQUENCY OF 121.8 MHZ. THIS FREQUENCY IS TO BE UTILIZED WHEN CROSSING ACTIVE FACILITIES. SUFFICIENT RADIOS SHALL BE ON SITE AND OPERATING AT ALL TIMES SO THAT INSTRUCTIONS OR COMMUNICATIONS MAY BE DISPATCHED TO ALL CREWS WITHIN AN ACTIVE AOA WITHIN ONE MINUTE AFTER RECEIPT OF DIRECTION FROM THE ATCT.

13. FLAGMEN – IN ACCORDANCE WITH THE SPECIFICATIONS, THE CONTRACTOR SHALL FURNISH, AT HIS OWN EXPENSE, FLAGMEN AS NECESSARY TO CONTROL CONSTRUCTION TRAFFIC UNLESS OTHERWISE DIRECTED BY THE ENGINEER. ALL CONTRACTOR VEHICLES THAT ARE REQUIRED TO CROSS ACTIVE RUNWAYS, RUNWAY SAFETY AREAS, TAXIWAYS AND APRONS SHALL DO SO UNDER THE DIRECT CONTROL OF A COMPETENT FLAGMAN WHO IS IN DIRECT RADIO CONTACT WITH FAA ATCT GROUND CONTROL. ALL AIRCRAFT TRAFFIC ON RUNWAYS, TAXIWAYS AND APRONS SHALL HAVE PRIORITY OVER CONTRACTOR'S TRAFFIC. AT NO TIME SHALL THE CONTRACTOR'S VEHICLES OR PERSONNEL BE ALLOWED TO ENTER OR CROSS ACTIVE RUNWAYS OR CLEAR ZONES WITHOUT PROPER AUTHORIZATION OBTAINED THROUGH GROUND CONTROL.

14. OPEN FLAME, WELDING OR TORCH CUTTING OPERATIONS ARE PROHIBITED UNLESS ADEQUATE FIRE AND SAFETY PRECAUTIONS HAVE BEEN TAKEN AND THE PROCEDURE PREVIOUSLY APPROVED BY THE ENGINEER. A FIRE WATCH IS REQUIRED. OPEN FLAME OPERATIONS REQUIRE A BURNING/WELDING PERMIT OBTAINABLE AT AIRPORT OPERATIONS 410–682–8831.

SITE ACCESS, CONTRACTOR STAGING, HAUL ROUTES AND MATERIAL STORAGE

1. ACCESS TO THE SITE – THE CONTRACTOR'S ACCESS POINTS TO THE SITE SHALL BE AS SHOWN ON THE GENERAL PROJECT LAYOUT. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL VEHICLES AND PERSONNEL WHO ENTER THE AIRPORT THROUGH THESE ACCESS POINTS. GATES SHALL BE SECURED WHEN NOT IN USE. THE CONTRACTOR SHALL PROVIDE AIRPORT OPERATIONS WITH A SCHEDULE OF TIMES THAT THE GATE WILL BE MANNED FOR ENTRY BY THE CONTRACTOR.

2. ALL OFF–SITE HAUL ROUTES SHALL BE SELECTED TO MINIMIZE DISTURBANCE TO THE PUBLIC. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO COORDINATE OFF–SITE HAUL ROUTES (STATE HIGHWAYS, COUNTY ROADS, OR CITY STREETS) WITH THE APPROPRIATE OWNER WHO HAS JURISDICTION OVER THE AFFECTED ROUTE. THE CONTRACTOR'S ON–AIRPORT HAUL ROUTES ARE INDICATED ON THE GENERAL PROJECT LAYOUT. THESE SHALL BE EXISTING HAUL ROADS, WHERE AVAILABLE, OR ALONG TAXIWAY/TAXILANE PAVEMENTS UNLESS OTHERWISE INDICATED IN THE CONTRACT DRAWINGS.

3. ON–SITE ROADS AND OTHER AIRFIELD PAVEMENTS USED AS HAUL ROUTES SHALL BE MAINTAINED BY THE CONTRACTOR AND SHALL BE RESTORED AT THE CONTRACTOR'S EXPENSE TO THEIR ORIGINAL CONDITION UPON COMPLETION OF BEING USED AS A HAUL ROUTE, UNLESS OTHERWISE DIRECTED BY THE CONTRACT DOCUMENTS OR BY THE ENGINEER. THE BEFORE AND AFTER CONDITION OF ALL ON–SITE HAUL ROUTES (TEMPORARY OR PERMANENT) SHALL BE JOINTLY INSPECTED AND DETERMINED BY THE CONTRACTOR AND THE ENGINEER THROUGH THE USE OF DIGITAL PHOTOGRAPHY AND/OR VIDEO. THE CONTRACTOR MAY NEED TO COORDINATE HAUL ROUTE USAGE WITH OTHER CONTRACTORS WORKING ON THE AIRPORT.

4. FENCING, DRAINAGE, GRADING AND OTHER MISCELLANEOUS CONSTRUCTION REQUIRED TO CONSTRUCT OR RESTORE TEMPORARY OR PERMANENT HAUL ROUTES OR ACCESS POINTS ON THE AIRPORT WILL BE THE CONTRACTOR'S RESPONSIBILITY AND SHALL BE APPROVED BY THE ENGINEER PRIOR TO COMMENCING THE WORK.

5. ALL ON–SITE ACCESS ROADS TO AIRPORT FACILITIES SHALL REMAIN OPEN AND MAINTAINED AT ALL TIMES.

6. CONTRACTOR'S STAGING AREA – AN AREA WILL BE MADE AVAILABLE FOR CONTRACTOR'S MOBILIZATION AND STORAGE. THE CONTRACTOR'S STAGING AREA SHALL BE FREE OF DEBRIS. IF DIRECTED BY THE ENGINEER, THE CONTRACTOR WILL BE REQUIRED TO STAKE OUT AND FLAG THE STAGING AREA LIMITS. NO STAGING WILL BE ALLOWED WITHIN RUNWAY SAFETY AREAS. UPON COMPLETION OF THE PROJECT, THE STAGING AREA SHALL BE RESTORED TO ITS ORIGINAL CONDITION AT THE CONTRACTOR'S EXPENSE.

7. ALL MATERIALS AND EQUIPMENT (INCLUDING STOCKPILED MATERIAL) WHEN NOT IN USE SHALL BE PLACED IN APPROVED AREAS WHERE THEY WILL NOT CONSTITUTE A HAZARD TO AIRCRAFT OPERATIONS AND NOT PENETRATE CLEARANCE SURFACES SHOWN ON THE GENERAL PROJECT LAYOUT.

   - THE OBSTACLE FREE ZONE (OFZ) GOVERNS EQUIPMENT CLEARANCE DURING CONSTRUCTION ADJACENT TO AN ACTIVE RUNWAY. UNDER NO CIRCUMSTANCES SHALL ANY MEN OR EQUIPMENT PENETRATE THESE SURFACES UNLESS PRIOR ARRANGEMENTS HAVE BEEN MADE WITH AIRPORT OPERATIONS.

   - THE FAR PART 77 APPROACH, PRIMARY, AND TRANSITIONAL SURFACES GOVERN STOCKPILES AND PARKED EQUIPMENT. UNDER NO CIRCUMSTANCES SHALL STOCKPILES, PARKED EQUIPMENT, OR OTHER CONSTRUCTION ITEMS PENETRATE THESE SURFACES ADJACENT TO AN ACTIVE RUNWAY.

8. EQUIPMENT SHALL BE PARKED AT THE CONTRACTOR'S STAGING AREA WHEN NOT IN USE. TALL EQUIPMENT SUCH AS CRANES SHALL BE LOWERED TO THE GROUND WHEN NOT IN USE. STOCKPILED MATERIAL SHALL BE CONSTRAINED IN A MANNER TO PREVENT MOVEMENT RESULTING FROM AIRCRAFT JET BLAST OR WIND CONDITIONS IN EXCESS OF 10 KNOTS.

9. ALL CONTRACTOR VEHICLES AND TRAFFIC (UNLESS OTHERWISE AUTHORIZED) SHALL REMAIN WITHIN THE DESIGNATED CONSTRUCTION LIMITS OR HAUL ROUTES.

SECURITY

1. THE AIRPORT WILL NOT PROVIDE AIRFIELD OPERATIONS AREA ESCORTS. THE CONTRACTOR MUST PROVIDE RADIOS TO THE CREW AND AQUAINT PERTINENT PERSONNEL WITH THE PROPER PROCEDURES IN COMMUNICATIONS WITH GROUND CONTROL.

2. THE CONTRACTOR SHALL PROVIDE THE ENGINEER WITH A CURRENT LIST OF ALL EMPLOYEES WORKING ON THE AIRPORT. THE LIST SHALL BE MAINTAINED CURRENT BY THE CONTRACTOR AND APPLIES TO BOTH THE CONTRACTOR AND SUBCONTRACTORS.

UTILITIES

1. UNDERGROUND UTILITIES – LOCATIONS OF KNOWN UNDERGROUND UTILITIES SHOWN ON THE PLANS ARE APPROXIMATE. ALL UTILITY LOCATIONS SHALL BE FIELD VERIFIED BY THE CONTRACTOR PRIOR TO COMMENCING CONSTRUCTION. THE CONTRACTOR IS REQUIRED TO COMPLETE A DIGGING AUTHORIZATION FORM, AS SUPPLIED BY THE ENGINEER, PRIOR TO INITIATION OF EXCAVATION OPERATIONS.

2. REPAIR OF UTILITIES DAMAGED DURING CONSTRUCTION MUST BE STARTED IMMEDIATELY AND CONTINUE UNTIL COMPLETED.

3. ALL SUCH REPAIRS SHALL BE IN ACCORDANCE WITH THE CONTRACT SPECIFICATIONS OR AS DIRECTED BY THE ENGINEER AND SHALL BE AT THE CONTRACTOR'S EXPENSE.

4. IF FAA CABLES ARE DAMAGED, REPAIRS SHALL BE DONE IN ACCORDANCE WITH FAA REQUIREMENTS AND IN THE PRESENCE OF AN FAA REPRESENTATIVE. THE FAA MAY ELECT TO HAVE THE REPAIR PERFORMED BY OTHERS IN WHICH CASE THE CONTRACTOR SHALL BE RESPONSIBLE FOR PAYING THE INCURRED COSTS OF REPAIRS.

5. UTILITIES NOTIFICATION – AT LEAST TWO WORKING DAYS PRIOR TO COMMENCING CONSTRUCTION OPERATIONS IN AN AREA WHICH MAY INVOLVE UNDERGROUND UTILITIES, THE CONTRACTOR SHALL NOTIFY THE ENGINEER AND THE OWNER OF EACH UNDERGROUND UTILITY AFFECTED.

6. THE FOLLOWING LIST INCLUDES POSSIBLE UTILITIES WITHIN THE CONSTRUCTION LIMITS. ADDITIONAL UTILITIES NOT LISTED BELOW MAY ALSO BE ON–SITE.

UTILITY OWNERSHIP:	
MISS UTILITY CENTER	1–800–257–7777
BGE	410–685–0123/410–234–5000/1–800–685–0123
VERIZON REPAIR BURIED CABLE	(410) 954–2222 1–800–275–2355
FAA AIRWAY FACILITIES SSC	(410) 859–7252

EMERGENCY CONTACT INFORMATION

1. EXCEPT FOR EMERGENCIES, ALL CONTACT WITH AIRPORT PERSONNEL SHALL BE MADE THROUGH THE ENGINEER. FOR EMERGENCIES INVOLVING SAFETY (INJURIES, FIRES, SECURITY BREACHES, ETC.) THE CONTRACTOR SHALL MAKE DIRECT CONTACT WITH AIRPORT OPERATIONS FOLLOWED BY NOTIFICATION TO THE ENGINEER AS SOON AS POSSIBLE.

2. THE PROJECT SUPERVISORS SHALL HAVE THE FOLLOWING TELEPHONE NUMBERS WITH THEM AT ALL TIMES:

   a. MAA FIRE MARSHAL 410–859–7815/7511
   b. MTN FIRE/POLICE EMERGENCY 911
   c. MTN OPERATIONS 410–682–8831
   d. MTN ATCT 410–682–8856
   e. MDE OIL CONTROL PROGRAM (COMPLIANCE AND REMEDIATION) 410–537–3442

3. THE CONTRACTOR SHALL PROVIDE THE PHONE NUMBERS OF THREE PERSONNEL, INCLUDING THE PROJECT SUPERINTENDENT, WHO MAY BE CONTACTED IN AN EMERGENCY. PERSONNEL SHALL BE ON CALL 24 HOURS PER DAY FOR MAINTAINING AIRPORT HAZARD LIGHTING AND BARRICADES.

COMPANY NAME

COMPANY NAME
COMPANY ADDRESS
CITY, STATE ZIP CODE
COMPANY PHONE NO. COMPANY FAX NO.

DESIGNED: ___
DRAWN: ___
CHECKED: ___
APPROVED: ___

"PROFESSIONAL CERTIFICATION:
I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND."

LICENSE NO. _____
EXPIRATION DATE: _____

REVISION NO.	REVISION DATE	DESCRIPTIONS

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION

OFFICE OF DESIGN AND CONSTRUCTION

PROJECT TITLE: PROJECT TITLE

SHEET TITLE: GENERAL CONSTRUCTION AND SAFETY NOTES I

SCALE: NONE

DATE: DATE

CONTRACT NO.: MAA–CO–XX–XXX

SHEET NO.: ___

PATH/FILENAME

RELATED DOCUMENTS

1. FAA ADVISORY CIRCULARS (AC's), ORDERS AND FEDERAL AVIATION REGULATIONS (FAR's) – THE FOLLOWING PUBLICATIONS CONTAIN DEFINITIONS OR DESCRIPTIONS OF CRITICAL AIRPORT OPERATING AREAS. COPIES OF THESE PUBLICATIONS ARE AVAILABLE THROUGH THE FAA AT WWW.FAA.GOV AND CAN BE REVIEWED AT THE OFFICES OF THE MAA.

   THE ITEMS OUTLINED BELOW PERTAIN TO AIRFIELD SAFETY REQUIREMENTS AND ARE REFERENCED THROUGHOUT THE CONTRACT DOCUMENTS.

   a. AC 150/5370-2, 'OPERATIONAL SAFETY ON AIRPORTS DURING CONSTRUCTION', CURRENT EDITION, SETS FORTH GUIDELINES TO ASSIST AIRPORT OPERATORS IN COMPLYING WITH FAR PART 139, "CERTIFICATION AND OPERATION: LAND AIRPORTS SERVING CERTAIN AIR CARRIERS" AND WITH THE REQUIREMENTS OF FEDERALLY FUNDED AIRPORT CONSTRUCTION PROJECTS.

   b. FAR PART 77 'OBJECTS AFFECTING NAVIGABLE AIRSPACE', CURRENT EDITION:

   i. ESTABLISHES STANDARDS FOR DETERMINING OBSTRUCTIONS TO NAVIGABLE AIRSPACE. IMAGINARY SURFACES ARE DEFINED IN THE PUBLICATION AND ARE SHOWN ON THIS SHEET.

   ii. ESTABLISHES REQUIREMENTS FOR FILING NOTICE TO THE FAA FOR CERTAIN PROPOSED CONSTRUCTION OR ALTERATION PROPOSALS. COMPLETION OF THE 'NOTICE OF PROPOSED CONSTRUCTION OR ALTERATION' FORM (FAA FORM 7460-1) IS DISCUSSED IN AC 70/7460-1 'OBSTRUCTION MARKING AND LIGHTING', CURRENT EDITION.

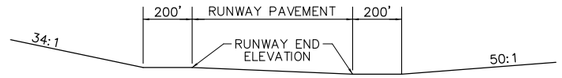
   c. AC 70/7460-2, 'PROPOSED CONSTRUCTION OF OBJECTS THAT MAY AFFECT THE NAVIGABLE AIRSPACE', CURRENT EDITION, PROVIDES INFORMATION TO PERSONS PROPOSING TO ERECT OR ALTER AN OBJECT THAT MAY AFFECT NAVIGABLE AIRSPACE. THE AC EXPLAINS THE REQUIREMENT TO NOTIFY THE FAA BEFORE CONSTRUCTION BEGINS AND THE FAA'S RESPONSIBILITY TO RESPOND TO THESE NOTICES.

   d. AC 150/5300-13, 'AIRPORT DESIGN', CURRENT EDITION, ESTABLISHES DESIGN, OPERATIONAL, AND MAINTENANCE STANDARDS FOR AIRPORTS. STANDARD TERMS USED IN THE CONTRACT PLANS AND SPECIFICATIONS ARE DEFINED BELOW.

   i. OBSTACLE FREE ZONE (OFZ) – A VOLUME OF SPACE WHICH IS FREE OF ALL FIXED OBJECTS AND CLEAR OF VEHICLES IN THE PROXIMITY OF AN AIRPLANE CONDUCTING AN APPROACH, MISSED APPROACH, LANDING, TAKEOFF, OR DEPARTURE. AN OFZ TYPICAL SECTION IS SHOWN ON GENERAL PROJECT LAYOUT.

   ii. OBJECT FREE AREA (OFA) – A TWO DIMENSIONAL GROUND AREA SURROUNDING RUNWAYS, TAXIWAYS, AND TAXILANES WHICH IS CLEAR OF OBJECTS EXCEPT FOR OBJECTS WHOSE LOCATION IS FIXED BY FUNCTION.

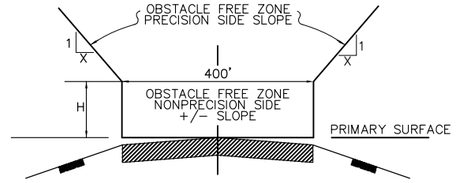
   iii. SAFETY AREA – THE SURFACE ADJACENT TO RUNWAYS, TAXIWAYS, AND TAXILANES OVER WHICH AIRCRAFT SHOULD, IN DRY WEATHER, BE ABLE TO CROSS AT NORMAL SPEEDS WITHOUT INCURRING ANY SIGNIFICANT DAMAGE. A SAFETY AREA IS GRADED, DRAINED AND COMPACTED. IT IS FREE OF ANY HOLES, TRENCHES, BUMPS OR OTHER SIGNIFICANT SURFACE VARIATIONS OR OBJECTS OTHER THAN THOSE WHICH MUST BE THERE BECAUSE OF THEIR ESSENTIAL AERONAUTICAL FUNCTION. THE SAFETY AREA REQUIRES THE CAPABILITY OF SUPPORTING MAINTENANCE VEHICLES AND AIRCRAFT RESCUE AND FIRE FIGHTING VEHICLES UNDER NORMAL (DRY) CONDITIONS.



RUNWAY END	ELEVATION	APPROACH SLOPE
15	24.5	34:1
33	10.3	50:1

TYPICAL PROFILE
F A R PART 77 IMAGINARY SURFACES

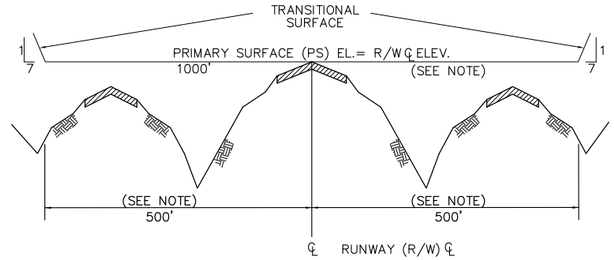
NOT TO SCALE



RUNWAY END	TYPE OF RUNWAY	SIDE SLOPE–X	H
15–33	PRECISION	6:1	41.0

TYPICAL SECTION
RUNWAY OBSTACLE FREE ZONE

NOT TO SCALE



NOTE

SEE "SAFETY REQUIREMENTS DURING CONSTRUCTION" AS CONTAINED IN THE SPECIFICATIONS, AND PLANS REGARDING RESTRICTED AREAS IN THE VICINITY OF ACTIVE RUNWAYS AND TAXIWAYS.

TYPICAL SECTION
F A R PART 77 IMAGINARY SURFACES

NOT TO SCALE

COMPANY NAME

COMPANY NAME
COMPANY ADDRESS
CITY, STATE ZIP CODE
COMPANY PHONE NO. COMPANY FAX NO.

DESIGNED: ---
DRAWN: ---
CHECKED: ---
APPROVED: ---

"PROFESSIONAL CERTIFICATION:
I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND."

LICENSE NO. _____
EXPIRATION DATE: _____

REVISION NO.	REVISION DATE	DESCRIPTIONS

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION

OFFICE OF DESIGN AND CONSTRUCTION

PROJECT TITLE: PROJECT TITLE

SHEET TITLE: GENERAL CONSTRUCTION AND SAFETY NOTES II

SCALE: NONE

DATE: DATE

CONTRACT NO.: MAA-CO-XX-XXX

SHEET NO.: ---

PATH/FILENAME

SYMBOLS LEGEND

(CONSULTANT CAN MODIFY PER PROJECT SPECIFIC)

AT–GRADE INLET PROTECTION	AGIP
BAFFLE BOARDS	BB
BENCHING	BENCHING
CLEAR WATER DIVERSION PIPE	CWD – 12 (DESIGNATION CWD–12 REFERS TO 12 INCH CLEAR WATER DIVERSION.)
CLEAR WATER PIPE	CWP
COMBINATION INLET PROTECTION	COIP
CONCRETE WASHOUT STRUCTURE	CWS
CURB INLET PROTECTION	CIP
DIVERSION FENCE	DF
EARTH DIKE	A–1 (PLACE DESIGNATION (e.g. A–1) ON FLOW CHANNEL SIDE OF DIKE.)
EMERGENCY SPILLWAY	ES
FILTER BAG	FB
FILTER BERM	FB–A, FB–B
FILTER LOG	FL–18 (DESIGNATION FL–18 REFERS TO 18 INCH DIAMETER FILTER LOG.
GABION INFLOW PROTECTION	GP
GABION INLET PROTECTION	GIP
HORIZONTAL DRAW–DOWN DEVICE	HDDD
LIMIT OF DISTURBANCE	LOD
MEDIAN INLET PROTECTION	MIP
MEDIAN SUMP INLET PROTECTION	MSIP
MOUNTABLE BERM	MB
PERIMETER DIKE/SWALE	PDS–1
PERMANENT SOIL STABILIZATION MATTING CHANNEL	PSSMC– lb/ft² (INCLUDE SHEAR STRESS)
PERMANENT SOIL STABILIZATION MATTING SLOPE	PSSMS– lb/ft² (INCLUDE SHEAR STRESS)
PIPE OUTLET SEDIMENT TRAP ST I	ST–I
PIPE SLOPE DRAIN	PSD – 12 (DESIGNATION PSD–12 REFERS TO 12 IN PIPE SLOPE DRAIN.
PLUNGE POOL	PP
PORTABLE SEDIMENT TANK	PST
REMOVABLE PUMPING STATION	RPS
RIPRAP INFLOW PROTECTION	RRPI
RIPRAP OUTLET SEDIMENT TRAP ST III	ST–III
ROCK OUTLET PROTECTION I	ROPI
ROCK OUTLET PROTECTION II	ROPII
ROCK OUTLET PROTECTION III	ROPIII
SILT FENCE	SF
SILT FENCE ON PAVEMENT	SFOP
STABILIZED CONSTRUCTION ENTRANCE	SCE
STANDARD INLET PROTECTION	SIP
STONE CHECK DAM	CD
STONE/RIPRAP OUTLET SEDIMENT TRAP ST II	ST–II
SUBSURFACE DRAINS	SSD
SUMP PIT	SP
SUPER SILT FENCE	SSF
TEMPORARY ACCESS BRIDGE	TB
TEMPORARY ACCESS CULVERT	
TEMPORARY ASPHALT BERM	TAB
TEMPORARY BARRIER DIVERSION	TBD
TEMPORARY GABION OUTLET STRUCTURE	TGOS
TEMPORARY SOIL STABILIZATION MATTING CHANNEL	TSSMC– lb/ft² (INCLUDE SHEAR STRESS)
TEMPORARY SOIL STABILIZATION MATTING SLOPE	TSSMS– lb/ft² (INCLUDE SHEAR STRESS)
TEMPORARY STONE OUTLET STRUCTURE	TSOS
TEMPORARY SWALE	A–1
VERTICAL DRAW–DOWN DEVICE	VDDD
WASH RACK OPTION	WR

MDE NO. XX-SF-XXXX
NOTE TO CONTRACTOR:
SEDIMENT CONTROL WILL BE STRICTLY ENFORCED

FOR EROSION AND SEDIMENT CONTROL ONLY.

COMPANY NAME

COMPANY NAME
COMPANY ADDRESS
CITY, STATE ZIP CODE
COMPANY PHONE NO. COMPANY FAX NO.

DESIGNED: ---
DRAWN: ---
CHECKED: ---
APPROVED: ---

"PROFESSIONAL CERTIFICATION:

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EXPIRATION DATE: _____

REVISION NO.	REVISION DATE	DESCRIPTIONS

XX% SUBMISSION

BWI THURGOOD MARSHALL OR MARTIN STATE LOGO

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION

OFFICE OF DESIGN AND CONSTRUCTION

PROJECT TITLE: PROJECT TITLE

SHEET TITLE: EROSION AND SEDIMENT CONTROL PLAN

SCALE: NONE

DATE: DATE

CONTRACT NO.: MAA–CO–XX–XXX

SHEET NO.: ---

PATH/FILENAME

GENERAL NOTES

1. DESCRIPTION

THIS WORK SHALL CONSIST OF THE APPLICATION OF MEASURES THROUGH–OUT THE LIFE OF THE PROJECT TO CONTROL EROSION AND MINIMIZE THE SEDIMENTATION OF RIVERS, STREAMS AND IMPOUNDMENTS (LAKES, RESERVOIRS, BAYS, AND COASTAL WATERS). THE MEASURES SHALL INCLUDE BUT ARE NOT LIMITED TO THE USE OF BERMS, DIKES, DAMS, SEDIMENT BASINS AND/OR TRAPS, GEOTEXTILES, STONE CHECKS, SILT FENCES, SURFACE ROUGHING, MATS & NETS, AGGREGATE, MULCH, GRASSES, SLOPE DRAINS AND OTHER APPROVED METHODS. EROSION AND SEDIMENT CONTROL MEASURES AS DESCRIBED HEREIN AND APPROVED BY MDE SHALL BE APPLIED TO ERODIBLE MATERIAL EXPOSED BY ANY ACTIVITY ON THIS PROJECT.

EROSION AND SEDIMENT CONTROL MEASURES SHALL BE COORDINATED WITH THE CONSTRUCTION OF THE PAVEMENT, DRAINAGE FACILITIES SUCH AS PIPES, CULVERTS, HEADWALLS, DITCH PAVING, FLUMES, ETC., WHICH SHALL BE CONSTRUCTED CONCURRENT WITH THE COMMENCEMENT OF THE GRADING OPERATION TO ASSURE ECONOMICAL, EFFECTIVE AND CONTINUOUS EROSION AND SEDIMENT CONTROL.

2. INTERIM AND EMERGENCY CONTROLS

IN ACCORDANCE WITH THE DEPARTMENT OF THE ENVIRONMENT, TITLE 4, SUBTITLE 106, SEDIMENT CONTROL, ANNOTATED CODE OF MARYLAND REGULATIONS, AND GENERAL PROVISION 7.12 OF THE MARYLAND DEPARTMENT OF TRANSPORTATION, STATE HIGHWAY ADMINISTRATION STANDARD SPECIFICATIONS FOR CONSTRUCTION AND MATERIALS, THE CONTRACTOR SHALL INCORPORATE ALL PERMANENT EROSION CONTROL FEATURES INTO THE WORK AT THE EARLIEST PRACTICABLE TIME AS REQUIRED BY THE CONTRACT DOCUMENTS. TEMPORARY POLLUTION CONTROL MEASURES WILL BE USED TO CORRECT CONDITIONS THAT DEVELOP DURING CONSTRUCTION THAT WERE NOT FORESEEN DURING DESIGN; THAT ARE NEEDED PRIOR TO INSTALLATION OF PERMANENT POLLUTION CONTROL FEATURES; OR THAT ARE NEEDED TEMPORARILY TO CONTROL EROSION THAT DEVELOPS DURING NORMAL CONSTRUCTION PRACTICES, BUT ARE NOT ASSOCIATED WITH PERMANENT CONTROL FEATURES OF THE PROJECT.

3. STANDARDS & SPECIFICATIONS

STABILIZATION/STABILIZED: (CASE 1) – TO MEET THE REQUIREMENTS

THIS PLAN WILL BE IN ACCORDANCE WITH THE STATE HIGHWAY ADMINISTRATION'S STANDARD SPECIFICATIONS TITLED "STANDARD SPECIFICATIONS FOR CONSTRUCTION & MATERIALS" DATED JULY 2008, AND REVISION THEREOF, AND ADDITIONS THERETO INCLUDED IN THESE CONTRACT DOCUMENTS.

THE 2011 "MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL" (AND AMENDMENTS) WILL BE AN ACCEPTABLE REFERENCE FOR THIS PROJECT.

THIS INFORMATION MUST BE PRESENT ON THE PROJECT AT ALL TIMES.

4. DEFINITIONS

CLEAR: ANY ACTIVITY WHICH REMOVES THE VEGETATION COVER WHILE LEAVING THE ROOT MAT INTACT.

DISTURBED AREA: A LOCATION WHERE THE NATURAL VEGETATIVE SOIL COVER HAS BEEN REMOVED OR ALTERED AND, THEREFORE, IS SUSCEPTIBLE TO EROSION.

GRADE: TO CAUSE THE DISTURBANCE OF THE EARTH. THIS INCLUDES, BUT IS NOT LIMITED TO, ANY EXCAVATION, FILLING, STOCKPILING OF EARTH MATERIALS, GRUBBING OR ROOT MAT OR TOPSOIL DISTURBANCE.

GRADING UNIT: THE MAXIMUM CONTIGUOUS AREA ALLOWED TO BE GRADED AT A GIVEN TIME. A GRADING UNIT IS 20 ACRES OR LESS AS DEFINED BY REGULATION.

GRUBBING: THE REMOVAL OF STUMPS, ROOTBALLS, LATERAL ROOT SYSTEMS OF TREES AND WOODY VEGETATION AND ROOT MATS.

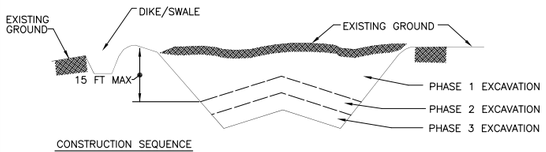
STABILIZE: TO PROTECT EXPOSED SOILS FROM EROSION BY THE APPLICATION OF SEED AND MULCH, SEED AND MATTING, SOD, OTHER VEGETATIVE MEASURES, AND/OR STRUCTURAL MEANS.

5. CLEARING AND GRUBBING

EROSION AND SEDIMENT CONTROL MEASURES WILL BE IMPLEMENTED AT THE BEGINNING OF THE GRUBBING PORTION OF THIS OPERATION. GRUBBING WILL BE RESTRICTED TO THE GRADING UNIT CURRENTLY ACTIVE.

6. EXCAVATION – INCREMENTAL STABILIZATION

EXCAVATE AND STABILIZE CUT SLOPES IN INCREMENTS NOT TO EXCEED FIFTEEN (15) FEET IN HEIGHT. PREPARE SEEDBED AND APPLY SEED AND MULCH ON ALL CUT SLOPES AS THE WORK PROGRESSES.



CONSTRUCTION SEQUENCE

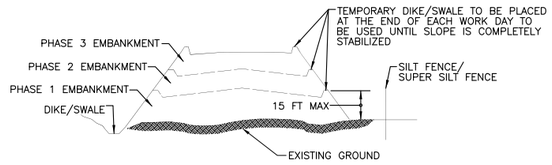
1. CONSTRUCT AND STABILIZE ALL TEMPORARY SWALES OR DIKES THAT WILL BE USED TO CONVEY RUNOFF AROUND THE EXCAVATION.
2. PERFORM PHASE 1 EXCAVATION, PREPARE SEEDBED AND STABILIZE.
3. PERFORM PHASE 2 EXCAVATION, PREPARE SEEDBED AND STABILIZE. OVERSEED PHASE 1 SLOPES AS NECESSARY.
4. PERFORM FINAL PHASE EXCAVATION, PREPARE SEEDBED AND STABILIZE. OVERSEED PREVIOUSLY SEEDED AREAS AS NECESSARY.

INCREMENTAL STABILIZATION – CUT SECTION

NOTE:

ONCE EXCAVATION HAS BEGUN THE OPERATION SHOULD BE CONTINUOUS FROM GRUBBING THROUGH THE COMPLETION OF GRADING AND PLACEMENT OF TOPSOIL (IF REQUIRED) AND PERMANENT SEED AND MULCH. ANY INTERRUPTIONS IN THE OPERATION OR COMPLETING THE OPERATION OUT OF THE SEEDING SEASON WILL NECESSITATE THE APPLICATION OF TEMPORARY STABILIZATION.

7. FILL–INCREMENTAL STABILIZATION



CONSTRUCTION SEQUENCE

1. CONSTRUCT AND STABILIZE ALL TEMPORARY SWALES OR DIKES THAT WILL BE USED TO DIVERT RUNOFF AROUND THE FILL. CONSTRUCT SILT FENCE ON THE LOW SIDE OF FILL UNLESS OTHER METHODS ON THE PLANS ADDRESS THIS AREA.
2. AT THE END OF EACH DAY,INSTALL TEMPORARY WATER CONVEYANCE PRACTICE(S), AS NECESSARY, TO INTERCEPT SURFACE RUNOFF AND CONVEY IT DOWN THE SLOPE IN A NON–EROSIVE MANNER.
3. PLACE PHASE 1 FILL, PREPARE SEEDBED AND STABILIZE.
4. PLACE PHASE 2 FILL, PREPARE SEEDBED AND STABILIZE.
5 PLACE FINAL PHASE FILL, PREPARE SEEDBED AND STABILIZE. OVERSEED PREVIOUSLY SEEDED AREAS AS NECESSARY.

INCREMENTAL STABILIZATION – FILL SECTION

NOTE:

ONCE THE PLACEMENT OF FILL HAS BEGUN THE OPERATION SHOULD BE CONTINUOUS FROM GRUBBING THROUGH THE COMPLETION OF GRADING AND PLACEMENT OF TOPSOIL (IF REQUIRED) AND PERMANENT SEED AND MULCH. ANY INTERRUPTIONS IN THE OPERATION OR COMPLETING THE OPERATION OUT OF THE SEEDING SEASON WILL NECESSITATE THE APPLICATION OF TEMPORARY STABILIZATION.

8. STABILIZATION / GRADING

ANY ACTIVITY PURSUANT TO AND IN COMPLIANCE WITH TITLE 15, MINES AND MINING OF THE ENVIRONMENTAL ARTICLE OR TITLE 9, SECTION 204 PURSUANT TO SANITARY LANDFILLS, AS DEFINED BY COMAR 26.04.07.02(26) IS EXEMPT FROM THE GRADING UNIT RESTRICTIONS. GRADING IS TO BE COMPLETED AND STABILIZED AS SOON AS POSSIBLE AFTER IT IS INITIATED AS DEFINED BY REGULATION, A GRADING UNIT IS THE MAXIMUM CONTIGUOUS AREA ALLOWED TO BE GRADED AT A GIVEN TIME AND IS LIMITED TO TWENTY (20) ACRES (872,800 SQUARE FEET). A PROJECT IS TO BE SEQUENCED SO THAT GRADING ACTIVITIES BEGIN ON ONE GRADING UNIT AT A TIME. WORK MAY PROCEED TO A SUBSEQUENT GRADING UNIT WHEN AT LEAST FIFTY (50) PERCENT OF THE DISTURBED AREA IN THE PRECEDING GRADING UNIT HAS BEEN STABILIZED AND APPROVED BY THE ENFORCEMENT AUTHORITY. UNLESS OTHERWISE SPECIFIED AND APPROVED BY THE APPROVAL AUTHORITY, NO MORE THAN THIRTY (30) ACRES MAY BE DISTURBED AT A GIVEN TIME. ALL APPROPRIATE PERIMETER CONTROLS WILL BE INSTALLED PRIOR TO ANY GRUBBING OPERATION IN ACCORDANCE WITH THE APPROVED PLANS. EARTH DISTURBANCE MUST BE STABILIZED AS SOON AS POSSIBLE AND AS DICTATED BY THE APPROVED PLAN. AT A MINIMUM, ALL PERIMETER CONTROLS AND SLOPES STEEPER THAN 3:1 REQUIRE STABILIZATION WITHIN THREE (3) CALENDAR DAYS AND ALL OTHER DISTURBED AREAS WITHIN SEVEN (7) CALENDAR DAYS. ONLY AREAS OF ACTIVE GRADING ARE EXEMPT FROM THESE REQUIREMENTS.

9. MAINTENANCE

MAINTAIN ALL SEDIMENT CONTROLS FOR THE DURATION OF THE PROJECT, INCLUDING THE WINTER MONTHS OR OTHER TIMES WHEN THE PROJECT MAY BE INACTIVE. INSPECT CONTROLS IMMIDIATELY AFTER STORM EVENTS, CLEAN OUT CONTROLS AS NECESSARY AND REPAIR ALL DAMAGE AS THE FIRST ORDER OF BUSINESS AFTER THE STORM EVENT. MAINTENANCE AND CLEANOUT REQUIREMENTS ARE LISTED AS PART OF THE CONSTRUCTION SPECIFICATION FOR EACH OF THE SEDIMENT AND EROSION CONTROL DETAILS FOUND ELSEWHERE IN THE PLAN SET.

MAINTAIN ACCESS TO ALL EROSION AND SEDIMENT CONTROLS UNTIL THE CONTROLS ARE REMOVED.

LACK OF MAINTENANCE OF THE EROSION AND SEDIMENT CONTROLS WILL BE CONSIDERED A MAJOR VIOLATION TO THE PLANS AND GROUNDS FOR A SHUTDOWN OF THE PROJECT.

THE CONTRACTOR WILL PROVIDE A POINT OF CONTACT FOR SEDIMENT AND EROSION CONTROL ISSUES.

10. EROSION AND SEDIMENT CONTROL EXCAVATION

ORIGINAL EXCAVATION INCLUDES EXCAVATION EMBANKMENT CONSTRUCTION, GRADING AND BACKFILL FOR SEDIMENT TRAPS, SEDIMENT BASINS AND OTHER SEDIMENT CONTROLS. THE CONTRACTOR WILL ENSURE THAT EXCAVATION AND EMBANKMENTS MEET THE DIMENSION FOR EACH SEDIMENT CONTROL AS SPECIFIED. STOCKPILE EXCAVATED MATERIAL AND USE AS BACKFILL WHEN THE SEDIMENT CONTROLS ARE REMOVED.

TO MAINTAIN LINE, GRADE AND CROSS–SECTIONS REMOVE ACCUMULATED SEDIMENT. CLEANOUT EXCAVATION INCLUDES THE REMOVAL OF ACCUMULATED SEDIMENT FROM SEDIMENT CONTROLS OR OTHER AREAS DURING ROUTINE MAINTENANCE OF SEDIMENT CONTROLS, OR AS DIRECTED BY THE INSPECTOR OR ENGINEER. PLACE REMOVED SEDIMENT IN AN APPROVED WASTE SITE.

11. STOCKPILED MATERIAL

THE STOCKPILE LOCATION AND ALL RELATED SEDIMENT CONTROL PRACTICES MUST BE CLEARLY INDICATED ON THE EROSION AND SEDIMENT CONTROL PLAN. THE FOOTPRINT OF THE STOCKPILE MUST BE SIZED TO ACCOMMODATE THE ANTICIPATED VOLUME OF MATERIAL AND BASED ON A SIDE SLOPE RATIO NO STEEPER THAN 2:1. BENCHING MUST BE PROVIDED IN ACCORDANCE WITH SECTION B–3 LAND GRADING OF THE 2011 MARYLAND STANDARDS AND SPECIFICATIONS OF SOIL EROSION AND SEDIMENT CONTROL. RUNOFF FROM THE STOCKPILE AREA MUST DRAIN TO A SUITABLE SEDIMENT CONTROL PRACTICE. ACCESS THE STOCKPILE AREA FROM THE UPGRADE SIDE. CLEARWATER RUNOFF INTO THE STOCKPILE AREA MUST BE MINIMIZED BY USE OF A DIVERSION DEVICE SUCH AS AN EARTH DIKE, TEMPORARY SWALE OR DIVERSION FENCE. PROVISIONS MUST BE MADE FOR DISCHARGING CONCENTRATED FLOW IN A NON–EROSIVE MANNER. WHERE RUNOFF CONCENTRATES ALONG THE TOE OF THE STOCKPILE FILL, AN APPROPRIATE EROSION/SEDIMENT CONTROL PRACTICE MUST BE USED TO INTERCEPT THE DISCHARGE. STOCKPILES MUST BE STABILIZED IN ACCORDANCE WITH THE 3 / 7 DAY STABILIZATION REQUIREMENT AS WELL AS 7. EMBANKMENT – INCREMENTAL STABILIZATION AS LISTED ABOVE.

IF THE STOCKPILE IS LOCATED ON AN IMPERVIOUS SURFACE, A LINER SHOULD BE PROVIDED BELOW THE STOCKPILE TO FACILITATE CLEANUP. STOCKPILES CONTAINING CONTAMINATED MATERIAL MUST BE COVERED WITH IMPERMEABLE SHEETING. THE STOCKPILE AREA MUST CONTINUOUSLY MEET THE REQUIREMENTS FOR ADEQUATE VEGETATIVE ESTABLISHMENT IN ACCORDANCE WITH SECTION B–4 VEGETATIVE STABILIZATION OF THE 2011 MARYLAND STANDARDS AND SPECIFICATIONS OF SOIL EROSION AND SEDIMENT CONTROL. SIDE SLOPES MUST BE MAINTAINED AT NO STEEPER THAN A 2:1 RATIO. THE STOCKPILE AREA MUST BE KEPT FREE OF EROSION. IF THE VERTICAL HEIGHT OF A STOCKPILE EXCEEDS TWENTY (20) FEET FOR 2:1 SLOPES, THIRTY (30) FEET FOR 3:1 SLOPES OR FORTY (40) FEET FOR 4:1 SLOPE, BENCHING MUST BE PROVIDED IN ACCORDANCE WITH SECTION B–3 LAND GRADING OF THE 2011 MARYLAND STANDARDS AND SPECIFICATIONS OF SOIL EROSION AND SEDIMENT CONTROL.

12. DEWATERING DISCHARGE

SEDIMENT–LADEN DISCHARGE FROM A DEWATERING OPERATION MUST BE DIRECTED TO AN MDE APPROVED PRACTICE FOR DEWATERING. ADDITIONAL TREATMENT BEYOND AN APPROVED DEWATERING PRACTICE MAY BE NEEDED TO REDUCE TURBIDITY IN THE DISCHARGE TO RECEIVING WATERS. TREATMENTS INCLUDE, BUT ARE NOT LIMITED TO, DISCHARGING TO A VEGETATIVE FILTER, USING COAGULANTS TO INCREASE SETTLING OR PUMPING TO A SEDIMENT TRAP OR BASIN.

DEWATERING PRACTICES NOT REFERENCED IN THE 2011 MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL MAY BE USED WITH THE CONSENT OF THE APPROVAL AUTHORITY.

PUMPING SEDIMENT–LADEN WATER INTO WATERS OF THE STATE IS STRICTLY PROHIBITED.

13. TEMPORARY SLOPE DRAINS

ALL TEMPORARY SLOPE DRAINS WILL DISCHARGE INTO A STABILIZED CHANNEL, SEDIMENT TRAPPING DEVICE OR INTO A STABLE AREA AT A NON–EROSIVE VELOCITY.

14. GEOTEXTILE

GEOTEXTILE WILL BE USED AS INDICATED ON THE SEDIMENT AND EROSION CONTROL DETAILS.

GEOTEXTILE FABRICS

		WOVEN SLIT FILM		WOVEN MONOFILAMENT		NON–WOVEN	
		MINIMUM AVERAGE ROLL VALUE					
PROPERTY	TEST METHOD	MD	CD	MD	CD	MD	CD
GRAB TENSILE STRENGTH	ASTM D–4632	200 LB	200 LB	370 LB	250 LB	200 LB	200 LB
GRAB TENSILE ELONGATION	ASTM D–4632	15%	10%	15%	15%	50%	50%
TRAPEZOIDAL TEAR STRENGTH	ASTM D–4533	75 LB	75 LB	100 LB	60 LB	80 LB	80 LB
PUNCTURE STRENGTH	ASTM D–6241	450 LB		900 LB		450 LB	
APPARENT OPENING SIZE[2]	ASTM D–4751	US SIEVE 30 (0.59 mm)		US SIEVE 70 (0.21 mm)		US SIEVE 70 (0.21 mm)	
PERMITTIVITY	ASTM D–4491	0.05 SEC.[1]		0.28 SEC.[1]		1.1 SEC.[1]	
ULTRAVIOLET RESISTANCE RETAINED AT 500 HOURS	ASTM D–4355	70% STRENGTH		70% STRENGTH		70% STRENGTH	

[1] ALL NUMERIC VALUES EXCEPT APPARENT OPENING SIZE (AOS) REPRESENT MINIMUM AVERAGE ROLL VALUES (MARV). MARV IS CALCULATED AS THE TYPICAL MINUS TWO STANDARD DEVIATIONS. MD IS MACHINE DIRECTION; CD IS CROSS DIRECTION.

[2] VALUES FOR AOS REPRESENT THE AVERAGE MAXIMUM OPENING.

GEOTEXTILES MUST BE EVALUATED BY THE NATIONAL TRANSPORTATION PRODUCT EVALUATION PROGRAM (NTPEP) AND CONFORM TO THE VALUES IN TABLE H.1.

THE GEOTEXTILE MUST BE INERT TO COMMONLY ENCOUNTERED CHEMICALS AND HYDROCARBONS AND MUST BE ROT AND MILDEW RESISTANT. THE GEOTEXTILE MUST BE MANUFACTURED FROM FIBERS CONSISTING OF LONG CHAIN SYNTHETIC POLYMERS AND COMPOSED OF A MINIMUM OF 95 PERCENT BY WEIGHT OF POLYOLEFINS OR POLYESTERS, AND FORMED INTO A STABLE NETWORK SO THE FILAMENTS OR YARNS RETAIN THEIR DIMENSIONAL STABILITY RELATIVE TO EACH OTHER, INCLUDING SELVAGES.

WHEN MORE THAN ONE SECTION OF GEOTEXTILE IS NECESSARY, OVERLAP THE SECTIONS BY AT LEAST ONE FOOT. THE GEOTEXTILE MUST BE PULLED TAUT OVER THE APPLIED SURFACE. EQUIPMENT MUST NOT RUN OVER EXPOSED FABRIC. WHEN PLACING RIPRAP ON GEOTEXTILE, DO NOT EXCEED A ONE (1) FOOT DROP HEIGHT.

15. NOTE TO CONTRACTOR

THE CONTRACTOR WILL NOTE THAT NO CONSTRUCTION ACTIVITIES WILL BE UNDERTAKEN WITHIN THE SPECIFIED AREAS OF THE PROJECT WITHOUT PRIOR NOTIFICATION OF SUCH ACTIVITIES TO THE ENGINEER. ALL WORK IN THESE AREAS WILL BE MONITORED BY A RESPONSIBLE PARTY DESIGNATED BY THE CONTRACTOR TO ASSURE THAT REASONABLE CARE BE TAKEN WHILE WORKING THESE ENVIRONMENTALLY SENSITIVE AREAS.

16. CONTRACTOR PAYMENT

THE CONTRACTOR WILL ONLY BE COMPENSATED FOR WORK THAT IS DONE IN ACCORDANCE WITH THE SPECIFICATION, SPECIAL PROVISIONS AND THESE PLANS. ANY CORRECTIONS BROUGHT ABOUT BY NON–COMPLIANCE OR ERRORS BY THE CONTRACTOR WILL BE MADE AT THE CONTRACTOR'S EXPENSE.

MDE NO. XX–SF–XXXX
NOTE TO CONTRACTOR:
SEDIMENT CONTROL WILL BE STRICTLY ENFORCED

FOR EROSION AND SEDIMENT CONTROL ONLY.

COMPANY NAME

COMPANY NAME
COMPANY ADDRESS
CITY, STATE ZIP CODE
COMPANY PHONE NO. COMPANY FAX NO.

DESIGNED: ---
DRAWN: ---
CHECKED: ---
APPROVED: ---

"PROFESSIONAL CERTIFICATION:

I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND."

LICENSE NO. _____
EXPIRATION DATE: _____

REVISION NO.	REVISION DATE	DESCRIPTIONS

XX% SUBMISSION

BWI THURGOOD MARSHALL OR MARTIN STATE LOGO

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION

OFFICE OF DESIGN AND CONSTRUCTION

PROJECT TITLE: PROJECT TITLE
SHEET TITLE: EROSION AND SEDIMENT CONTROL NOTES 1
SCALE: NONE
DATE: DATE

CONTRACT NO.: MAA–CO–XX–XXX
SHEET NO.: ---

PATH/FILENAME

Q:\HBA_BBM\MAA\AE–06–008 Comp Design\2820 Design Standards Assistance\x 2012 DST CD – working\Appendix C – Standard Drawings\ErosioC–ES NOTES 1.dwg Jan 03,2013 2:07pm smunroe

STANDARD EROSION AND SEDIMENT CONTROL NOTES

THE WATER MANAGEMENT ADMINISTRATION (WMA) REQUIRES THAT THESE NOTES, IN THEIR ENTIRETY, BE INCLUDED ON THE EROSION AND SEDIMENT CONTROL PLAN. IT IS RECOGNIZED THAT EVERY NOTE MAY NOT APPLY TO ALL PROJECTS. THE REQUIREMENT OF ANY IDIVIDUAL NOTE NOT APPLICABLE TO THE SUBJECT PROJECT IS NOT BINDING UPON THE APPLICANT OR THE APPLICANT'S CONTRACTOR.

1. THE CONTRACTOR SHALL NOTIFY THE ADMINISTRATION (WMA) AT (410) 537–3510 SEVEN (7) DAYS BEFORE COMMENCING ANY LAND DISTURBING ACTIVITY AND, UNLESS WAIVED BY THE ADMINISTRATION, SHALL BE REQUIRED TO HOLD A PRE–CONSTRUCTION MEETING BETWEEN PROJECT REPRESENTATIVES AND A REPRESENTATIVE OF WMA.

2. THE CONTRACTOR MUST NOTIFY WMA IN WRITING AND BY TELEPHONE AT THE FOLLOWING POINTS:

   A. THE REQUIRED PRE–CONSTRUCTION MEETING.

   B. FOLLOWING INSTALLATION OF SEDIMENT CONTROL MEASURES.

   C. DURING THE INSTALLATION OF SEDIMENT BASINS (TO BE CONVERTED INTO PERMANENT STORMWATER MANAGEMENT STRUCTURES) AT THE REQUIRED INSPECTION POINTS (SEE INSPECTION CHECKLIST ON PLAN). NOTIFICATION PRIOR TO COMMENCING CONSTRUCTION OF EACH STEP IS MANDATORY.

   D. PRIOR TO REMOVAL OR MODIFICATION OF ANY SEDIMENT CONTROL STRUCTURE(S).

   E. PRIOR TO REMOVAL OF ALL SEDIMENT CONTROL DEVICES.

   F. PRIOR TO FINAL ACCEPTANCE.

3. THE CONTRACTOR SHALL CONSTRUCT ALL EROSION AND SEDIMENT CONTROL MEASURES PER THE APPROVED PLAN AND CONSTRUCTION SEQUENCE AND SHALL HAVE THEM INSPECTED AND APPROVED BY THE AGENCY INSPECTOR OR WMA INSPECTOR PRIOR TO BEGINNING ANY OTHER LAND DISTURBANCES. MINOR SEDIMENT CONTROL DEVICE LOCATION ADJUSTMENTS MAY BE MADE IN THE FIELD WITH THE APPROVAL OF THE WMA INSPECTOR. THE CONTRACTOR SHALL ENSURE THAT ALL RUNOFF FROM DISTURBED AREAS IS DIRECTED TO THE SEDIMENT CONTROL DEVICES, AND SHALL NOT REMOVE ANY EROSION OR SEDIMENT CONTROL MEASURE WITHOUT PRIOR PERMISSION FROM WMA INSPECTOR AND AGENCY INSPECTOR. THE CONTRACTOR MUST OBTAIN PRIOR AGENCY AND WMA APPROVAL FOR CHANGES TO THE SEDIMENT CONTROL PLAN AND/OR SEQUENCE OF CONSTRUCTION.

4. THE CONTRACTOR SHALL PROTECT ALL POINTS OF CONSTRUCTION INGRESS AND EGRESS TO PREVENT THE DEPOSITION OF MATERIALS ONTO PUBLIC ROADS. ALL MATERIALS DEPOSITED ONTO PUBLIC ROADS SHALL BE REMOVED IMMEDIATELY.

5. THE CONTRACTOR SHALL INSPECT DAILY AND MAINTAIN CONTINUOUSLY IN AN EFFECTIVE OPERATING CONDITION ALL EROSION AND SEDIMENT CONTROL MEASURES UNTIL SUCH TIMES AS THEY ARE REMOVED WITH PRIOR PERMISSION FROM WMA INSPECTOR AND AGENCY INSPECTOR.

6. ALL SEDIMENT BASINS, TRAP EMBANKMENTS AND SLOPES, PERIMETER DIKES, SWALES, AND ALL DISTURBED SLOPES STEEPER OR EQUAL TO 3:1 SHALL BE STABILIZED WITH SOD OR SEED AND ANCHORED STRAW MULCH, OR OTHER APPROVED STABILIZATION MEASURES, AS SOON AS POSSIBLE BUT NO LATER THAN THREE (3) CALENDAR DAYS AFTER ESTABLISHMENT. ALL AREAS DISTURBED OUTSIDE OF THE PERIMETER SEDIMENT CONTROL SYSTEM MUST BE MINIMIZED. MAINTENANCE MUST BE PERFORMED AS NECESSARY TO ENSURE CONTINUED STABILIZATION.

7. THE CONTRACTOR SHALL APPLY SOD OR SEED AND ANCHORED STRAW MULCH, OR OTHER APPROVED STABILIZATION MEASURES TO ALL DISTURBED AREAS AND STOCKPILES WITHIN SEVEN (7) CALENDAR DAYS AFTER STRIPPING AND GRADING ACTIVITIES HAVE CEASED IN THE AREA. MAINTENANCE SHALL BE PERFORMED AS NECESSARY TO ENSURE CONTINUED STABILIZATION. (REQUIREMENT MAY BE REDUCED TO THREE (3) DAYS FOR SENSITIVE AREAS.)

8. PRIOR TO REMOVAL OF SEDIMENT CONTROL MEASURES, THE CONTRACTOR SHALL STABILIZE AND HAVE ESTABLISHED PERMANENT STABILIZATION FOR ALL CONTRIBUTORY DISTURBED AREAS USING SOD OR AN APPROVED PERMANENT SEED MIXTURE WITH REQUIRED SOIL AMENDMENTS AND AN APPROVED ANCHOR MULCH. WOOD FIBER MULCH MAY ONLY BE USED IN SEEDING SEASON WHERE THE SLOPE DOES NOT EXCEED 10% AND GRADING HAS BEEN DONE TO PROMOTE SHEET FLOW DRAINAGE. AREAS BROUGHT TO FINISHED GRADE DURING THE SEEDING SEASON SHALL BE PERMANENTLY STABILIZED AS SOON AS POSSIBLE, BUT NO LATER THAN SEVEN (7) CALENDAR DAYS AFTER ESTABLISHMENT. WHEN PROPERTY IS BROUGHT TO FINISHED GRADE DURING THE MONTHS OF NOVEMBER THROUGH FEBRUARY, AND PERMANENT STABILIZATION IS FOUND TO BE IMPRACTICAL, TEMPORARY SEED AND ANCHORED STRAW MULCH SHALL BE APPLIED TO DISTURBED AREAS. THE FINAL PERMANENT STABILIZATION OF SUCH PROPERTY SHALL BE APPLIED BY MARCH 15 OR EARLIER IF GROUND AND WEATHER CONDITIONS ALLOW.

9. THE SITE'S APPROVAL LETTER, APPROVED EROSION AND SEDIMENT CONTROL PLANS, DAILY LOGBOOKS, AND TEST REPORTS SHALL BE AVAILABLE AT THE SITE FOR INSPECTION BY DULY AUTHORIZED OFFICIALS OF WMA AND AGENCY RESPONSIBLE FOR PROJECT.

10. SURFACE DRAINAGE FLOWS OVER UNSTABILIZED CUT AND FILL SLOPES SHALL BE CONTROLLED BY EITHER PREVENTING DRAINAGE FLOWS FROM TRAVERSING THE SLOPES OR BY INSTALLING PROTECTIVE DEVICES TO LOWER THE WATER DOWNSLOPE WITHOUT CAUSING EROSION. DIKES SHALL BE INSTALLED AND MAINTAINED AT THE TOP OF A CUT OR FILL SLOPE UNTIL THE SLOPE AND DRAINAGE AREA TO IT ARE FULLY STABILIZED, AT WHICH TIME THEY MUST BE REMOVED AND FINAL GRADING DONE TO PROMOTE SHEET FLOW DRAINAGE. PROTECTIVE METHODS MUST BE PROVIDED AT POINTS OF CONCENTRATED FLOW WHERE EROSION IS LIKELY TO OCCUR.

11. PERMANENT SWALES OR OTHER POINTS OF CONCENTRATED WATER FLOW SHALL BE STABILIZED WITH SOD OR SEED WITH AN APPROVED EROSION CONTROL MATTING, RIPRAP OR OTHER APPROVED STABILIZATION MEASURES.

12. TEMPORARY SEDIMENT CONTROL DEVICES MAY BE REMOVED, WITH PERMISSION OF WMA INSPECTOR AND AGENCY INSPECTORS, WITHIN THIRTY (30) CALENDAR DAYS FOLLOWING ESTABLISHMENT OF PERMANENT STABILIZATION IN ALL CONTRIBUTORY DRAINAGE AREAS. STORMWATER MANAGEMENT STRUCTURES USED TEMPORARILY FOR SEDIMENT CONTROL SHALL BE CONVERTED TO THE PERMANENT CONFIGURATION WITHIN THIS TIME PERIOD AS WELL.

13. NO PERMANENT CUT OR FILL SLOPE WITH A GRADIENT STEEPER THAN 3:1 WILL BE PERMITTED IN LAWN MAINTENANCE AREAS. A SLOPE GRADIENT OF UP TO 2:1 WILL BE PERMITTED IN NON–MAINTENANCE AREAS PROVIDED THAT THOSE AREAS ARE INDICATED ON THE EROSION AND SEDIMENT CONTROL PLAN WITH A LOW–MAINTENANCE GROUND COVER SPECIFIED FOR PERMANENT STABILIZATION. SLOPE GRADIENT STEEPER THAN 2:1 WILL NOT BE PERMITTED WITH VEGETATIVE STABILIZATION.

14. FOR FINISHED GRADING, THE CONTRACTOR SHALL PROVIDE ADEQUATE GRADIENTS TO PREVENT THE WATER FROM PONDING FOR MORE THAN TWENTY–FOUR (24) HOURS AFTER THE END OF A RAINFALL EVENT. DRAINAGE COURSES AND SWALE FLOW AREAS MAY TAKE AS LONG AS FORTY–EIGHT (48) HOURS AFTER THE END OF A RAINFALL EVENT TO DRAIN. AREAS DESIGNED TO HAVE STANDING WATER SHALL NOT BE REQUIRED TO MEET THIS REQUIREMENT.

15. SEDIMENT TRAPS OR BASINS ARE NOT PERMITTED WITHIN TWENTY (20) FEET OF A FOUNDATION WHICH IS EXISTING OR UNDER CONSTRUCTION. NO STRUCTURE MAY BE CONSTRUCTED WITHIN TWENTY (20) FEET OF AN ACTIVE SEDIMENT TRAP OR BASIN.

16. THE WMA INSPECTOR HAS THE OPTION OF REQUIRING ADDITIONAL SAFETY OR SEDIMENT CONTROL MEASURES, IF DEEMED NECESSARY.

17. ALL TRAP DEPTH DIMENSIONS ARE RELATIVE TO THE OUTLET ELEVATION. ALL TRAPS MUST HAVE A STABLE OUTFALL. ALL TRAPS AND BASINS SHALL HAVE STABLE INFLOW POINTS.

18. VEGETATIVE STABILIZATION SHALL BE PERFORMED IN ACCORDANCE WITH THE STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL. REFER TO APPROPRIATE SPECIFICATIONS FOR TEMPORARY SEEDING, PERMANENT SEEDING, MULCHING, SODDING, AND GROUND COVERS.

19. SEDIMENT SHALL BE REMOVED AND THE TRAP OR BASIN RESTORED TO ITS ORIGINAL DIMENSIONS WHEN SEDIMENT HAS ACCUMULATED TO ONE QUARTER OF THE TOTAL DEPTH OF THE TRAP OR BASIN. TOTAL DEPTH SHALL BE MEASURED FROM THE TRAP OR BASIN BOTTOM TO THE CREST OF THE OUTLET.

20. SEDIMENT REMOVED FROM TRAPS (AND BASINS) SHALL BE PLACED AND STABILIZED IN APPROVED AREAS, BUT NOT WITHIN A FLOODPLAIN, WETLAND OR TREE–SAVE AREA. WHEN PUMPING SEDIMENT LADEN WATER, THE DISCHARGE MUST BE DIRECTED TO A SEDIMENT TRAPPING DEVICE PRIOR TO RELEASE FROM THE SITE. A SUMP PIT MAY BE USED IF SEDIMENT TRAPS THEMSELVES ARE BEING PUMPED OUT.

21. ALL WATER REMOVED FROM EXCAVATED AREAS (E.G. UTILITY TRENCHES) SHALL BE PASSED THROUGH AN APPROVED DEWATERING PRACTICE OR PUMPED TO A SEDIMENT TRAP OR BASIN PRIOR TO DISCHARGE FROM THE SITE (I.E. VIA FUNCTIONAL STORM DRAIN SYSTEM OR TO STABLE GROUND SURFACE).

22. SEDIMENT CONTROL FOR UTILITY CONSTRUCTION FOR AREAS OUTSIDE OF DESIGNED CONTROLS OR AS DIRECTED BY ENGINEER OR WMA INSPECTOR:

   A. CALL "MISS UTILITY" AT 1–800–257–7777 FORTY–EIGHT (48) HOURS PRIOR TO THE START OF WORK.

   B. EXCAVATED TRENCH MATERIAL SHALL BE PLACED ON THE HIGH SIDE OF THE TRENCH.

   C. TRENCHES FOR UTILITY INSTALLATION SHALL BE BACKFILLED, COMPACTED AND STABILIZED AT THE END OF EACH WORKING DAY. NO MORE TRENCH SHALL BE OPENED THAN CAN BE COMPLETED THE SAME DAY, UNLESS;

   D. TEMPORARY SILT FENCE SHALL BE PLACED IMMEDIATELY DOWNSTREAM OF ANY DISTURBED AREA INTENDED TO REMAIN DISTURBED FOR MORE THAN ONE DAY.

23. WHERE DEEMED APPROPRIATE BY THE ENGINEER OR INSPECTOR, SEDIMENT BASINS AND TRAPS MAY NEED TO BE SURROUNDED WITH AN APPROVED SAFETY FENCE. THE FENCE MUST CONFORM TO LOCAL ORDINANCES AND REGULATIONS. THE DEVELOPER OR OWNER SHALL CHECK WITH LOCAL BUILDING OFFICIALS ON APPLICABLE SAFETY REQUIREMENTS. WHERE SAFETY FENCE IS DEEMED APPROPRIATE AND LOCAL ORDINANCES DO NOT SPECIFY FENCING SIZES AND TYPES, THE FOLLOWING SHALL BE USED AS A MINIMUM STANDARD: THE SAFETY FENCE MUST BE MADE OF WELDED WIRE AND AT LEAST FORTY–TWO (42) INCHES HIGH, HAVE POSTS SPACED NO FURTHER APART THAN EIGHT (8) FEET, HAVE MESH OPENINGS NO GREATER THAN TWO (2) INCHES IN WIDTH AND FOUR (4) INCHES IN HEIGHT WITH A MINIMUM OF FOURTEEN (14) GAUGE WIRE. SAFETY FENCE MUST BE MAINTAINED AND IN GOOD CONDITION AT ALL TIMES.

24. OFF–SITE SPOIL OR BORROW AREAS ON STATE OF FEDERAL PROPERTY MUST HAVE PRIOR APPROVAL BY WMA AND OTHER APPLICABLE STATE, FEDERAL, AND LOCAL AGENCIES; OTHERWISE APPROVAL MUST BE GRANTED BY THE LOCAL AUTHORITIES. ALL WASTE AND BORROW AREAS OFF–SITE MUST BE PROTECTED BY SEDIMENT CONTROL MEASURES AND STABILIZED.

25. SITES WHERE INFILTRATION DEVICES ARE USED FOR THE CONTROL OF STORMWATER, EXTREME CARE MUST BE TAKEN TO PREVENT RUNOFF FROM UNSTABILIZED AREAS FROM ENTERING THE STRUCTURE DURING CONSTRUCTION. SEDIMENT CONTROL DEVICES PLACED IN INFILTRATION AREAS MUST HAVE BOTTOM ELEVATIONS AT LEAST TWO (2) FEET HIGHER THAN THE FINISH GRADE BOTTOM ELEVATION OF THE INFILTRATION PRACTICE. WHEN CONVERTING A SEDIMENT TRAP TO AN INFILTRATION DEVICE, ALL ACCUMULATED SEDIMENT MUST BE REMOVED AND DISPOSED OF PRIOR TO FINAL GRADING OF INFILTRATION DEVICE.

26. WHEN A STORM DRAIN SYSTEM OUTFALL IS DIRECTED TO A SEDIMENT TRAP OR SEDIMENT BASIN AND THE SYSTEM IS TO BE USED FOR TEMPORARILY CONVEYING SEDIMENT LADEN WATER, ALL STORM DRAIN INLETS IN NON–SUMP AREAS SHALL HAVE TEMPORARY ASPHALT BERMS CONSTRUCTED AT THE TIME OF BASE PAVING TO DIRECT GUTTER FLOW INTO THE INLETS TO AVOID SURCHARGING AND OVERFLOW OF INLETS IN SUMP AREAS.

27. SITE INFORMATION:

A. TOTAL AREA OF FACILITY (BASE, CAMPUS, PARK, ETC.)	_____ACRES
B. TOTAL AREA OF PROJECT SITE	_____ACRES
C. AREA DISTURBED	_____ACRES
D. AREA TO BE ROOFED OR PAVED	_____ACRES
E. TOTAL CUT	_____CUBIC YARDS
F. TOTAL FILL	_____CUBIC YARDS
G. OFF–SITE WASTE / BORROW AREA LOCATION	TO BE DETERMINED

DESIGN CERTIFICATION

I HEREBY CERTIFY THAT THIS PLAN HAS BEEN DESIGNED IN ACCORDANCE WITH THE MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL, 2000 MARYLAND STORMWATER DESIGN MANUAL, VOLUMES I & II INCLUDING SUPPLEMENTS, THE ENVIRONMENT ARTICLE SECTIONS 4–101 THROUGH 116 AND SECTIONS 4–201 AND 215, AND THE CODE OF MARYLAND REGULATIONS (COMAR) 26.17.01 AND COMAR 26.17.2 FOR EROSION AND SEDIMENT CONTROL AND STORMWATER MANAGEMENT, RESPECTIVELY.

_____ DATE

_____ DESIGNER'S SIGNATURE

MD. REGISTRATION NO. _____
P.E., R.L.S. OR R.L.A. (Circle)

_____ PRINTED NAME

OWNER'S/DEVELOPER'S CERTIFICATION

I/WE HEREBY CERTIFY THAT ALL CLEARING, GRADING, CONSTRUCTION, AND/OR DEVELOPMENT WILL BE DONE PURSUANT TO THIS PLAN AND THAT ANY RESPONSIBLE PERSONNEL INVOLVED IN THE CONSTRUCTION PROJECT WILL HAVE A CERTIFICATE OR ATTENDANCE AT A MARYLAND DEPARTMENT OF THE ENVIRONMENT APPROVED TRAINING PROGRAM FOR THE CONTROL OF EROSION AND SEDIMENT BEFORE BEGINNING THE PROJECT. I/WE HEREBY AUTHORIZE THE RIGHT OF ENTRY FOR PERIODIC ON–SITE EVALUATION BY APPROPRIATE INSPECTION AND ENFORCEMENT AUTHORITY OR THE STATE OF MARYLAND, DEPARTMENT OF THE ENVIRONMENT.

_____ DATE

_____ OWNER/DEVELOPER SIGNATURE

_____ CARD NO.

_____ PRINTED NAME AND TITLE

STANDARD STABILIZATION NOTE

FOLLOWING INITIAL SOIL DISTURBANCE OR RE–DISTURBANCE, PERMANENT OR TEMPORARY STABILIZATION MUST BE COMPLETED WITHIN:

THREE (3) CALENDAR DAYS AS TO THE SURFACE OF ALL PERIMETER DIKES, SWALES, DITCHES PERIMETER SLOPES AND ALL SLOPES STEEPER THAN THREE (3) HORIZONTAL TO ONE (1) VERTICAL (3:1; AND SEVEN (7) CALENDAR DAYS AS TO ALL OTHER DISTURBED OR GRADED AREAS ON THE PROJECT SITE NOT UNDER ACTIVE GRADING

STORMWATER MANAGEMENT "AS–BUILT" CERTIFICATION

I HEREBY CERTIFY THAT THE STORMWATER MANAGEMENT FACILITY (FACILITITES) SHOWN ON THE PLANS AND INDIVIDUALLY IDENTIFIED BELOW HAS (HAVE) BEEN CONSTRUCTED IN ACCORDANCE WITH THE PLANS INCLUDED UNDER THE MARYLAND DEPARTMENT OF THE ENVIRONMENT APPROVAL, NUMBER __–SF–____, EXCEPT AS NOTED IN RED ON THE "AS–BUILT" DRAWINGS. FURTHERMORE, THE RED–NOTED EXCEPTIONS DO NOT ADVERSELY AFFECT THE INTENDED PERFORMANCE OF THE FACILITY (FACILITIES).

_____ _____

_____ _____

_____ _____
FACILITY IDENTIFICATION (IDENTIFY EACH FACILITY INDIVIDUALLY)

_____ _____
NAME (PRINTED) SIGNATURE

_____ _____
MARYLAND REGISTRATION NUMBER DATE

"CERTIFY" MEANS TO STATE OR DECLARE A PROFESSIONAL OPINION BASED ON SUFFICIENT AND APPROPRIATE ONSITE INSPECTIONS AND MATERIAL TESTS CONDUCTED DURING CONSTRUCTION.

EROSION AND SEDIMENT CONTROL SEQUENCE OF CONSTRUCTION

REFER TO THE STANDARD EROSION AND SEDIMENT CONTROL NOTES FOR THE INITIAL SEQUENCE OF OPERATION ITEMS NOT SPECIFICALLY IDENTIFIED IN THE SEQUENCE OF CONSTRUCTION BELOW, IN ADDITION TO CONSTRUCTION PHASING PLANS.

1. NOTIFY MDE WMA COMPLIANCE INSPECTOR AT (410) 537–3510 AT LEAST SEVEN (7) DAYS PRIOR TO BEGINNING EARTH DISTURBANCE TO SCHEDULE A PRE–CONSTRUCTION MEETING.
2. THE LIMITS OF DISTURBANCE MUST BE FIELD MARKED PRIOR TO CLEARING OF TREES, INSTALLATION OF SEDIMENT CONTROL MEASURES, CONSTRUCTION, OR OTHER LAND DISTURBING ACTIVITIES.
3. THE CONTRACTOR MUST OBTAIN APPROVAL FROM THE MDE INSPECTOR, CERTIFYING THAT THE LIMITS OF DISTURBANCE AND TREE PROTECTION MEASURES ARE CORRECTLY MARKED AND INSTALLED PRIOR TO COMMENCING ANY CLEARING.

INITIAL PHASE

1. CLEAR AND GRADE FOR INSTALLATION OF SEDIMENT CONTROL DEVICES.
2. INSTALL INITIAL SEDIMENT CONTROL DEVICES. INSTALL **(CONSULTANT TO LIST DEVICES USED ON PLANS HERE)**.
3. ONCE THE SEDIMENT CONTROL DEVICES ARE INSTALLED, THE CONTRACTOR MUST OBTAIN WRITTEN APPROVAL FROM THE MDE INSPECTOR BEFORE PROCEEDING WITH ANY ADDITIONAL GRADING OR CONSTRUCTION.
4. **(CONSULTANT TO ESTABLISH SEQUENCING HERE)**
5. THE CONTRACTOR SHALL OBTAIN WRITTEN APPROVAL FROM MDE INSPECTOR, PRIOR TO THE REMOVAL OF ANY SEDIMENT CONTROL DEVICE.
6. STABILIZE ALL REMAINING DISTURBED AREAS. REMOVE REMAINING SEDIMENT CONTROL DEVICES UPON FINAL APPROVAL OF THE MDE INSPECTOR.

FINAL PHASE (IF REQUIRED)

1. THE LIMITS OF DISTURBANCE MUST BE FIELD MARKED PRIOR TO CLEARING OF TREES, INSTALLATION OF SEDIMENT CONTROL MEASURES, CONSTRUCTION, OR OTHER LAND DISTURBING ACTIVITIES.
2. THE CONTRACTOR MUST OBTAIN APPROVAL FROM THE MDE INSPECTOR, CERTIFYING THAT THE LIMITS OF DISTURBANCE AND TREE PROTECTION MEASURES ARE CORRECTLY MARKED AND INSTALLED PRIOR TO COMMENCING ANY CLEARING.
3. WITH THE APPROVAL OF THE MDE INSPECTOR, CLEAR AND GRADE FOR INSTALLATION OF SEDIMENT CONTROL DEVICES.
4. INSTALL FINAL SEDIMENT CONTROL DEVICES. INSTALL **(CONSULTANT TO LIST DEVICES USED ON PLANS HERE)**
5. ONCE THE SEDIMENT CONTROL DEVICES ARE INSTALLED, THE CONTRACTOR MUST OBTAIN WRITTEN APPROVAL FROM THE MDE INSPECTOR BEFORE PROCEEDING WITH ANY ADDITIONAL GRADING OR CONSTRUCTION.
6. **(CONSULTANT TO ESTABLISH SEQUENCING HERE)**
7. THE CONTRACTOR SHALL OBTAIN WRITTEN APPROVAL FROM MDE INSPECTOR, PRIOR TO THE REMOVAL OF ANY SEDIMENT CONTROL DEVICE.
8. STABILIZE ALL REMAINING DISTURBED AREAS. REMOVE REMAINING SEDIMENT CONTROL DEVICES UPON FINAL APPROVAL OF THE MDE INSPECTOR.

MDE NO. XX–SF–XXXX
NOTE TO CONTRACTOR:
SEDIMENT CONTROL WILL BE STRICTLY ENFORCED

FOR EROSION AND SEDIMENT CONTROL ONLY.

COMPANY NAME

COMPANY NAME
COMPANY ADDRESS
CITY, STATE ZIP CODE
COMPANY PHONE NO. COMPANY FAX NO.

DESIGNED: ___
DRAWN: ___
CHECKED: ___
APPROVED: ___

"PROFESSIONAL CERTIFICATION:
I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND."
LICENSE NO. _____
EXPIRATION DATE: _____

REVISION NO.	REVISION DATE	DESCRIPTIONS

XX% SUBMISSION

BWI THURGOOD MARSHALL OR MARTIN STATE LOGO

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
OFFICE OF DESIGN AND CONSTRUCTION

PROJECT TITLE: PROJECT TITLE
SHEET TITLE: EROSION AND SEDIMENT CONTROL NOTES 2
SCALE: NONE
DATE: DATE

CONTRACT NO.: MAA–CO–XX–XXX
SHEET NO.: ———

PATH/FILENAME

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MAA STANDARD SPECIFICATION

ITEM 903 SEEDING

DESCRIPTION

903–1.1 GENERAL

THIS ITEM PROVIDES SPECIFICATIONS FOR SEEDING OF AREAS AS DESIGNATED ON PLANS OR AS DIRECTED BY THE MAA ENGINEER. THE SPECIES, MIXTURES AND METHODS OF APPLICATION PROVIDED IN THIS ITEM HAVE BEEN DESIGNED TO REDUCE THE ATTRACTIVENESS OF AIRPORT GROUNDS TO WILDLIFE. ONLY MAA –APPROVED SPECIES, MIXTURES AND RATES OF APPLICATION PROVIDED IN THIS ITEM MAY BE USED TO ESTABLISH VEGETATION. ALL ACTIVITIES ASSOCIATED WITH SEEDING INCLUDING SOIL PREPARATION, SEED APPLICATION FERTILIZATION, AND MAINTENANCE SHALL ALSO CONFORM TO THESE APPROVED STANDARDS.

MATERIALS

903–2.1 SEED

ALL SEED SHALL COMPLY WITH THE MARYLAND SEED LAW (AGRICULTURAL ARTICLE OF THE ANNOTATED CODE OF MARYLAND). ONLY MAA–APPROVED SPECIES, MIXTURES AND RATES OF APPLICATION PROVIDED IN THIS ITEM MAY BE USED TO ESTABLISH VEGETATION. SEED WILL BE SAMPLED AND TESTED BY AN INSPECTOR FROM THE TURF AND SEED SECTION, MARYLAND DEPARTMENT OF AGRICULTURE (MDA), ANNAPOLIS, MARYLAND. ALL LAWN AND TURF SEED AND MIXTURES SHALL BE FREE FROM THE FOLLOWING STATE–LISTED RESTRICTED NOXIOUS WEEDS:

CORN COCKLE (AGROSTEMMA GITHAGO)
BENTGRASS (AGOSTIS SPP)[1]
REDTOP (AGOSTIS GIGANTEA)[1]
WILD ONION (ALLIUM CANADENSE)
WILD GARLIC (ALLIUM VINEALE)
BINDWEED (CALSTEGIA SPP)
DODDER (CUSCUTA SPP)
BERMUDA GRASS (CYNODON DACTYLON)

ORCHARDGRASS (DACTYLIS GLOMERATA)
TALL FESCUE (FESTUCA ARUNDINACEA)[1]
MEADOW FESCUE (FESTUCA PRATENSIS)[1]
VELVETGRASS (HOLCUS LANATUS)
ANNUAL BLUEGRASS (POA ANNUA)[1]
ROUGH BLUEGRASS (POA TRIVIALIS)
TIMOTHY (PHLEUM PRATENSE)
JOHNSON GRASS (SORGUM HALEPENSE)

1. THESE SPECIES MAY BE INCLUDED AS A LABELED COMPONENT OF A MIXTURE WHEN EACH IS PRESENT IN EXCESS OF FIVE PERCENT OF THE MIXTURE BY WEIGHT.

RESTRICTED NOXIOUS–WEED SEED MAY NOT EXCEED 0.5 PERCENT BY WEIGHT OF ANY SEED MIXTURE. RESTRICTED NOXIOUS–WEED SEED MAY NOT EXCEED 0.5 PERCENT BY WEIGHT OF ANY SEED MIXTURE. IN ADDITION, ALL SEEDS SOLD IN MARYLAND SHALL BE FREE FROM THE FOLLOWING LISTED PROHIBITED NOXIOUS WEEDS:

BALLOONVINE (CARDIOSPERMUM HALICACABUM)
QUACKGRASS (ELYTRIGIA REPENS)
SICKLEPOD (SENNA OBTUSIFOLIA)
SORGHUM (SORGHUM SPP)

CANADA THISTLE (CIRSIUM ARVENSE)
PLUMELESS THISTLE (CARDUUS SPP–INCLUDES MUSK AND CURLED THISTLE)
SERRATED TUSSOCK (NASSELLA TRICHOTOMA)

903–2.1.1 APPROVED SPECIES

THE FOLLOWING TABLE CONTAINS SPECIES THAT ARE APPROVED BY MAA FOR USE IN SEED MIXTURES. PURITY REQUIREMENTS AND GERMINATION REQUIREMENTS ARE ALSO PROVIDED.

APPROVED PLANT SPECIES
MAA SEED MIXTURES

	PURITY[a] NOT LESS THAN %	MINIMUM % GERMINATION[b]	PURE LIVE SEED FACTOR
CERTIFIED TURF–TYPE TALL FESCUE (FESTUCA ARUNDINACEA)	98	90	1.13
CERTIFIED KENTUCKY BLUE GRASS (POA PRATENSIS)	90	80	1.39
FOWL BLUEGRASS (POA PALUSTRIS)	90	80	1.39
HARD FESCUE (FESTUCA LONGIFOLIA)	98	90	1.13
CHEWING RED FESCUE (FESTUCA RUBRA COMMUTATA)	98	90	1.13
ANNUAL RYEGRASS (LOLIUM MULTIFLORUM)	95	85	1.24
PERENNIAL RYEGRASS (LOLIUM PERENNE)	90	80	1.39
CREEPING BENTGRASS (AGROSTIS STOLONIFERA)	90	80	1.39
SWITCHGRASS (PANCIUM VIRGATUM)	90	80	1.39
LITTLE BLUESTEM (ANDROPOGON SCOPARIUS)	62	94	1.71

a THE PERCENTAGE WEIGHT OF PURE SEED PRESENT SHALL BE FREE OF ANY AGRICULTURE SEEDS, INERT MATTER, AND OTHER SEEDS DISTINQUISHABLE BY THEIR APPEARANCE.
b THE PERCENTAGE OF GERMINATION SHALL BE ACTUAL SPROUTS AND SHALL NOT INCLUDE HARD SEEDS UNLESS SPECIFICALLY PERMITTED BY THE MAA ENGINEER.

903–2.1.2 PURITY

ALL SEED SHALL BE FREE OF ALL STATE–DESIGNATED NOXIOUS WEEDS LISTED IN PARAGRAPH 2.1.1 AND CONFORM TO MAA SPECIFICATIONS. TO ENSURE COMPLIANCE, MAA REQUIRES SAMPLING AND TESTING OF SEED BY THE TURF AND SEED SECTION, MARYLAND DEPARTMENT OF AGRICULTURE (MDA). THE CONTRACTOR SHALL FURNISH THE MAA ENGINEER WITH DUPLICATE SIGNED COPIES OF A STATEMENT BY THE TURF AND SEED SECTION CERTIFYING THAT EACH LOT OF SEED HAS BEEN LABORATORY TESTED WITHIN SIX MONTHS TO DATE OF DELIVERY. THIS STATEMENT SHALL INCLUDE THE FOLLOWING INFORMATION:

- NAME AND ADDRESS OF LABORATORY
- DATE OF TEST
- LOT NUMBER
- THE RESULTS OF TESTS AS TO NAME, PERCENTAGES OF PURITY AND OF GERMINATION
- PERCENTAGE OF WEED CONTENT FOR THE SEED FURNISHED
- AND, IN THE CASE OF A MIXTURE, THE PROPORTIONS OF EACH KIND OF SEED

SEED SHALL BE FURNISHED IN STANDARD CONTAINERS WITH THE SEED NAME, LOT NUMBER, NET WEIGHT, PERCENTAGES OF PURITY, GERMINATION RATE AND HARD SEED, AND PERCENTAGE OF MAXIMUM WEED SEED CONTENT CLEARLY MARKED. ALL SEED CONTAINERS SHALL BE TAGGED WITH A MDA SUPERVISED MIX PROGRAM SEED TAG.

903–2.1.3 MIXTURES AND APPLICATION RATES

ONLY SEED MIXTURES AND APPLICATION RATES DESCRIBED IN THIS ITEM MAY BE USED UNLESS OTHERWISE APPROVED BY THE MAA ENGINEER. SEED MIXTURES SHALL MEET CRITERIA DETAILED IN PARAGRAPH 903–2.1.2. SEED MIXTURES HAVE BEEN FORMULATED TO MINIMIZE THE ATTRACTIVENESS OF AREAS TO WILDLIFE OF COMMON LANDSCAPE SCENARIOS. THE APPROPRIATE SEED MIXTURE FOR APPLICATION WILL BE DESIGNATED BASED ON ENVIRONMENTAL CONDITIONS AND MAY VARY FROM SITE TO SITE. ALL PLANTING RATES LISTED ARE IN POUNDS OF PURE LIVE SEED (PLS) PER ACRE.

SEED MIXTURES, APPLICATION SCENARIOS AND RATES FOR PERMANENT COOL–SEASON GRASSES ARE AS FOLLOWS:

A. SEED MIXTURE NO. 1 RELATIVELY FLAT AREAS (GRADE LESS THAN 4:1) SUBJECT TO NORMAL CONDITIONS AND REGULAR MOWING (APPLICATION RATE = 234 LBS PLS/ACRE)
B. SEED MIXTURE NO. 2 SLOPED AREAS (GRADE GREATER THAN 4:1) NOT SUBJECT TO REGULAR MOWING (APPLICATION RATE = 115 LBS PLS/ACRE)
C. SEED MIXTURE NO. 3 WETLANDS AND THEIR ASSOCIATED BUFFER ZONES (APPLICATION RATE = 131 LBS PLS/ACRE)

SEED MIXTURE NO. 1

RELATIVELY FLAT AREAS REGULARLY MOWED AND EXPOSED TO NORMAL CONDITIONS (APPLICATION RATE = 234 LBS PLS/ACRE)

SEED		RATE OF APPLICATION (LBS OF PLS/ACRE)
85%	CERTIFIED TURF–TYPE TALL FESCUE	192
10%	CERTIFIED KENTUCKY BLUEGRASS	28
5%	PERENNIAL RYEGRASS	14
SUPPLEMENTAL SEED		
ANNUAL RYEGRASS		25

SEED MIXTURE NO. 2

SLOPED AREAS NOT SUBJECT TO REGULAR MOWING (APPLICATION RATE = 115 LBS PLS/ACRE)

SEED		RATE OF APPLICATION (LBS OF PLS/ACRE)
75%	HARD FESCUE	85
20%	CHEWINGS FESCUE	23
5%	KENTUCKY BLUEGRASS	7
SUPPLEMENTAL SEED		
REDTOP		3

SEED MIXTURE NO. 3

WETLAND AREAS AND THEIR ASSOCIATED BUFFER ZONES (APPLICATION RATE = 131 LBS PLS/ACRE)

SEED		RATE OF APPLICATION (LBS OF PLS/ACRE)
60%	CREEPING BENTGRASS	83
30%	FOWL BLUEGRASS	34
10%	SWITCHGRASS	14
SUPPLEMENTAL SEED		
REDTOP		3

903–2.1.4 SEEDING SEASONS

APPLICATION OF SEED AND SEED MIXTURES SHALL OCCUR WITHIN A SPECIFIED SEEDING SEASON UNLESS OTHERWISE APPROVED BY THE MAA ENGINEER. NO SEED OR SEED MIXTURES ARE TO BE APPLIED ON FROZEN GROUND OR WHEN TEMPERATURE IS AT OR BELOW 35 DEGREES FAHRENHEIT (7.2 DEGREES CENTIGRADE). UNDER THESE CONDITIONS, A LAYER OF MULCH SHOULD BE APPLIED IN ACCORDANCE WITH ITEM 905, MULCHING, TO STABILIZE THE SITE, AND PERMANENT SEEDING SHOULD OCCUR IN THE SUBSEQUENT SEEDING SEASON. SEED APPLICATION MAY OCCUR DURING THE SEEDING SEASON DATES LISTED BELOW. SEEDING PERFORMED AFTER OCTOBER 20 SHOULD BE A TEMPORARY COVER OF ANNUAL RYEGRASS AND FOLLOWED BY OVERSEEDING OF THE APPROPRIATE SEED MIXTURE DURING THE SPRING SEEDING SEASON.

SEEDING SEASONS

PERMANENT COOL–SEASON GRASSES	MARCH 1 TO APRIL 20 AND AUGUST 1 TO OCTOBER 20, INCLUSIVE
TEMPORARY COVER OF ANNUAL RYE/REDTOP	MARCH 1 TO APRIL 30 AND AUGUST 1 TO NOVEMBER 30, INCLUSIVE
TEMPORARY COVER OF WARM–SEASON GRASSES (LITTLE BLUESTEM ONLY)	MAY 1 TO JULY 31, INCLUSIVE. RATE OF APPLICATION SHOULD BE 13.6 LBS PLS PER ACRE

SEEDING SEASONS ARE BASED ON TYPICAL YEARS AND CAN BE SUBJECT TO VARIATION, WHICH MAY BE MODIFIED BY THE MAA ENGINEER BASED ON SEASONAL TRENDS.

IF THE TIME REQUIRED TO COMPLETE ANY OF THE OPERATIONS NECESSARY UNDER THIS ITEM, WITHIN THE SPECIFIED PLANTING SEASON OR ANY AUTHORIZED EXTENSIONS THEREOF, EXTENDS BEYOND THE CONTRACT PERIOD, THEN SUCH TIME WILL BE CHARGED AGAINST THE CONTRACT TIME AND LIQUIDATED DAMAGES WILL BE ENFORCED WITH RESPECT TO THIS PORTION OF WORK.

903–2.2 LIME

LIME SHALL CONSIST OF GROUND LIMESTONE AND CONTAIN AT LEAST 85 PERCENT TOTAL CARBONATES. LIME SHALL BE GROUND TO A FINENESS SO THAT AT LEAST 90 PERCENT WILL PASS THROUGH A NO. 20 MESH SIEVE AND 50 PERCENT WILL PASS THROUGH A NO. 100 MESH SIEVE. DOLOMITIC LIME OR A HIGH MAGNESIUM LIME SHALL CONTAIN AT LEAST 10 PERCENT MAGNESIUM OXIDE. LIME SHALL BE APPLIED BY APPROVED METHODS DETAILED IN SECTION 903–3.3 OF THIS ITEM. THE RATE OF APPLICATION WILL BE BASED ON RESULTS OF SOIL TESTS.

903–2.3 FERTILIZER

FERTILIZER SHALL BE STANDARD COMMERCIAL FERTILIZER (SUPPLIED SEPARATELY OR IN MIXTURE) AND MEET THE REQUIREMENTS OF APPLICABLE STATE AND FEDERAL LAWS (O–F–241) AS WELL AS STANDARDS OF THE ASSOCIATION OF OFFICIAL AGRICULTURAL CHEMISTS. NITROGEN–PHOSPHORUS–POTASSIUM (N–P–K) CONCENTRATIONS SHALL BE DETERMINED FROM ANALYSIS OF SOIL SAMPLES. METHODS OF FERTILIZER APPLICATION SHALL CONFORM TO STANDARDS DESCRIBED IN SECTION 903–3.3 OF THIS ITEM. FERTILIZER SHALL BE FURNISHED IN STANDARD CONTAINERS THAT ARE CLEARLY LABELED WITH NAME, WEIGHT AND GUARANTEED ANALYSIS OF THE CONTENTS (PERCENTAGE OF TOTAL NITROGEN, AVAILABLE PHOSPHORIC ACID AND WATER–SOLUBLE POTASH). MIXED FERTILIZERS SHALL NOT CONTAIN ANY HYDRATED LIME OR CYANAMIDE COMPOUNDS. FERTILIZERS FAILING TO MEET THE SPECIFIED NUTRIENTS PER UNIT OF MEASURE WITHOUT ADDITIONAL COST TO MAA.

THE FERTILIZERS MAY BE SUPPLIED IN THE FOLLOWING FORMS:

A. A DRY, FREE–FLOWING FERTILIZER SUITABLE FOR APPLICATION BY A COMMON FERTILIZER SPREADER

B. A FINELY GROUND FERTILIZER SOLUBLE IN WATER, SUITABLE FOR APPLICATION BY POWER SPRAYERS

C. A GRANULAR OR PELLET FORM SUITABLE FOR APPLICATION BY BLOWER EQUIPMENT

THE RATE OF APPLICATION WILL BE BASED ON RESULTS OF SOIL TESTS PERFORMED BY THE UNIVERSITY OF MARYLAND SOIL TESTING LABORATORY. BY LAW, PERSONS APPLYING FERTILIZER TO STATE–OWNED LAND SHALL FOLLOW THE RECOMMENDATIONS OF THE UNIVERSITY OF MARYLAND AS SET FORTH IN THE "PLANT NUTRIENT RECOMMENDATIONS BASED ON SOIL TESTS FOR TURF MAINTENANCE" AND THE "PLANT NUTRIENT RECOMMENDATIONS BASED ON SOIL TESTS FOR SOD PRODUCTION" (SEE APPENDIX B). APPLICATION OF THE FERTILIZER SHALL BE IN A MANNER THAT IS CONSISTENT WITH THE RECOMMENDATIONS OF THE UNIVERSITY OF MARYLAND COOPERATIVE EXTENSION.

CONSTRUCTION METHODS AND EQUIPMENT

903–3.1 GENERAL

THIS SECTION PROVIDES APPROVED METHODS FOR THE APPLICATION OF AND INCLUDES STANDARDS FOR SEEDBED PREPARATION, METHODS OF APPLICATION AND EQUIPMENT TO BE USED DURING THE PROCESS. LIME AND FERTILIZER SHALL BE APPLIED TO SEEDED AREAS BEFORE THE SEED IS SPREAD. THE MIXTURE OF SEED WILL BE DETERMINED FOR SITES BASED ON ENVIRONMENTAL CONDITIONS AS DESCRIBED IN PARAGRAPH 903–2.1.3.

903–3.2 ADVANCE PREPARATION

AREAS DESIGNATED FOR SEEDING SHALL BE PROPERLY PREPARED IN ADVANCE OF SEED APPLICATION. THE AREA SHALL BE TILLED AND GRADED PRIOR TO APPLICATION OF LIME AND FERTILIZER, AND THE SURFACE AREA SHALL BE CLEARED OF ANY STONES LARGER THAN 1 INCH IN DIAMETER, STICKS, STUMPS AND OTHER DEBRIS THAT MIGHT INTERFERE WITH SOWING OF SEED, GROWTH OF GRASSES OR SUBSEQUENT MAINTENANCE OF GRASS–COVERED AREAS. DAMAGE CAUSED BY EROSION OR OTHER FORCES THAT OCCUR AFTER THE COMPLETION OF GRADING SHALL BE REPAIRED PRIOR TO THE APPLICATION OF FERTILIZER AND LIME. THE CONTRACTOR WILL REPAIR SUCH DAMAGE, WHICH MAY INCLUDE FILLING GULLIES, SMOOTHING IRREGULARITIES AND REPAIRING OTHER INCIDENTAL DAMAGE BEFORE BEGINNING THE APPLICATION OF FERTILIZER AND GROUND LIMESTONE.

IF AN AREA TO BE SEEDED IS SPARSELY SODDED, WEEDY, BARREN AND UNWORKED OR PACKED AND HARD, ALL GRASS AND WEEDS SHALL FIRST BE CUT OR OTHERWISE SATISFACTORILY DISPOSED OF, AND THE SOIL THEN SCARIFIED OR OTHERWISE LOOSENED TO A DEPTH NOT LESS THAN 5 INCHES (125 MM). CLODS SHALL BE BROKEN AND THE TOP 3 INCHES (75 MM) OF SOIL SHALL BE WORKED INTO A SATISFACTORILY CONDITION BY DISCING OR BY USE OF CULTIPACKERS, ROLLERS, DRAGS, HARROWS OR OTHER APPROPRIATE MEANS.

AN AREA TO BE SEEDED SHALL BE CONSIDERED A SATISFACTORY SEEDBED (WITHOUT REQUIRING ADDITIONAL TREATMENT) IF IT HAS RECENTLY BEEN THOROUGHLY LOOSENED AND WORKED TO A DEPTH OF NOT LESS THAN 5 INCHES; THE TOP 3 INCHES OF SOIL IS LOOSE, FRIABLE AND IS REASONABLY FREE FROM LARGE CLODS, ROCKS, LARGE ROOTS OR OTHER UNDESIRABLE MATTER; APPROPRIATE AMOUNTS OF FERTILIZER AND LIME HAVE BEEN ADDED; AND, IF IT HAS BEEN SHAPED TO THE REQUIRED GRADE IMMEDIATELY PRIOR TO SEEDING. FOR SLOPE AREAS STEEPER THAN 3:1 (THREE HORIZONTAL TO ONE VERTICAL), THE SUBSOIL SHALL BE LOOSE TO A DEPTH OF 1 INCH.

AFTER COMPLETION OF TILLING AND GRADING, LIME AND FERTILIZER SHALL BE APPLIED WITHIN 48 HOURS ACCORDING TO THE SPECIFIED RATE (PARAGRAPHS 903–2.2 AND 2.3) AND METHODS (PARAGRAPHS 903–3.3.1 AND 903–3.3.2) APPROVED BY MAA. THE SEEDING MIXTURE SHALL BE APPLIED WITHIN 48 HOURS AFTER APPLICATION OF LIME AND FERTILIZER. TO FIRM THE SEEDED AREAS, CULTIPACKING SHALL OCCUR IMMEDIATELY AFTER SEEDING.

903–3.3 METHODS OF APPLICATION

LIME, FERTILIZER AND SEED MIXES SHALL BE APPLIED BY EITHER THE DRY OR WET APPLICATION METHODS THAT HAVE BEEN APPROVED BY MAA AND ARE DETAILED BELOW.

903–3.3.1 DRY APPLICATION METHOD

A. LIMING — IF SOIL TEST RESULTS INDICATE THAT LIME IS NEEDED, THE FOLLOWING PROCEDURES WILL BE USED: FOLLOWING ADVANCE PREPARATION OF THE SEEDBED, LIME SHALL BE APPLIED PRIOR TO THE APPLICATION OF ANY FERTILIZER OR SEED AND ONLY ON SEEDBEDS THAT HAVE BEEN PREPARED AS DESCRIBED IN PARAGRAPH 903–3.2. THE LIME SHALL BE UNIFORMLY SPREAD AND WORKED INTO THE TOP 2 INCHES OF SOIL, AFTER WHICH THE SEEDBED SHALL BE PROPERLY GRADED AGAIN.

B. FERTILIZING — FOLLOWING ADVANCE PREPARATION (AND LIMING IF NECESSARY), FERTILIZER SHALL BE SPREAD UNIFORMLY AT THE SPECIFIED RATE TO PROVIDE NO LESS THAN THE MINIMUM QUANTITY STATED IN PARAGRAPH 903–2.3.

C. SEEDING — SEED MIXTURES SHALL BE SOWN IMMEDIATELY AFTER FERTILIZATION OF THE SEEDBED. THE FERTILIZER AND SEED SHALL BE LIGHTLY RAKED TO A DEPTH OF 1 INCH FOR NEWLY GRADED AND DISTURBED AREAS.

D. ROLLING — AFTER THE SEED HAS BEEN PROPERLY COVERED, THE SEEDBED SHALL BE IMMEDIATELY COMPACTED USING A CULTIPACKER OR AN APPROVED LAWNROLLER.

903–3.3.2 WET APPLICATION METHOD/HYDROSEEDING

A. GENERAL — THE CONTRACTOR MAY ELECT TO APPLY SEED AND FERTILIZER AS PER PARAGRAPHS C AND D OF THIS SECTION IN THE FORM OF AN AQUEOUS MIXTURE BY SPRAYING OVER THE PREVIOUSLY PREPARED SEEDBED USING METHODS AND EQUIPMENT APPROVED BY MAA. THE RATES OF APPLICATIONS SHALL BE SPECIFIED IN PARAGRAPHS 903–2.1 THROUGH 903–2.3.

B. SPRAYING EQUIPMENT — THE SPRAYING EQUIPMENT SHALL HAVE A CONTAINER OR WATER TANK EQUIPPED WITH A LIQUID LEVEL GAUGE CAPABLE OF READING INCREMENTS OF 50 GALLONS OR LESS OVER THE ENTIRE RANGE OF THE TANK CAPACITY. THE LIQUID LEVEL GAUGE SHALL ALSO BE MOUNTED SO AS TO BE VISIBLE TO THE NOZZLE OPERATOR AT ALL TIMES. THE CONTAINER OR TANK SHALL ALSO BE EQUIPPED WITH A MECHANICAL POWER–DRIVEN AGITATOR CAPABLE OF KEEPING ALL THE SOLIDS IN THE MIXTURE IN COMPLETE SUSPENSION AT ALL TIMES UNTIL USED.

THE SPRAYING EQUIPMENT SHALL ALSO INCLUDE A PRESSURE PUMP CAPABLE OF DELIVERING 100 GALLONS PER MINUTE AT A PRESSURE OF 100 POUNDS PER SQUARE INCH. THE PRESSURE PUMP ASSEMBLAGE SHALL BE CONFIGURED TO ALLOW THE MIXTURE TO FLOW THROUGH THE TANK WHEN NOT BEING SPRAYED FROM THE NOZZLE. ALL PUMP PASSAGES AND PIPELINES SHALL BE CAPABLE OF PROVIDING CLEARANCE FOR ⅝–INCH SOLIDS. THE POWER UNIT FOR THE PUMP AND AGITATOR SHALL HAVE CONTROLS MOUNTED SO AS TO BE ACCESSIBLE TO THE NOZZLE OPERATOR. A PRESSURE GAUGE SHALL BE CONNECTED TO AND MOUNTED IMMEDIATELY BEHIND THE NOZZLE.

THE NOZZLE PIPE SHALL BE MOUNTED ON AN ELEVATED SUPPORTING STAND IN SUCH A MANNER THAT IT CAN BE ROTATED THROUGH 360 DEGREES HORIZONTALLY AND INCLINED VERTICALLY FROM AT LEAST 20 DEGREES BELOW TO AT LEAST 60 DEGREES ABOVE THE HORIZONTAL. THERE SHALL BE A QUICK–ACTING, THREE–WAY CONTROL VALVE CONNECTING THE RECIRCULATING LINE TO THE NOZZLE PIPE AND MOUNTED SO THAT THE NOZZLE OPERATOR CAN CONTROL AND REGULATE THE AMOUNT OF FLOW OF MIXTURE TO BE SUPPLIED SO THAT MIXTURES MAY BE PROPERLY SPRAYED OVER A DISTANCE VARYING FROM 20 FEET TO 100 FEET. ONE SHALL BE A CLOSE–RANGE RIBBON NOZZLE, ONE A MEDIUM–RANGE RIBBON NOZZLE AND ONE A LONG–RANGE JET NOZZLE. FOR EASE OF REMOVAL AND CLEANING, ALL NOZZLES SHALL BE CONNECTED TO THE NOZZLE PIPE BY MEANS OF QUICK–RELEASE COUPLINGS. IN ORDER TO REACH AREAS INACCESSIBLE TO THE REGULAR EQUIPMENT, AN EXTENSION HOSE AT LEAST 50 FEET IN LENGTH SHALL BE PROVIDED TO WHICH THE NOZZLES MAY BE CONNECTED.

C. MIXTURES — LIME SHALL BE APPLIED SEPARATELY IN THE QUANTITY SPECIFIED, PRIOR TO THE FERTILIZING AND SEEDING OPERATIONS. LIME SHOULD BE ADDED TO AND MIXED WITH WATER AT A CONCENTRATION NOT TO EXCEED 220 POUNDS OF LIME FOR EVERY 100 GALLONS OF WATER. AFTER LIME HAS BEEN APPLIED, THE TANK SHOULD BE EMPTIED AND RINSED WITH FRESH WATER. SEED AND FERTILIZER SHALL BE MIXED TOGETHER IN THE RELATIVE PROPORTIONS SPECIFIED, BUT THE RESULTING CONCENTRATION SHOULD NOT EXCEED 220 POUNDS OF MIXTURE PER PER 100 GALLONS OF WATER AND SHOULD BE APPLIED WITHIN 30 MINUTES TO PREVENT FERTILIZER BURN OF THE SEEDS.

ALL WATER USED SHALL BE OBTAINED FROM FRESH WATER SOURCES AND SHALL BE FREE FROM INJUROUS CHEMICALS AND OTHER TOXIC SUBSTANCES HARMFUL TO PLANT LIFE. BRACKISH WATER SHALL NOT BE USED AT ANY TIME. THE CONTRACTOR SHALL IDENTIFY ALL SOURCES OF WATER TO THE MAA ENGINEER AT LEAST TWO WEEKS PRIOR TO USE. THE ENGINEER MAY TAKE SAMPLES OF THE WATER AT THE SOURCE OR FROM THE TANK AT ANY TIME AND HAVE A LABORATORY TEST THE SAMPLES FOR CHEMICAL AND SALINE CONTENT. THE CONTRACTOR SHALL NOT USE ANY WATER FROM ANY SOURCE THAT IS DISAPPROVED BY THE ENGINEER FOLLOWING SUCH TESTS.

ALL MIXTURES SHALL BE CONSTANTLY AGITATED FROM THE TIME THEY ARE MIXED UNTIL THEY ARE FINALLY APPLIED TO THE SEEDBED. ALL SUCH MIXTURES SHALL BE USED WITHIN 30 MINUTES FROM THE TIME THEY WERE MIXED OR THEY SHALL BE WASTED AND DISPOSED OF AT A LOCATION ACCEPTABLE TO THE ENGINEER.

D. SPRAYING — LIME SHALL BE SPRAYED UPON PREVIOUSLY PREPARED SEEDBEDS ON WHICH THE LIME, IF REQUIRED, SHALL HAVE BEEN WORKED IN ALREADY. THE MIXTURES SHALL BE APPLIED USING A HIGH–PRESSURE SPRAY WHICH SHALL ALWAYS BE DIRECTED UPWARD INTO THE AIR SO THAT THE MIXTURES WILL FALL TO THE GROUND IN A UNIFORM SPRAY. NOZZLES OR SPRAYS SHALL NEVER BE DIRECTED TOWARD THE GROUND IN SUCH A MANNER THAT MIGHT PRODUCE EROSION OR RUNOFF. PARTICULAR CARE SHALL BE EXERCISED TO ENSURE THAT THE APPLICATION IS MADE UNIFORMLY, AT THE PRESCRIBED RATE, AND TO GUARD AGAINST MISSES AND OVERLAPPED AREAS. PREDETERMINED QUANTITIES OF THE MIXTURE SHALL BE IN ACCORDANCE WITH SPECIFICATIONS TO COVER SPECIFIED SECTIONS OF KNOWN AREAS. TO CHECK THE RATE AND UNIFORMITY OF APPLICATION, THE APPLICATOR WILL OBSERVE THE DEGREE OF WETTING OF THE GROUND OR DISTRIBUTE TEST SHEETS OF PAPER OR PANS OVER THE AREA AT INTERVALS AND OBSERVE THE QUANTITY OF MATERIAL DEPOSITED THEREON.

ON SURFACES THAT ARE TO BE MULCHED AS INDICATED BY THE PLANS OR DESIGNATED BY THE MAA ENGINEER, SEED AND FERTILIZER APPLIED BY THE SPRAY METHOD NEED NOT BE RAKED INTO THE SOIL OR ROLLED. HOWEVER, ON SURFACES ON WHICH MULCH IS NOT TO BE USED, THE RAKING AND ROLLING OPERATIONS WILL BE REQUIRED AFTER THE SOIL HAS DRIED.

903–3.4 MAINTENANCE OF SEEDED AREAS

THE CONTRACTOR SHALL PROTECT SEEDED AREAS AGAINST TRAFFIC OR OTHER USE BY WARNING SIGNS OR BARRICADES, AS APPROVED BY THE ENGINEER. SURFACES GULLIED OR OTHERWISE DAMAGED FOLLOWING SEEDING SHALL BE REPAIRED BY REGRADING AND RESEEDING AS DIRECTED. THE CONTRACTOR SHALL MOW, WATER AS DIRECTED, AND OTHERWISE MAINTAIN SEEDED AREAS IN A SATISFACTORY CONDITION UNTIL INSPECTION AND ACCEPTANCE OF THE WORK.

WHEN EITHER THE DRY OR WET APPLICATION METHOD OUTLINED ABOVE IS USED FOR WORK PERFORMED OUT OF SEASON, THE CONTRACTOR WILL BE REQUIRED TO ESTABLISH A GOOD STAND OF GRASS OF UNIFORM COLOR AND DENSITY TO THE SATISFACTION OF THE ENGINEER. IF AT THE TIME WHEN THE CONTRACT HAS BEEN OTHERWISE COMPLETED IT IS NOT POSSIBLE TO MAKE AN ADEQUATE DETERMINATION OF THE COLOR, DENSITY AND UNIFORMITY OF SUCH STANDS OF GRASS, PAYMENT FOR THE UNACCEPTED PORTIONS OF THE AREAS SEEDED OUT OF SEASON WILL BE WITHHELD UNTIL SUCH TIME AS THESE REQUIREMENTS HAVE BEEN MET.

ITEM 904 SODDING

DESCRIPTION

904–1

THIS ITEM PROVIDES STANDARDS FOR FURNISHING, HAULING AND PLACING APPROVED LIVE SOD ON PREPARED AREAS AS INDICATED ON SITE PLANS. SOD WILL ONLY BE APPLIED TO LANDSCAPE AREAS AND SHALL BE MOVED FREQUENTLY.. ALL SODDING ACTIVITIES SHALL CONFORM TO THESE SPECIFICATIONS AT THE LOCATIONS SHOWN ON SITE PLANS OR AS DIRECTED BY THE MAA ENGINEER.

MATERIALS

904–2.1 SOD

SOD FURNISHED BY THE CONTRACTOR SHALL HAVE A GOOD COVER OF LIVING OR GROWING GRASS. THIS INCLUDES GRASS THAT IS SEASONALLY DORMANT DURING THE COLD AND DRY SEASONS AND CAPABLE OF RENEWING GROWTH AFTER THE DORMANT PERIOD. ALL SOD SHALL BE OBTAINED FROM AREAS IN WHICH THE SOIL IS REASONABLY FERTILE AND CONTAINS A HIGH PERCENTAGE OF LOAMY TOPSOIL. SOD SHALL BE CUT OR STRIPPED FROM LIVING, THICKLY MATTED TURF RELATIVELY FREE OF WEEDS OR OTHER UNDESIRABLE FOREIGN PLANTS, LARGE STONES, ROOTS, OR OTHER MATERIALS THAT MIGHT BE DETRIMENTAL TO THE DEVELOPMENT OF THE SOD OR TO FUTURE MAINTENANCE. GRASS SOD SHALL BE MARYLAND–CERTIFIED OR APPROVED AND SHALL COMPLY WITH THE MARYLAND SOD LAW OF THE ANNOTATED CODE OF MARYLAND (AGRICULTURAL ARTICLE SECTIONS 9–101 THROUGH 9–110). EACH LOAD OF SOD SHALL BEAR A MARYLAND STATE APPROVED OR CERTIFIED LABEL AT THE TIME OF DELIVERY ON THE JOB. SOD SHALL BE EITHER: (1) BLUEGRASS SOD CONTAINING NOT LESS THAN 80 PERCENT KENTUCKY BLUEGRASS (POA PRATENSIS) AND NOT MORE THAN 20 PERCENT RED FESCUE (FESTUCA RUBRA); OR (2) CERTIFIED TURF TYPE–TALL FESCUE (FESTUCA ARUNDINACEA) SOD CONTAINING NOT LESS THAN 80 PERCENT CERTIFIED TURF TYPE–TALL FESCUE (FESTUCA ARUNDINACEA) GRASS AND NOT MOTE THAN 20 PERCENT KENTUCKY BLUEGRASS (POA PRATENSIS) AND RED FESCUE (FESTUCA RUBRA). ANY VEGETATION MORE THAN 6 INCHES IN HEIGHT SHALL BE MOWED TO A HEIGHT OF 3 INCHES OR LESS BEFORE SOD IS LIFTED. SOD, INCLUDING THE SOIL CONTAINING THE ROOTS AND THE EMERGENT PLANT GROWTH, SHALL BE CUT UNIFORMLY TO A THICKNESS NOT LESS THAN THAT SPECIFIED IN SECTION 904–3.4.

904–2.2 LIME

LIME SHALL CONFORM TO STAHDARDS DESCRIBED IN SECTION 903, "SEEDING".

904–2.3 FERTILIZER

FERTILIZERS AND APPLICATION METHODS SHALL CONFORM TO THE STANDARDS PREVIOUSLY DESCRIBED IN SECTION 903, "SEEDING".

904–2.4 WATER

ALL WATER SHALL CONFORM TO THE STANDARDS PREVIOUSLY DESCRIBED IN PARAGRAPH 902–2.4, "WATER".

904–2.5 SOILS FOR REPAIR

ALL SOILS FOR REPAIRS SHALL CONFORM TO THE STANDARDS PREVIOUSLY DESCRIBED IN PARAGRAPH 901–2.3, "SOILS FOR REPAIR".

CONSTRUCTION REQUIREMENTS

904–3.1 GENERAL

AREAS TO BE SODDED SHALL BE CLEARLY INDICATED BY SITE PLANS. AREAS REQUIRING SPECIAL GROUND SURFACE PREPARATION, SUCH AS TILLING, AND THOSE AREAS IN A SATISFACTORY CONDITION THAT ARE TO REMAIN UNDISTURBED SHALL ALSO BE SHOWN ON THE PLANS.

SUITABLE EQUIPMENT NECESSARY FOR PROPER PREPARATION OF THE GROUND SURFACE AND FOR THE HANDLING AND PLACING OF ALL REQUIRED MATERIALS SHALL BE ON HAND, IN GOOD CONDITION, AND SHALL BE APPROVED BY THE MAA ENGINEER, BEFORE STARTING THE VARIOUS OPERATIONS, THAT THE APPLICATION OF REQUIRED MATERIALS, SUCH AS FERTILIZER AND LIMESTONE, WILL BE MADE AT THE SPECIFIED RATES.

904–3.2 ADVANCE PREPARATION

IF THE AREA TO BE SODDED IS SPARSELY VEGETATED, WEEDY, BARREN AND UNWORKED, OR PACKED AND HARD, ALL EXISTING HERBACEOUS VEGETATION SHALL BE REMOVED. THE SOIL SHALL THEN BE SCARIFIED OR OTHERWISE LOOSENED TO A DEPTH OF AT LEAST 5 INCHES (125 MM). CLODS SHALL BE PULVERIZED, AND THE TOP 3 INCHES (75 MM) OF SOIL SHALL BE WORKED INTO A SATISFACTORY BED BY DISCING OR USE OF CULTIPACKERS, ROLLERS, DRAGS, HARROWS OR OTHER EQUIPMENT APPROVED BY THE MAA ENGINEER. THE AREA SHALL THEN BE PROPERLY GRADED AS INDICATED BY SITE PLANS.

AFTER GRADING OF AREAS IS COMPLETE AND PRIOR TO THE APPLICATION OF FERTILIZERS AND LIMESTONE, AREAS TO BE SODDED SHALL BE RAKED OR OTHERWISE CLEARED OF STONES LARGER THAN 1 INCH IN DIAMETER, STICKS, STUMPS AND OTHER DEBRIS WHICH MIGHT INTERFERE WITH SODDING, GROWTH OF GRASSES OR SUBSEQUENT MAINTENANCE OF GRASS–COVERED AREAS. IF ANY DAMAGE BY EROSION OR OTHER CAUSES HAS OCCURRED AFTERGRADING OF AREAS AND BEFORE BEGINNING THE APPLICATION OF FERTILIZER AND GROUND LIMESTONE, THE CONTRACTOR SHALL REPAIR SUCH DAMAGE. THIS MAY INCLUDE FILLING GULLIES, SMOOTHING IRREGULARITIES, AND REPAIRING OTHER INCIDENTAL DAMAGE.

MDE NO. XX-SF-XXXX
NOTE TO CONTRACTOR:
SEDIMENT CONTROL WILL BE STRICTLY ENFORCED

FOR EROSION AND SEDIMENT CONTROL ONLY.

904–3.2 ADVANCE PREPARATION

AN AREA TO BE SODDED WILL BE CONSIDERED A SATISFACTORY SEEDBED WITHOUT ADDITIONAL TREATMENT IF IT RECENTLY HAS BEEN THOROUGHLY LOOSENED AND WORKED TO A DEPTH OF AT LEAST 5 INCHES AS A RESULT OF GRADING OPERATIONS AND, IF IMMEDIATELY PRIOR TO SODDING, THE TOP 3 INCHES OF SOIL IS LOOSE, FRIABLE, REASONABLY FREE FROM LARGE CLODS, ROCKS, LARGE ROOTS OR OTHER UNDESIRABLE MATTER, AND IS SHAPED TO THE REQUIRED GRADE. FOR SLOPE AREAS STEEPER THAN 3:1 (THREE HORIZONTAL TO ONE VERTICAL) THE SUBSOIL SHALL BE LOOSENED TO A DEPTH OF 1 INCH. LIME AND FERTILIZER SHALL BE APPLIED WITHIN 48 HOURS AFTER TILLING AS DESCRIBED IN 903–3.3 AND 3.4. THE SOD SHALL BE APPLIED IMMEDIATELY AFTER THE LIME AND FERTILIZER HAVE BEEN WORKED INTO THE SOIL.

904–3.3 APPLICATION OF FERTILIZER AND LIME

FOLLOWING GROUND SURFACE PREPARATION, FERTILIZER SHALL BE UNIFORMLY SPREAD AS DESCRIBED IN SECTION 903–3.3 AT A RATE THAT WILL PROVIDE AT LEAST THE MINIMUM QUANTITY OF FERTILIZER REQUIRED. IF THE USE OF GROUND LIMESTONE IS SPECIFIED, IT SHALL BE SPREAD AS DESCRIBED IN SECTION 903–3.3, "METHODS OF APPLICATION"; AT A RATE THAT WILL PROVIDE AT LEAST THE MINIMUM QUANTITY OF LIME REQUIRED. THESE MATERIALS SHALL BE INCORPORATED INTO THE SOIL TO A DEPTH OF AT LEAST 2 INCHES BY DISCING, RAKING OR OTHER METHODS APPROVED BY THE MAA ENGINEER. ANY STONES LARGER THAN 1 INCH IN DIAMETER, LARGE CLODS, ROOTS AND OTHER LITTER BROUGHT TO THE SURFACE BY THIS OPERATION SHALL BE REMOVED.

904–3.4 OBTAINING AND DELIVERING SOD

THE SOD SHALL BE WELL ROOTED, GROWN IN THE STATE OF MARYLAND, AND FIELD GROWN FOR A MINIMUM OF 12 MONTHS. AFTER INSPECTION AND APPROVAL OF THE SOD BY THE MAA ENGINEER, THE SOD SHALL BE CUT WITH APPROVED SOD CITTERS TO SUCH A THICKNESS THAT AFTER PLACEMENT ON THE PREPARED BED, BUT BEFORE COMPACTION, IT SHALL HAVE A UNIFORM ATTACHED SOIL THICKNESS OF AT LEAST 0.75 INCH. SOD SECTIONS OR STRIPS SHALL BE CUT IN UNIFORM WIDTHS OF AT LEAST 14 INCHES AND IN LENGTHS OF AT LEAST 18 INCHES, BUT NOT TO LENGTHS THAT MIGHT INHIBIT PLACEMENT WITHOUT BREAKING, TEARING OR LOSS OF SOIL. WHERE STRIPS ARE REQUIRED, THE SOD SHALL BE ROLLED OR FOLDED UNDAMAGED, WITH THE GRASS FACING INWARD. THE CONTRACTOR MAY BE REQUIRED TO MOW HIGH GRASS BEFORE CUTTING SOD.

SOD SHALL BE TRANSPLANTED WITHIN 24 HOURS FROM THE TIME OF HARVEST UNLESS CIRCUMSTANCES BEYOND THE CONTRACTOR'S CONTROL MAKE STORAGE NECESSARY. IN SUCH CASES, SOD SHALL BE STACKED, KEPT MOIST, PROTECTED FROM EXPOSURE TO THE AIR AND SUN, AND SHALL BE KEPT FROM FREEZING. SOD SHALL ONLY BE HARVESTED AND MOVED WHEN SOIL MOISTURE CONDITIONS ARE SUCH THAT FAVORABLE RESULTS CAN BE EXPECTED. WHERE SOIL IS TOO DRY, PERMISSION TO CUT SOD MAY BE GRANTED ONLY AFTER IT HAS BEEN SUFFICIENTLY WATERED TO MOISTEN THE SOIL TO THE DEPTH AT WHICH THE SOD WILL BE CUT.

904–3.5 PLACING SOD

SODDING SHALL ONLY BE PERFORMED DURING SEASONS WHEN SATISFACTORY RESULTS CAN BE EXPECTED. FROZEN SOD SHALL NOT BE USED AND SOD SHALL NOT BE PLACED UPON FROZEN SOIL. SOD MAY BE TRANSPLANTED DURING PERIODS OF DROUGHT WITH THE APPROVAL OF THE MAA ENGINEER, PROVIDED THE SOD BED IS WATERED TO MOISTEN THE SOIL TO A DEPTH OF AT LEAST 4 INCHES IMMEDIATELY PRIOR TO LAYING THE SOD.

THE SOD SHALL BE MOIST AND SHALL BE PLACED ON A BED, PREPARED ACCORDING TO PARAGRAPHS 904–3.2, "ADVANCE PREPARATION", AND 904–3.3, "APPLICATION OF FERTILIZER AND LIME" BY HAND. PITCHFORKS SHALL NOT BE USED TO HANDLE SOD, AND DUMPING FROM VEHICLES SHALL NOT BE PERMITTED. THE SOD SHALL BE PLACED CAREFULLY BY HAND, EDGE TO EDGE WITH STAGGERED JOINTS, IN ROWS AT RIGHT ANGLES TO THE SLOPES, STARTING AT THE BASE OF THE AREA TO BE SODDED AND WORKING UPWARD. THE SOD SHALL IMMEDIATELY BE PRESSED FIRMLY INTO CONTACT WITH THE SOD BED BY TAMPING OR ROLLING WITH APPROVED EQUIPMENT TO PROVIDE A TRUE AND EVEN SURFACE, AND ENSURE KNITTING WITHOUT DISPLACEMENT OF THE SOD OR DEFORMATION OF THE SURFACES OF SODDED AREAS. WHERE THE SOD HAS BEEN DISPLACED DURING SODDING OPERATIONS, THE WORKMEN REPLACING IT SHALL WORK FROM LADDERS OR TREADED PLANKS TO PREVENT FURTHER DISPLACEMENT. WHERE THE GRADES ARE SUCH THAT THE FLOW OF WATER WILL BE FROM PAVED SURFACES ACROSS SODDED AREAS, THE SURFACE OF THE SOIL IN THE SOD AFTER COMPACTION SHALL BE SET APPROXIMATELY 1.5 INCHES BELOW THE PAVEMENT EDGE. WHERE THE FLOW WILL BE OVER THE SODDED AREAS AND ONTO THE PAVED SURFACES AROUND MANHOLES AND INLETS, THE SURFACE OF THE SOIL IN THE SOD AFTER COMPACTION SHALL BE PLACED FLUSH WITH PAVEMENT EDGES.

ON SLOPES STEEPER THAN 1:2.5 AND IN V–SHAPED OR FLAT–BOTTOM DITCHES OR GUTTERS, THE SOD SHALL BE SECURED WITH WOODEN PEGS AT LEAST 18 INCHES LONG AND A CROSS–SECTIONAL AREA OF AT LEAST 0.75 SQUARE INCH, OR BY OTHER METHODS OF SECURING SOD APPROVED BY THE MAA ENGINEER. THE PEGS SHALL BE DRIVEN FLUSH WITH THE SURFACE OF THE SOD. THE PEGS SHALL BE OF SUFFICIENT NUMBER AND AT ADEQUATE SPACING TO SECURE SOD FROM DISPLACEMENT. THE USE OF SOD STAPLES OR OTHER MEANS OF SECURING THE SOD FROM DISPLACEMENT MAY BE APPROVED BY THE MAA ENGINEER PROVIDED SATISFACTORY RESULTS ARE EXPECTED.

904–3.6 WATERING

ADEQUATE WATER AND WATERING EQUIPMENT SHALL BE ON HAND BEFORE SODDING BEGINS, AND SOD SHALL BE KEPT MOIST UNTIL IT HAS BECOME ESTABLISHED AND ITS CONTINUED GROWTH ASSURED. IN ALL CASES, WATERING SHALL BE DONE IN A MANNER THAT WILL AVOID EROSION FROM THE APPLICATION OF EXCESSIVE QUANTITIES AND WILL AVOID DAMAGE TO THE FINISHED SURFACE.

904–3.7 ESTABLISHING TURF

904–3.7.1 GENERAL

THE CONTRACTOR SHALL PROVIDE GENERAL CARE FOR THE SODDED AREAS AS SOON AS THE SOD HAS BEEN LAID AND SHALL CONTINUE TO PROVIDE SUCH CARE UNTIL FINAL INSPECTION AND ACCEPTANCE OF THE WORK.

904–3.7.2 PROTECTION

ALL SODDED AREAS SHALL BE PROTECTED AGAINST TRAFFIC OR OTHER USE BY WARNING SIGNS AND BARRICADES APPROVED BY THE MAA ENGINEER.

904–3.7.3 MOWING

THE CONTRACTOR SHALL MOW THE SODDED AREAS WITH APPROVED MOWING EQUIPMENT, DEPENDING UPON CLIMATIC AND GROWTH CONDITIONS AND THE NEEDS FOR MOWING OF SPECIFIC AREAS. IN THE EVENT THAT WEEDS OR OTHER UNDESIRABLE VEGETATION ESTABLISHES TO SUCH AN EXTENT THAT, EITHER BY CUT OR UNCUT, THEY THREATEN TO SMOTHER SPECIES, THE WEEDS SHALL BE MOWED AND THE CLIPPINGS RAKED AND REMOVED FROM THE AREA. SPOT APPLICATIONS OF AN APPROPRIATE HERBICIDE BY A LICENSED APPLICATOR SHALL BE APPROVED BY THE MAA ENGINEER TO REMOVE INVASIVE SPECIES. THE APPROPRIATE HERBICIDE SHALL BE DETERMINED ON A CASE–BY–CASE BASIS, DEPENDING ON THE LOCATION AND TYPE OF WEED.

904–3.7.4 REPAIR

WHEN THE SURFACE HAS BECOME GULLIED OR OTHERWISE DAMAGED DURING THE PERIOD COVERED BY THIS CONTRACT, THE AFFECTED AREAS SHALL BE REPAIRED TO RE–ESTABLISH THE GRADE AND THE CONDITION OF THE SOIL AND SHALL THEN BE RE–SODDED AS SPECIFIED IN PARAGRAPH 904–3.5, "PLACING SOD", AT THE CONTRACTOR'S EXPENSE.

ITEM 905 MULCHING

DESCRIPTION

905–1.1 GENERAL

THIS ITEM PROVIDES THE CONTRACTOR WITH MAA–APPROVED SPECIFICATIONS FOR MULCH AND THE APPLICATION OF MULCH INCLUDING DISTRIBUTION OF MULCH AND SECURING OF MULCHED AREAS. AREAS TO BE MULCHED WILL BE CLEARLY SHOWN ON SITE PLANS OR OTHERWISE DESIGNATED BY THE MAA ENGINEER.

MATERIALS

905–2.1 TYPES OF MULCH

ACCEPTABLE MULCH SHALL BE COMPOSED OF THE MATERIALS LISTED BELOW OR COMPOSED OF ANY LOCALLY AVAILABLE MATERIALS THAT ARE SIMILAR TO THOSE SPECIFIED AND APPROVED BY THE MAA ENGINEER. LOW–GRADE, SHALELY, SOILED, PARTIALLY ROTTED HAY, STRAW, OR OTHER MATERIALS UNFIT FOR ANIMAL CONSUMPTION WILL NOT BE ACCEPTABLE FOR USE AS MULCH. STRAW OR OTHER MATERIAL THAT IS FRESH, EXCESSIVELY BRITTLE, OR IS IN SUCH AN ADVANCED STAGE OF DECOMPOSITION AS TO SMOTHER OR RETARD THE PLANTED GRASS, IS NOT ACCEPTABLE. CLEAN, WEED–FREE STRAW MAY BE USED. MULCH MATERIALS CONTAINING MATURED SEED WITH THE POTENTIAL TO ESTABLISH AND BE DETRIMENTAL TO THE PROJECT OR THE SURROUNDING AREA IS NOT ACCEPTABLE.

A. SHREDDED HARDWOOD BARK — SHREDDED HARDWOOD BARK SHALL CONSIST OF HARDWOOD TREE BARK THAT HAS BEEN MILLED AND SCREENED TO ENSURE A MAXIMUM 4–INCH (100 MM) PARTICLE SIZE, PROVIDE A UNIFORM TEXTURE, AND BE FREE FROM SAWDUST, TOXIC SUBSTANCES, AND OTHER FOREIGN MATERIALS.

B. WOOD CHIPS — WOOD CHIPS SHALL BE PRODUCED BY A CHIPPING MACHINE TO A SIZE SPECIFIED BY THE MAA ENGINEER. CHIPS MAY NOT HAVE BEEN SUBJECTED TO ANY CONDITIONS THAT WOULD SHORTEN THEIR USEFUL LIFE OR CAUSE THEM TO LOSE ANY OF THEIR VALUE AS MULCH. WOOD CHIPS SHALL BE FREE FROM BARK, TWIGS, WOOD SHAVINGS, SAWDUST, TOXIC SUBSTANCES AND OTHER FOREIGN MATERIALS.

C. WOOD CELLULOSE FIBER — WOOD CELLULOSE FIBER SHALL CONSIST OF A PROCESSED WOOD PRODUCT WITH UNIFORM FIBER CHARACTERISTICS. THE FIBER SHALL BE CAPABLE OF REMAINING IN A UNIFORM SUSPENSION UNDER AGITATION IN WATER AND BLENDING WITH SEED, FERTILIZER AND OTHER ADDITIVES TO FORM A HOMOGENEOUS SLURRY. THE FIBER SHALL PERFORM SATISFACTORILY IN HYDRAULIC SEEDING EQUIPMENT WITHOUT CLOGGING OR DAMAGING THE SYSTEM. THE SLURRY SHALL CONTAIN A GREEN DYE TO PROVIDE EASY VISUAL INSPECTION FOR UNIFORMITY OF APPLICATION.

CERTIFICATION SHOWING THAT THE FIBER MATERIAL CONFORMS TO THE FOLLOWING SPECIFICATIONS SHALL BE PROVIDED BY THE MANUFACTURER:

WOOD CELLULOSE FIBER REQUIREMENTS	
PARTICLE LENGTH, IN. (MM)	APPROXIMATELY ½ (13)
PARTICLE THICKNESS, IN. (MM)	APPROXIMATELY 1⁄16 (1.5)
NET DRY WEIGHT CONTENT	MINIMUM AS STATED ON BAG
TAPPI* T 509, PH	4.0 TO 8.5
ASH CONTENT, TAPPI* STANDARD T 413, % MAX.	7.0
WATER HOLDING CAPACITY, % MIN.	90

* TECHNICAL ASSOCIATION OF PULP AND PAPER INDUSTRY

THE MATERIAL SHALL BE DELIVERED IN PACKAGES OF UNIFORM NET WEIGHT OF 75 LBS (34 KG) OR LESS AND SHALL BE CLEARLY LABELED WITH THE NAME OF THE MANUFACTURER, NET WEIGHT AND A SUPPLEMENTAL STATEMENT OF THE NET WEIGHT CONTENT.

905–2.2 INSPECTION

WITHIN 5 DAYS OF ACCEPTANCE OF THE BID, THE CONTRACTOR SHALL PROVIDE REPRESENTATIVE SAMPLES OF MULCH MATERIAL TO BE USED TO THE MAA ENGINEER AND IDENTIFY THE SOURCE OF THE MATERIAL AND QUANTITIES OF MULCH MATERIALS AVAILABLE. THE SAMPLES PROVIDED MAY BE USED AS STANDARDS WITH THE APPROVAL OF THE MAA ENGINEER AND ANY MATERIALS BROUGHT ON THE SITE THAT DO NOT MEET THESE STANDARDS MAY BE REJECTED.

CONSTRUCTION REQUIREMENTS

905–3.1 ADVANCE PREPARATION

BEFORE SPREADING MULCH, ALL LARGE CLODS, STUMPS, STONES, BRUSH, ROOTS AND OTHER FOREIGN MATERIAL SHALL BE REMOVED FROM THE AREA TO BE MULCHED. MULCH SHALL BE APPLIED IMMEDIATELY AFTER SEEDING UNLESS OTHERWISE SPECIFIED. THE APPLICATION AND SPREADING OF MULCH MAY BE BY HAND METHODS, BLOWER OR OTHER MECHANICAL METHODS, PROVIDED A UNIFORM COVERING IS OBTAINED.

905–3.2 APPLICATION OF MULCH

THE CONTRACTOR SHALL EVENLY APPLY MULCH MATERIALS TO AREAS INDICATED BY SITE PLANS OR OTHERWISE DESIGNATED BY THE MAA ENGINEER. CELLULOSE FIBER OR WOOD–PULP MULCH SHALL BE APPLIED AT A RATE OF 1,500 POUNDS (DRY WEIGHT) PER ACRE. MULCH MAY BE BLOWN ON THE SLOPES AND USE OF CUTTERS IN THE EQUIPMENT FOR THIS PURPOSE WILL BE PERMITTED TO THE EXTENT THAT AT LEAST 95 PERCENT OF THE MULCH IN PLACE ON THE SLOPE IS 6 INCHES OR MORE IN LENGTH. WHEN MULCH APPLIED BY THE BLOWING METHODS IS CUT, THE LOOSE DEPTH IN PLACE SHALL BE 1 TO 2 INCHES. CELLULOSE FIBER OR WOOD–PULP MULCH SHALL BE APPLIED AS AN AQUEOUS MIXTURE BY SPRAYING AT THE RATE OF 1,500 POUNDS (DRY WEIGHT) PER ACRE USING SPRAYING EQUIPMENT APPROVED BY THE MAA ENGINEER.

905–3.3 SECURING MULCH

MULCH SHALL BE HELD IN PLACE BY LIGHT DISCING, A THIN COATING OF TOPSOIL, PINS, STAKES, WIRE MESH OR OTHER METHODS APPROVED BY THE MAA ENGINEER. IF THE "PEG AND STRING" METHOD IS USED, THE MULCH SHALL BE SECURED WITH STAKES OR WIRE PINS DRIVEN INTO THE GROUND ON 5–FOOT CENTERS OR LESS. BINDER TWINE SHALL BE STRUNG BETWEEN ADJACENT STAKES IN STRAIGHT LINES AND CROSSED DIAGONALLY OVER THE MULCH. THE STAKES SHALL BE FIRMLY DRIVEN NEARLY FLUSH TO THE GROUND TO DRAW THE TWINE DOWN TIGHTLY ONTO THE MULCH.

905–3.4 MAINTENANCE OF MULCHED AREAS

THE CONTRACTOR SHALL CARE FOR MULCHED AREAS UNTIL FINAL ACCEPTANCE OF THE PROJECT. CARE REQUIRED MAY CONSIST OF PROVIDING PROTECTION AGAINST TRAFFIC OR OTHER DISTURBANCES BY PLACEMENT OF WARNING SIGNS AND/OR BARRICADES BEFORE OR IMMEDIATELY AFTER MULCHING HAS BEEN COMPLETED.

THE CONTRACTOR MAY BE REQUIRED TO REPAIR OR REPLACE ANY MULCHING THAT IS DEFECTIVE OR BECOMES DAMAGED BEFORE THE PROJECT IS FINISHED AND DEEMED SATISFACTORY BY THE MAA ENGINEER. WHEN, IN THE JUDGEMENT OF THE MAA ENGINEER, DEFECTS OR DAMAGE RESULT FROM POOR WORKMANSHIP OR FAILURE TO MEET THE REQUIREMENTS OF THE SPECIFICATIONS, THE COST OF THE NECESSARY REPAIRS OR REPLACEMENT WILL BE BORNE BY THE CONTRACTOR. HOWEVER, ONCE THE CONTRACTOR HAS COMPLETED THE MULCHING OF AN AREA IN ACCORDANCE WITH THE PROVISIONS OF THE SPECIFICATIONS AND TO THE SATISFACTION OF THE ENGINEER, NO ADDITIONAL WORK AT HIS EXPENSE WILL BE REQUIRED. ANY SUBSEQUENT REPAIRS AND/OR REPLACEMENTS DEEMED NECESSARY BY THE ENGINEER MAY BE MADE BY THE CONTRACTOR AND WILL BE PAID FOR AS ADDITIONAL OR EXTRA WORK.

B–4–2 STANDARDS AND SPECIFICATIONS FOR SOIL PREPARATION, TOPSOILING AND SOIL AMENDMENTS

DEFINITION

THE PROCESS OF PREPARING THE SOILS TO SUSTAIN ADEQUATE VEGETATIVE STABILIZATION.

PURPOSE

TO PROVIDE A SUITABLE SOIL MEDIUM FOR VEGETATIVE GROWTH.

CONDITIONS WHERE PRACTICE APPLIES

WHERE VEGETATIVE STABILIZATION IS TO BE ESTABLISHED.

CRITERIA

A. SOIL PREPARATION

1. TEMPORARY STABILIZATION
   - A. SEEDBED PREPARATION CONSISTS OF LOOSENING SOIL TO A DEPTH OF 3 TO 5 INCHES BY MEANS OF SUITABLE AGRICULTURAL OR CONSTRUCTION EQUIPMENT, SUCH AS DISC HARROWS OR CHISEL PLOWS OR RIPPERS MOUNTED ON CONSTRUCTION EQUIPMENT. AFTER THE SOIL IS LOOSENED, IT MUST NOT BE ROLLED OR DRAGGED SMOOTH BUT LEFT IN THE ROUGHENED CONDITION. SLOPES 3:1 OR FLATTER ARE TO BE TRACKED WITH RIDGES RUNNING PARALLEL TO THE CONTOUR OF THE SLOPE.
   - B. APPLY FERTILIZER AND LIME AS PRESCRIBED ON THE PLANS.
   - C. INCORPORATE LIME AND FERTILIZER INTO THE TOP 3 TO 5 INCHES OF SOIL BY DISCING OR OTHER SUITABLE MEANS.
2. PERMANENT STABILIZATION
   - A. A SOIL TEST IS REQUIRED FOR ANY EARTH DISTURBANCE OF 5 ACRES OR MORE. THE MAXIMUM SOIL CONDITIONS REQUIRED FOR PERMANENT VEGETATIVE ESTABLISHMENT ARE:
     - i SOIL PH BETWEEN 6.0 AND 7.0.
     - ii SOLUBLE SALTS LESS THAN 500 PARTS PER MILLION (PPM).
     - iii SOIL CONTAINS LESS THAN 40 PERCENT CLAY BUT EHOUGH FINE GRAINED MATERIAL (GREATER THAN 30 PERCENT SILT PLUS CLAY) TO PROVIDE THE CAPACITY TO HOLD A MODERATE AMOUNT OF MOISTURE. AN EXCEPTION: OF LOVEGRASS WILL BE PLANTED, THEN A SANDY SOIL (LESS THAN 30 PERCENT SILT PLUS CLAY) WOULD BE ACCEPTABLE.
     - iv SOIL CONTAINS 1.5 PERCENT MINIMUM ORGANIC MATTER BY WEIGHT.
     - v SOIL CONTAINS SUFFICIENT PORE SPACE TO PERMIT ADEQUATE ROOT PENETRATION.
   - B. APPLICATION OF AMENDMENTS TO TOPSOIL IS REQUIRED IF ON–SITE SOILS DO NOT MEET THE ABOVE CONDITIONS.
   - C. GRADED AREAS MUST BE MAINTAINED IN A TRUE AND EVEN GRADE AS SPECIFIED ON THE APPROVED PLAN, THEN SCARIFIED OR OTHERWISE LOOSENED TO A DEPTH OF 3 TO 5 INCHES.
   - D. APPLY SOIL AMENDMENTS AS SPECIFIED ON THE APPROVED PLAN OR AS INDICATED BY THE RESULTS OF A SOIL TEST.
   - E. MIX SOIL AMENDMENTS INTO THE TOP 3 TO 5 INCHES OF SOIL BY DISCING OR OTHER SUITABLE MEANS. RAKE LAWN AREAS TO SMOOTH THE SURFACE, REMOVE LARGE OBJECTS LIKE STONES AND BRANCHES, AND READY THE AREA FOR SEED APPLICATION. LOOSEN SURFACE SOIL BY DRAGGING WITH A HEAVY CHAIN OR OTHER EQUIPMENT TO ROUGHEN THE SURFACE WHERE SITE CONDITIONS WILL NOT PERMIT NORMAL SEEDBED PREPARATION. TRACK SLOPES 3:1 OR FLATTER WITH TRACKED EQUIPMENT LEAVING THE SOIL IN AN IRREGULAR CONDITION WITH RIDGES RUNNING PARALLEL TO THE CONTOUR OF THE SLOPE. LEAVE THE TOP 1 TO 3 INCHES OF SOIL LOOSE AND FRIABLE. SEEDBED LOOSENING MAY BE UNNECESSARY ON NEWLY DISTURBED AREAS.

B. TOPSOILING

1. TOPSOIL IS PLACED OVER PREPARED SUBSOIL PRIOR TO ESTABLISHMENT OF PERMANENT VEGETATION. THE PURPOSE OS TO PROVIDE A SUITABLE SOIL MEDIUM FOR VEGETATIVE GROWTH. SOILS OF CONCERN HAVE LOW MOISTURE CONTENT, LOW NUTRIENT LEVELS, LOW PH, MATERIALS TOXIC TO PLANTS AND/OR UNACCEPTABLE SOIL GRADATION.
2. TOPSOIL SALVAGED FROM AN EXISTING SITE MAY BE USED PROVIDED IT MEETS THE STANDARDS AS SET FORTH IN THESE SPECIFICATIONS. TYPICALLY, THE DEPTH OF TOPSOIL TO BE SALVAGED FOR A GIVEN SOIL TYPE CAN BE FOUND IN THE REPRESENTATIVE SOIL PROFILE SECTION IN THE SOIL SURVEY BY USDA–NRCS.
3. TOPSOILING IS LIMITED TO AREAS HAVING 2:1 OR FLATTER SLOPES WHERE:
   - A. THE TEXTURE OF THE EXPOSED SUBSOIL/PARENT MATERIAL IS NOT ADEQUATE TO PRODUCE VEGETATIVE GROWTH.
   - B. THE SOIL MATERIAL IS SO SHALLOW THAT THE ROOTING ZONE IS NOT DEEP ENOUGH TO SUPPORT PLANTS OR FURNISH CONTINUING SUPPLIES OF MOISTURE AND PLANT NUTRIENTS.
   - C. THE ORIGINAL SOIL TO BE VEGETATED CONTAINS MATERIAL TOXIC TO PLANT GROWTH.
   - D. THE SOIL IS SO ACIDIC THAT TREATMENT WITH LIMESTONE IS NOT FEASIBLE.
4. AREAS HAVING SLOPES STEEPER THAN 2:1 REQUIRE SPECIAL CONSIDERATION AND DESIGN.
5. TOPSOIL SPECIFICATIONS: SOIL TO BE USED AS TOPSOIL MUST MEET THE FOLLOWING CRITERIA:
   - A. TOPSOIL MUST BE A LOAM, SANDY LOAM, CLAY LOAM, SILT LOAM, SANDY CLAY LOAM OR LOAMY SAND. OTHER SOILS MAY BE USED IF RECOMMENDED BY AN AGRONOMIST OR SOIL SCIENTIST AND APPROVED BY THE APPROPRIATE APPROVAL AUTHORITY. TOPSOIL MUST NOT BE A MIXTURE OF CONTRASTING TEXTURED SUBSOILS AND MUST CONTAIN LESS THAN 5 PERCENT BY VOLUME OF CINDERS, STONES, SLAG, COARSE FRAGMENTS, GRAVEL, STICKS, ROOTS, TRASH OR OTHER MATERIALS LARGER THAN 1½ INCHES IN DIAMETER.
   - B. TOPSOIL MUST BE FREE OF NOXIOUS PLANTS OR PLANT PARTS SUCH AS BERNUDA GRASS, QUACK GRASS, JOHNSON GRASS, NUT SEDGE, POISON IVY, THISTLE OR OTHERS AS SPECIFIED.
   - C. TOPSOIL SUBSTITUTES OR AMENDMENTS, AS RECOMMENDED BY A QUALIFIED AGRONOMIST OR SOIL SCIENTIST AND APPROVED BY THE APPROPRIATE APPROVAL AUTHORITY, MAY BE USED IN LIEU OF NATURAL TOPSOIL.
6. TOPSOIL APPLICATION
   - A. EROSION AND SEDIMENT CONTROL PRACTICES MUST BE MAINTAINED WHEN APPLYING TOPSOIL.
   - B. UNIFORMLY DISTRIBUTE TOPSOIL IN A 5 TO 8 INCH LAYER AND LIGHTLY COMPACT TO A MINIMUM THICKNESS OF 4 INCHES. SPREADING IS TO BE PERFORMED IN SUCH A MANNER THAT SODDING OR SEEDING CAN PROCEED WITH A MINIMUM OF ADDITIONAL SOIL PREPARATION AND TILLAGE. ANY IRREGULARITIES IN THE SURFACE RESULTING FROM TOPSOILING OR OTHER OPERATIONS MUST BE CORRECTED IN ORDER TO PREVENT THE FORMATION OF DEPRESSIONS OR WATER POCKETS.
   - C. TOPSOIL MUST NOT BE PLACED IF THE TOPSOIL OR SUBSOIL IS IN A FROZEN OR MUDDY CONDITION, WHEN THE SUBSOIL IS EXCESSIVELY WET OR IN A CONDITION THAT MAY OTHERWISE BE DETRIMENTAL TO PROPER GRADING AND SEEDBED PREPARATION.

C. SOIL AMENDMENTS (FERTILIZER AND LIME SPECIFICATIONS)

1. SOIL TESTS MUST BE PERFORMED TO DETERMINE THE EXACT RATIOS AND APPLICATIONS RATES FOR BOTH LIME AND FERTILIZER ON SITES HAVING DISTURBED AREAS OF 5 ACRES OR MORE. SOIL ANALYSIS MAY BE PERFORMED BY A RECOGNIZED PRIVATE OR COMMERCIAL LABORATORY. SOIL SAMPLES TAKEN FOR ENGINEERING PURPOSES MAY ALSO BE USED FOR CHEMICAL ANALYSIS.
2. FERTILIZERS MUST BE UNIFORM IN COMPOSITION, FREE FLOWING AND SUITABLE FOR ACCURATE APPLICATION BY APPROPRIATE EQUIPMENT. MANURE MAY BE SUBSTITUTED FOR FERTILIZER WITH PRIOR APPROVAL FROM THE APPROPRIATE APPROVAL AUTHORITY. FERTILIZERS MUST ALL BE DELIVERED TO THE SITE FULLY LABELED ACCORDING TO APPLICABLE LAWS AND MUST BEAR THE NAME, TRADE NAME OR TRADEMARK AND WARRANTY OF THE PRODUCER.
3. LIME MATERIALS MUST BE GROUND LIMESTONE (HYDRATED OR BURNT LIME MAY BE SUBSTITUTED EXCEPT WHEN HYDROSEEDING) WHICH CONTAINS AT LEAST 50 PERCENT TOTAL OXIDES (CALCIUM OXIDE PLUS MAGNESIUM OXIDE). LIMESTONE MUST BE GROUND TO SUCH FINENESS THAT AT LEAST 50 PERCENT WILL PASS THROUGH A #100 MESH SIEVE AND 98 TO 100 PERCENT WILL PASS THROUGH A #20 MESH SIEVE.
4. LIME AND FERTILIZER ARE TO BE EVENLY DISTRIBUTED AND INCORPORATED INTO THE TOP 3 TO 5 INCHES OF SOIL BY DISCING OR OTHER SUITABLE MEANS.
5. WHERE THE SUBSOIL IS EITHER HIGHLY ACIDIC OR COMPOSED OF HEAVY CLAYS, SPREAD GROUND LIMESTONE AT THE RATE OF 4 TO 8 TONS/ACRE (200–400 POUNDS PER 1,000 SQUARE FEET) PRIOR TO THE PLACEMENT OF TOPSOIL.

B–4–4 STANDARDS AND SPECIFICATIONS FOR TEMPORARY STABILIZATION

DEFINITION

TO STABILIZE DISTURBED SOILS WITH VEGETATION FOR UP TO 6 MONTHS.

PURPOSE

TO USE FAST GROWING VEGETATION THAT PROVIDES COVER ON DISTURBED SOILS.

CONDITIONS WHERE PRACTICE APPLIES

EXPOSED SOILS WHERE GROUND COVER IS NEEDED FOR A PERIOD OF 6 MONTHS OR LESS. FOR LONGER DURATION OF TIME, PERMANENT STABILIZATION PRACTICES ARE REQUIRED.

CRITERIA

1. SELECT ONE OR MORE OF THE SPECIES OR SEED MIXTURES LISTED IN TABLE B.1 FOR THE APPROPRIATE PLANT HARDINESS ZONE (FROM FIGURE B.3), AND ENTER THEM IN THE TEMPORARY SEEDING SUMMARY BELOW ALONG WITH APPLICATION RATES, SEEDING DATES AND SEEDING DEPTHS. IF THIS SUMMARY IS NOT PUT ON THE PLAN AND COMPLETED, THEN TABLE B.1 PLUS FERTILIZER AND LIME RATES MUST BE PUT ON THE PLAN.
2. FOR SITES HAVING SOIL TESTS PERFORMED, USE AND SHOW THE RECOMMENDED RATES BY THE TESTING AGENCY. SOIL TESTS ARE NOT REQUIRED FOR TEMPORARY SEEDING.
3. WHEN STABILIZATION IS REQUIRED OUTSIDE OF A SEEDING SEASON, APPLY SEED AND MULCH OR STRAW MULCH ALONE AS PRESCRIBED IN SECTION B–4–3.A.1.b AND MAINTAIN UNTIL THE NEXT SEEDING SEASON.

TEMPORARY SEEDING SUMMARY						
HARDINESS ZONE: 6A					FERTILIZER RATE (10–20–20)	LIME RATE
TYPE	SPECIES	APPLICATION RATE (LB/AC)	SEEDING DATES	SEEDING DEPTHS		
COOL SEASON GRASSES	ANNUAL RYE REDTOP	40	MARCH 1 TO APRIL 30 & AUGUST 1 TO NOVEMBER 30	0.5 INCHES	436 LB/AC (10 LB/1000 SF)	2 TONS/AC (90 LB/1000 SF)
WARM SEASON GRASSES	LITTLE BLUESTEM	13.6	MAY 1 TO JULY 31	0.5 INCHES		

B–4–5 STANDARDS AND SPECIFICATIONS FOR PERMANENT STABILIZATION

DEFINITION

TO STABILIZE DISTURBED SOILS WITH PERMANENT VEGETATION.

PURPOSE

TO USE LONG–LIVED PERENNIAL GRASSES AND LEGUMES TO ESTABLISH PERMANENT GROUND COVER ON DISTURBED SOILS.

CONDITIONS WHERE PRACTICE APPLIES

EXPOSED SOILS WHERE GROUND COVER IS NEEDED FOR 6 MONTHS OR MORE.

CRITERIA

A. SEED MIXTURES

1. GENERAL USE
   - A. SELECT ONE OR MORE SPECIES OR MIXTURES LISTED IN TABLE B.3 FOR THE APPROPRIATE PLANT HARDINESS ZONE (FROM FIGURE B.3) AND BASED ON THE SITE CONDITION OR PURPOSE FOUND ON TABLE B.2. ENTER SELECTED MIXTURE(S), APPLICATION RATES AND SEEDING DATES IN THE PERMANENT SEEDING SUMMARY. THE SUMMARY IS TO BE PLACED ON THE PLAN.
   - B. ADDITIONAL PLANTING SPECIFICATIONS FOR EXCEPTIONAL SITES AS SHORELINES, STREAM BANKS, OR DUNES OR FOR SPECIAL PURPOSES SUCH AS WILDLIFE OR AESTHETIC TREATMENT MAY BE FOUND IN USDA–NRCS TECHNICAL FIELD OFFICE GUIDE, SECTION 342 – CRITICAL AREA PLANTING.
   - C. FOR SITES HAVING DISTURBED AREA OVER 5 ACRES, USE AND SHOW THE RATES RECOMMENDED BY THE SOIL TESTING AGENCY.
   - D. FOR AREAS RECEIVING LOW MAINTENANCE, APPLY UREA FORM FERTILIZER (46–0–0) AT 3½ POUNDS PER 1000 SQUARE FEET (150 POUNDS PER ACRE) AT THE TIME OF SEEDING IN ADDITION TO THE SOIL AMENDMENTS SHOWN IN THE PERMANENT SEEDING SUMMARY.
2. TURFGRASS MIXTURES

   ONLY SEED MIXTURES AND APPLICATION RATES DESCRIBED IN THIS ITEM MAY BE USED UNLESS OTHERWISE APPROVED BY THE MAA ENGINEER. SEED MIXTURES SHALL MEET CRITERIA DETAILED IN PARAGRAPH 903–2.1.2. SEED MIXTURES HAVE BEEN FORMULATED TO MINIMIZE THE ATTRACTIVENESS OF AREAS TO WILDLIFE OF COMMON LANDSCAPE SCENARIOS. THE APPROPRIATE SEED MIXTURE FOR APPLICATION WILL BE DESIGNATED BASED ON ENVIRONMENTAL CONDITIONS AND MAY VARY FROM SITE TO SITE. ALL PLANTING RATES LISTED ARE IN POUNDS OF PURE LIVE SEED (PLS) PER ACRE.

   SEED MIXTURES, APPLICATION SCENARIOS AND RATES FOR PERMANENT COOL–SEASON GRASSES ARE AS FOLLOWS:

   - A. SEED MIXTURE NO. 1 — RELATIVELY FLAT AREAS (GRADE LESS THAN 4:1) SUBJECT TO NORMAL CONDITIONS AND REGULAR MOWING (APPLICATION RATE = 234 LBS PLS/ACRE)
   - B. SEED MIXTURE NO. 2 — SLOPED AREAS (GRADE GREATER THAN 4:1) NOT SUBJECT TO REGULAR MOWING (APPLICATION RATE = 115 LBS PLS/ACRE)
   - C. SEED MIXTURE NO. 3 — WETLANDS AND THEIR ASSOCIATED BUFFER ZONES (APPLICATION RATE = 131 LBS PLS/ACRE)

   SEED MIXTURE NO.1

   RELATIVELY FLAT AREAS REGULARLY MOWED AND EXPOSED TO NORMAL CONDITIONS (APPLICATION RATE = 234 LBS PLS/ACRE)

SEED	RATE OF APPLICATION (LBS OF PLS/ACRE)
85% CERTIFIED TURF–TYPE TALL FESCUE	192
10% CERTIFIED KENTUCKY BLUEGRASS	28
5% PERENNIAL RYEGRASS	14

   SEED MIXTURE NO.2

   SLOPED AREAS NOT SUBJECT TO REGULAR MOWING (APPLICATION RATE = 115 LBS PLS/ACRE)

SEED	RATE OF APPLICATION (LBS OF PLS/ACRE)
75% HARD FESCUE	85
20% CHEWINGS FESCUE	23
5% KENTUCKY BLUEGRASS	7

   SUPPLEMENTAL SEED

REDTOP	3

MDE NO. XX-SF-XXXX
NOTE TO CONTRACTOR:
SEDIMENT CONTROL WILL BE
STRICTLY ENFORCED

FOR EROSION AND SEDIMENT CONTROL ONLY.

SEED MIXTURE NO.3

WETLAND AREAS AND THEIR ASSOCIATED BUFFER ZONES (APPLICATION RATE = 131 LBS PLS/ACRE)

SEED	RATE OF APPLICATION (LBS OF PLS/ACRE)
60% CREEPING BENTGRASS	83
30% FOWL BLUEGRASS	34
10% SWITCHGRASS	14
SUPPLEMENTAL SEED	
REDTOP	3

IDEAL TIMES OF SEEDING FOR TURF GRASS MIXTURES

WESTERN MARYLAND: MARCH 15 TO JUNE 1, AUGUST 1 TO OCTOBER 1 (HARDINESS ZONES: 5b,6a)

CENTRAL MARYLAND: MARCH 1 TO MAY 15, AUGUST 15 TO OCTOBER 15 (HARDINESS ZONE: 6b)

SOUTHERN MD, EASTERN SHORE: MARCH 1 TO MAY 15, AUGUST 15 TO OCTOBER 15 (HARDINESS ZONES: 7a, 7b)

TILL AREAS TO RECEIVE SEED BY DISCING OR OTHER APPROVED METHODS TO A DEPTH OF 2 TO 4 INCHES, LEVEL AND RAKE THE AREAS TO PREPARE A PROPER SEEDBED. REMOVE STONES AND DEBRIS OVER 1½ INCHES IN DIAMETER. THE RESULTING SEEDBED MUST BE IN SUCH CONDITION THAT FUTURE MOWING OF GRASSES WILL POSE NO DIFFICULTY.

IF SOIL MOISTURE IS DEFICIENT, SUPPLY NEW SEEDINGS WITH ADEQUATE WATER FOR PLANT GROWTH (½ TO 1 INCH EVERY 3 TO 4 DAYS DEPENDING ON SOIL TEXTURE) UNTIL THEY ARE FIRMLY ESTABLISHED. THIS IS ESPECIALLY TRUE WHEN SEEDINGS ARE MADE LATE IN THE PLANTING SEASON, IN ABNORMALLY DRY OR HOT SEASONS, OR ON ADVERSE SITES.

PERMANENT SEEDING SUMMARY

HARDINESS ZONE: 6a					FERTILIZER RATE (10-20-20)			LIME RATE
MIXTURE NO.	SPECIES	APPLICATION RATE LB/AC	SEEDING DATES	SEEDING DEPTH	N	P2O5	K2O	
1	CERTIFIED TURF-TYPE TALL FESCUE	192	MARCH 1 TO APRIL 30 AND AUGUST 1 TO OCTOBER 20	¼ TO ½ INCH	45 LBS PER ACRE (1.0 LB/ 1000 SF)	90 LB/AC (2 LB/ 1000 SF)	90 LB/AC (2 LB/ 1000 SF)	2 TONS/AC 90 LB/ 1000 SF)
	CERTIFIED KENTUCKY BLUEGRASS	28						
	PERENNIAL RYEGRASS	14						
SUPPLEMENTAL SEED	ANNUAL RYEGRASS	25						
2	HARD FESCUE	85	MARCH 1 TO APRIL 30 AND AUGUST 1 TO OCTOBER 20	¼ TO ½ INCH	45 LBS PER ACRE (1.0 LB/ 1000 SF)	90 LB/AC (2 LB/ 1000 SF)	90 LB/AC (2 LB/ 1000 SF)	2 TONS/AC 90 LB/ 1000 SF)
	CHEWING FESCUE	23						
	KENTUCKY BLUEGRASS	7						
SUPPLEMENTAL SEED	RED TOP	3						
3	CREEPING BENTGRASS	83	MARCH 1 TO APRIL 30 AND AUGUST 1 TO OCTOBER 20	¼ TO ½ INCH	45 LBS PER ACRE (1.0 LB/ 1000 SF)	90 LB/AC (2 LB/ 1000 SF)	90 LB/AC (2 LB/ 1000 SF)	2 TONS/AC 90 LB/ 1000 SF)
	FOWL BLUEGRASS	34						
	SWITCHGRASS	14						
SUPPLEMENTAL SEED	RED TOP	3						

B. SOD: TO PROVIDE QUICK COVER ON DISTURBED AREAS (2:1 GRADE OR FLATTER)

1. GENERAL SPECIFICATIONS

A. CLASS OF TURFGRASS SOD MUST BE MARYLAND STATE CERTIFIED. SOD LABELS MUST BE MADE AVAILABLE TO THE JOB FOREMAN AND INSPECTOR.

B. SOD MUST BE MACHINE CUT AT A UNIFORM SOIL THICKNESS OF ¾ INCH, PLUS OR MINUS ¼ INCH, AT THE TIME OF CUTTING. MEASUREMENT FOR THICKNESS MUST EXCLUDE TOP GROWTH AND THATCH. BROKEN PADS AND TORN OR UNEVEN ENDS WILL NOT BE ACCEPTABLE.

C. STANDARD SIZE SECTIONS OF SOD MUST BE STRONG ENOUGH TO SUPPORT THERI OWN WEIGHT AND RETAIN THEIR SIZE AND SHAPE WHEN SUSPENDED VERTICALLY WITH A FIRM GRASP ON THE UPPER 10 PERCENT OF THE SECTION.

D. SOD MUST NOT BE HARVESTED OR TRANSPLANTED WHEN MOISTURE CONTENT (EXCESSIVELY DRY OR WET) MAY ADVERSELY AFFECT ITS SURVIVAL.

E. SOD MUST BE HARVESTED, DELIVERED AND INSTALLED WITHIN A PERIOD OF 36 HOURS. SOD NOT TRANSPLANTED WITHIN THIS PERIOD MUST BE APPROVED BY AN AGRONOMIST OR SOIL SCIENTIST PRIOR TO OTS INSTALLATION.

2. SOD INSTALLATION

A. DURING PERIODS OF EXCESSIVELY HIGH TEMPERATURE OR IN AREAS HAVING DRY SUBSOIL, LIGHTLY IRRIGATE THE SUBSOIL IMMEDIATELY PRIOR TO LAYING THE SOD.

B. LAY THE FIRST ROW OF SOD IN A STRAIGHT LINE WITH SUBSEQUENT ROWS PLACED PARALLEL TO IT AND TIGHTLY WEDGED AGAINST EACH OTHER. STAGGER LATERAL JOINTS TO PROMOTE MORE UNIFORM GROWTH AND STRENGTH. ENSURE THAT SOD IS NOT STRETCHED OR OVERLAPPED AND THAT ALL JOINTS ARE BUTTED TIGHT IN ORDER TO PREVENT VOIDS WHICH WOULD CAUSE AIR DRYING OF THE ROOTS.

C. WHEREVER POSSIBLE, LAY SOD WITH THE LONG EDGES PARALLEL TO THE CONTOUR AND WITH STAGGERING JOINTS. ROLL AND TAMP, PEG OR OTHERWISE SECURE THE SOD TO PREVENT SLIPPAGE ON SLOPES. ENSURE SOLID CONTACT EXISTS BETWEEN SOD ROOTS AND THE UNDERLYING SOIL SURFACE.

D. WATER THE SOD IMMEDIATELY FOLLOWING ROLLING AND TAMPING UNTIL THE UNDERSIDE OF THE NEW SOD PAD AND SOIL SURFACE BELOW THE SOD ARE THOROUGHLY WET. COMPLETE THE OPERATIONS OF LAYING, TAMPING AND IRRIGATING FOR ANY PIECE OF SOD WITHIN EIGHT HOURS.

3. SOD MAINTENANCE

A. IN THE ABSENCE OF ADEQUATE RAINFALL, WATER DAILY DURING THE FIRST WEEK OR AS OFTEN AND SUFFICIENTLY AS NECESSARY TO MAINTAIN MOIST SOIL TO A DEPTH OF 4 INCHES. WATER SOD DURING THE HEAT OF THE DAY TO PREVENT WILTING.

B. AFTER THE FIRST WEEK, SOD WATERING IS REQUIRED AS NECESSARY TO MAINTAIN ADEQUATE MOISTURE CONTENT.

C. DO NOT MOW UNTIL THE SOD IS FIRMLY ROOTED. NO MORE THAN ⅓ OF THE GRASS LEAF MUST BE REMOVED BY THE INITIAL CUTTING OR SUBSEQUENT CUTTINGS. MAINTAIN A GRASS HEIGHT OF AT LEAST 3 INCHES UNLESS OTHERWISE SPECIFIED.

MDE NO. XX-SF-XXXX
NOTE TO CONTRACTOR:
SEDIMENT CONTROL WILL BE STRICTLY ENFORCED

FOR EROSION AND SEDIMENT CONTROL ONLY.

COMPANY NAME

COMPANY NAME
COMPANY ADDRESS
CITY, STATE ZIP CODE
COMPANY PHONE NO. COMPANY FAX NO.

DESIGNED: ___
DRAWN: ___
CHECKED: ___
APPROVED: ___

"PROFESSIONAL CERTIFICATION:

I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND."

LICENSE NO. _____

EXPIRATION DATE: _____

REVISION NO.	REVISION DATE	DESCRIPTIONS

XX% SUBMISSION

BWI THURGOOD MARSHALL OR MARTIN STATE LOGO

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION

OFFICE OF DESIGN AND CONSTRUCTION

PROJECT TITLE: PROJECT TITLE

SHEET TITLE: VEGETATIVE STABILIZATION NOTES 3

SCALE: NONE

DATE: DATE

CONTRACT NO.: MAA-CO-XX-XXX

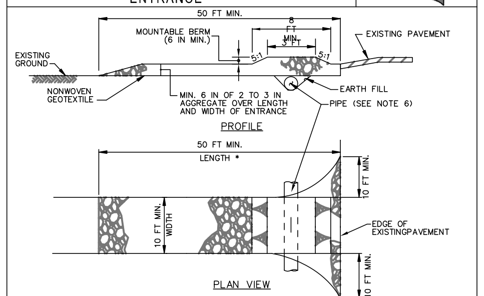
SHEET NO.: ___

PATH/FILENAME

Q:\HBA_BBM\MAA\AE-06-008 Comp Design\2820 Design Standards Assistance\x 2012 DST CD - working\Appendix C - Standard Drawings\ErosioC-VS NOTES 3.dwg Jan 03,2013 2:06pm smunroe

DETAIL B-1 STABILIZED CONSTRUCTION ENTRANCE

STANDARD SYMBOL: SCE



CONSTRUCTION SPECIFICATIONS

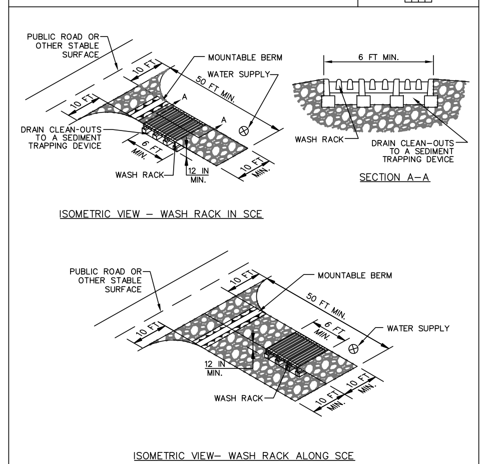
1. PLACE STABILIZED CONSTRUCTION ENTRANCE IN ACCORDANCE WITH THE APPROVED PLAN. VEHICLES MUST TRAVEL OVER THE ENTIRE LENGTH OF THE SCE. USE MINIMUM LENGTH OF 50 FEET (*30 FEET FOR SINGLE RESIDENCE LOT). USE MINIMUM WIDTH OF 10 FEET. FLARE SCE 10 FEET MINIMUM AT THE EXISTING ROAD TO PROVIDE A TURNING RADIUS.
2. PIPE ALL SURFACE WATER FLOWING TO OR DIVERTED TOWARD THE SCE UNDER THE ENTRANCE, MAINTAINING POSITIVE DRAINAGE. PROTECT PIPE INSTALLED THROUGH THE SCE WITH A MOUNTABLE BERM WITH 5:1 SLOPES AND A MINIMUM OF 12 INCHES OF STONE OVER THE PIPE. PROVIDE PIPE AS SPECIFIED ON APPROVED PLAN. WHEN THE SCE IS LOCATED AT A HIGH SPOT AND HAS NO DRAINAGE TO CONVEY, A PIPE IS NOT NECESSARY. A MOUNTABLE BERM IS REQUIRED WHEN SCE IS NOT LOCATED AT A HIGH SPOT.
3. PREPARE SUBGRADE AND PLACE NONWOVEN GEOTEXTILE, AS SPECIFIED IN SECTION H-1 MATERIALS.
4. PLACE CRUSHED AGGREGATE (2 TO 3 INCHES IN SIZE) OR EQUIVALENT RECYCLED CONCRETE (WITHOUT REBAR) AT LEAST 6 INCHES DEEP OVER THE LENGTH AND WIDTH OF THE SCE.
5. MAINTAIN ENTRANCE IN A CONDITION THAT MINIMIZES TRACKING OF SEDIMENT. ADD STONE OR MAKE OTHER REPAIRS AS CONDITIONS DEMAND TO MAINTAIN CLEAN SURFACE, MOUNTABLE BERM, AND SPECIFIED DIMENSIONS. IMMEDIATELY REMOVE STONE AND/OR SEDIMENT SPILLED, DROPPED, OR TRACKED ONTO ADJACENT ROADWAY BY VACUUMING, SCRAPING, AND/OR SWEEPING. WASHING ROADWAY TO REMOVE MUD TRACKED ONTO PAVEMENT IS NOT ACCEPTABLE UNLESS WASH WATER IS DIRECTED TO AN APPROVED SEDIMENT CONTROL PRACTICE.

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL B-2 WASH RACK OPTION

STANDARD SYMBOL: WR



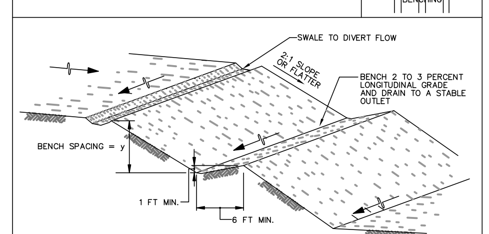
CONSTRUCTION SPECIFICATIONS

1. USE A WASH RACK DESIGNED AND CONSTRUCTED/MANUFACTURED FOR THE ANTICIPATED TRAFFIC LOADS. CONCRETE, STEEL, OR OTHER MATERIALS ARE ACCEPTABLE. PRE-FABRICATED UNITS SUCH AS CATTLE GUARDS ARE ACCEPTABLE. USE MINIMUM DIMENSION OF 6 FEET x 10 FEET. ORIENT DIRECTION OF RIBS AS SHOWN ON THE DETAIL.
2. INSTALL PRIOR TO, ALONG SIDE OF, OR AS PART OF THE SCE.
3. DIRECT WASH WATER TO AN APPROVED SEDIMENT TRAPPING DEVICE.
4. KEEP AREA UNDER WASH RACK FREE OF ACCUMULATED SEDIMENT. IF DAMAGED, REPAIR OR REPLACE WASH RACK.

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL
U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE | 2011 | MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL B-3-1 BENCHING

STANDARD SYMBOL: BENCHING



SLOPE	y (MAX.)
2:1	20 FT
3:1	30 FT
4:1	40 FT

CONSTRUCTION SPECIFICATIONS

1. USE FILL MATERIAL FREE OF BRUSH, RUBBISH, ROCKS, LOGS, STUMPS, BUILDING DEBRIS, AND OTHER OBJECTIONABLE MATERIALS THAT WOULD INTERFERE WITH OR PREVENT CONSTRUCTION OF SATISFACTORY FILLS.
2. DO NOT INCORPORATE FROZEN, SOFT, MUCKY, OR HIGHLY COMPRESSIBLE MATERIALS INTO FILL SLOPES OR STRUCTURAL FILLS. DO NOT PLACE FILL ON A FROZEN FOUNDATION.
3. PLACE ALL FILL IN LOOSE LIFTS NOT TO EXCEED 8 INCHES AND THEN COMPACT.
4. COMPACT ALL FILLS AS REQUIRED TO REDUCE EROSION, SLIPPAGE, SETTLEMENT, OR OTHER RELATED PROBLEMS. COMPACT FILL INTENDED TO SUPPORT BUILDINGS, STRUCTURES, CONDUITS, ETC., IN ACCORDANCE WITH LOCAL REQUIREMENTS OR CODES.
5. HANDLE SEEPS OR SPRINGS ENCOUNTERED DURING CONSTRUCTION IN ACCORDANCE WITH SECTION H-2 SUBSURFACE DRAINS OR OTHER APPROVED METHODS.
6. MAINTAIN LINE, GRADE, AND CROSS SECTION OF BENCHING. STABILIZE IN ACCORDANCE WITH THE 3/7 DAY STABILIZATION CRITERIA OR AS SPECIFIED ON THE APPROVED EROSION AND SEDIMENT CONTROL PLAN. INSTALLATION OF EROSION CONTROL MATTING MAY BE NECESSARY IN BENCH/SWALE INVERTS. CONTINUOUSLY MEET REQUIREMENTS FOR ADEQUATE VEGETATIVE ESTABLISHMENT IN ACCORDANCE WITH SECTION B-4 VEGETATIVE STABILIZATION.
7. KEEP ALL BENCHES FREE OF SEDIMENT DURING ALL PHASES OF DEVELOPMENT.

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL
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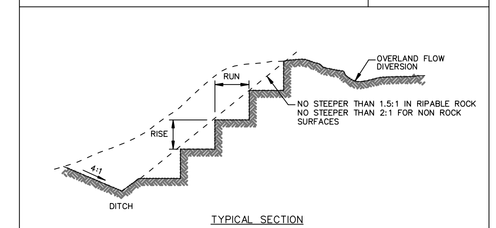
DETAIL B-3-2 SERRATED SLOPE

STANDARD SYMBOL



CONSTRUCTION SPECIFICATIONS

1. DIVERT OVERLAND FLOW FROM THE TOP OF ALL SERRATED CUT SLOPES AND CARRY TO A SUITABLE OUTLET.
2. MAKE SERRATIONS AS THE EXCAVATION PROGRESSES.
3. CONSTRUCT EACH STEP OR SERRATION ON THE CONTOUR. RISE & RUN DIMENSIONS WILL VARY DEPENDING ON THE FINAL SLOPE RATIO. FOR RIPABLE ROCK SURFACES, MAKE TWO FOOT VERTICAL (RISE) AND THREE FOOT HORIZONTAL (RUN) SERRATIONS AT A SLOPE RATIO NO STEEPER THAN 1.5:1. FOR NON ROCK SURFACES, MAKE TWO FOOT VERTICAL (RISE) AND FOUR FOOT HORIZONTAL (RUNS) SERRATIONS AT A SLOPE RATIO NO STEEPER THAN 2:1.
4. KEEP ALL BENCHES FREE OF SEDIMENT DURING ALL PHASES OF CONSTRUCTION.
5. HANDLE SEEPS OR SPRINGS ENCOUNTERED DURING CONSTRUCTION IN ACCORDANCE WITH SECTION H-2 SUBSURFACE DRAINS OR OTHER APPROVED METHODS.
6. MAINTAIN LINE, GRADE, AND CROSS SECTION OF SERRATED SLOPES. TEMPORARILY OR PERMANENTLY STABILIZE ALL GRADED, NON ROCK SURFACES IN ACCORDANCE WITH THE 3/7 DAY STABILIZATION REQUIREMENTS OR AS SPECIFIED ON THE APPROVED EROSION AND SEDIMENT CONTROL PLAN. CONTINUOUSLY MEET REQUIREMENTS FOR ADEQUATE VEGETATIVE ESTABLISHMENT IN ACCORDANCE WITH SECTION B-4 VEGETATIVE STABILIZATION.

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL
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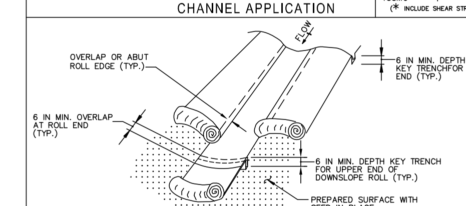
DETAIL B-4-6-A TEMPORARY SOIL STABILIZATION MATTING CHANNEL APPLICATION

STANDARD SYMBOL: TSSMC – * lb/ft² (* INCLUDE SHEAR STRESS)



CONSTRUCTION SPECIFICATIONS

1. USE MATTING THAT HAS A DESIGN VALUE FOR SHEAR STRESS EQUAL TO OR HIGHER THAN THE SHEAR STRESS DESIGNATED ON APPROVED PLANS.
2. USE TEMPORARY SOIL STABILIZATION MATTING MADE OF DEGRADABLE (LASTS 6 MONTHS MINIMUM) NATURAL OR MAN-MADE FIBERS (MOSTLY ORGANIC). MAT MUST HAVE UNIFORM THICKNESS AND DISTRIBUTION OF FIBERS THROUGHOUT AND BE SMOLDER RESISTANT. CHEMICALS USED IN THE MAT MUST BE NON-LEACHING AND NON-TOXIC TO VEGETATION AND SEED GERMINATION AND NON-INJURIOUS TO THE SKIN. IF PRESENT, NETTING MUST BE EXTRUDED PLASTIC WITH A MAXIMUM MESH OPENING OF 2x2 INCHES AND SUFFICIENTLY BONDED OR SEWN ON 2 INCH CENTERS ALONG LONGITUDINAL AXIS OF THE MATERIAL TO PREVENT SEPARATION OF THE NET FROM THE PARENT MATERIAL.
3. SECURE MATTING USING STEEL STAPLES, WOOD STAKES, OR BIODEGRADABLE EQUIVALENT. STAPLES MUST BE "U" OR "T" SHAPED STEEL WIRE HAVING A MINIMUM GAUGE OF NO. 11 AND NO. 8 RESPECTIVELY. "U" SHAPED STAPLES MUST AVERAGE 1 TO 1½ INCHES WIDE AND BE A MINIMUM OF 6 INCHES LONG. "T" SHAPED STAPLES MUST HAVE A MINIMUM 8 INCH MAIN LEG, A MINIMUM 1 INCH SECONDARY LEG, AND A MINIMUM 4 INCH HEAD. WOOD STAKES MUST BE ROUGH-SAWN HARDWOOD, 12 TO 24 INCHES IN LENGTH, 1x3 INCH IN CROSS SECTION, AND WEDGE SHAPED AT THE BOTTOM.
4. PERFORM FINAL GRADING, TOPSOIL APPLICATION, SEEDBED PREPARATION, AND PERMANENT SEEDING IN ACCORDANCE WITH SPECIFICATIONS. PLACE MATTING WITHIN 48 HOURS OF COMPLETING SEEDING OPERATIONS UNLESS END OF WORKDAY STABILIZATION IS SPECIFIED ON THE APPROVED EROSION AND SEDIMENT CONTROL PLAN.
5. UNROLL MATTING IN DIRECTION OF WATER FLOW, CENTERING THE FIRST ROLL ON THE CHANNEL CENTERLINE. WORK FROM CENTER OF CHANNEL OUTWARD WHEN PLACING ROLLS. LAY MAT SMOOTHLY AND FIRMLY ON THE SEEDED SURFACE. AVOID STRETCHING THE MATTING.
6. KEY-IN UPSTREAM END OF EACH MAT ROLL BY DIGGING A 6 INCH (MINIMUM) TRENCH AT THE UPSTREAM END OF THE MATTING, PLACING THE ROLL END IN THE TRENCH, STAPLING THE MAT IN PLACE, REPLACING THE EXCAVATED MATERIAL, AND TAMPING TO SECURE THE MAT END.
7. OVERLAP OR ABUT THE ROLL EDGES PER MANUFACTURER RECOMMENDATIONS. OVERLAP ROLL ENDS BY 6 INCHES (MINIMUM), WITH THE UPSTREAM MAT OVERLAPPING ON TOP OF THE NEXT DOWNSTREAM MAT.
8. STAPLE/STAKE MAT IN A STAGGERED PATTERN ON 4 FOOT (MAXIMUM) CENTERS THROUGHOUT AND 2 FOOT (MAXIMUM) CENTERS ALONG SEAMS, JOINTS, AND ROLL ENDS.
9. ESTABLISH AND MAINTAIN VEGETATION SO THAT REQUIREMENTS FOR ADEQUATE VEGETATIVE ESTABLISHMENT ARE CONTINUOUSLY MET IN ACCORDANCE WITH SECTION B-4 VEGETATIVE STABILIZATION.

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL
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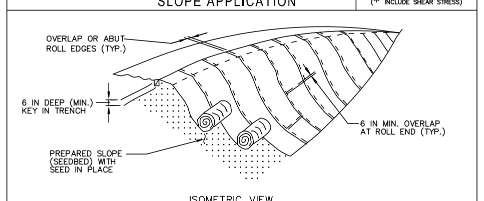
DETAIL B-4-6-B TEMPORARY SOIL STABILIZATION MATTING SLOPE APPLICATION

STANDARD SYMBOL: TSSMS – * lb/ft² (* INCLUDE SHEAR STRESS)



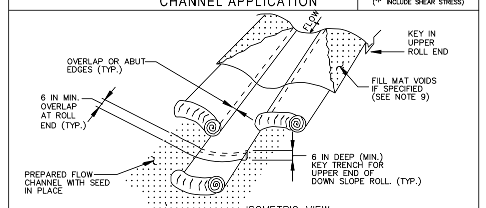
CONSTRUCTION SPECIFICATIONS

1. USE MATTING THAT HAS A DESIGN VALUE FOR SHEAR STRESS EQUAL TO OR HIGHER THAN THE SHEAR STRESS DESIGNATED ON APPROVED PLANS.
2. USE TEMPORARY SOIL STABILIZATION MATTING MADE OF DEGRADABLE (LASTS 6 MONTHS MINIMUM) NATURAL OR MAN-MADE FIBERS (MOSTLY ORGANIC). MAT MUST HAVE UNIFORM THICKNESS AND DISTRIBUTION OF FIBERS THROUGHOUT AND BE SMOLDER RESISTANT. CHEMICALS USED IN THE MAT MUST BE NON-LEACHING AND NON-TOXIC TO VEGETATION AND SEED GERMINATION AND NON-INJURIOUS TO THE SKIN. IF PRESENT, NETTING MUST BE EXTRUDED PLASTIC WITH A MAXIMUM MESH OPENING OF 2x2 INCHES AND SUFFICIENTLY BONDED OR SEWN ON 2 INCH CENTERS ALONG LONGITUDINAL AXIS OF THE MATERIAL TO PREVENT SEPARATION OF THE NET FROM THE PARENT MATERIAL.
3. SECURE MATTING USING STEEL STAPLES, WOOD STAKES, OR BIODEGRADABLE EQUIVALENT. STAPLES MUST BE "U" OR "T" SHAPED STEEL WIRE HAVING A MINIMUM GAUGE OF NO. 11 AND NO. 8 RESPECTIVELY. "U" SHAPED STAPLES MUST AVERAGE 1 TO 1½ INCHES WIDE AND BE A MINIMUM OF 6 INCHES LONG. "T" SHAPED STAPLES MUST HAVE A MINIMUM 8 INCH MAIN LEG, A MINIMUM 1 INCH SECONDARY LEG, AND A MINIMUM 4 INCH HEAD. WOOD STAKES MUST BE ROUGH-SAWN HARDWOOD, 12 TO 24 INCHES IN LENGTH, 1x3 INCH IN CROSS SECTION, AND WEDGE SHAPED AT THE BOTTOM.
4. PERFORM FINAL GRADING, TOPSOIL APPLICATION, SEEDBED PREPARATION, AND PERMANENT SEEDING IN ACCORDANCE WITH SPECIFICATIONS. PLACE MATTING WITHIN 48 HOURS OF COMPLETING SEEDING OPERATIONS UNLESS END OF WORKDAY STABILIZATION IS SPECIFIED ON THE APPROVED EROSION & SEDIMENT CONTROL PLAN.
5. UNROLL MATTING DOWNSLOPE. LAY MAT SMOOTHLY AND FIRMLY UPON THE SEEDED SURFACE. AVOID STRETCHING THE MATTING.
6. OVERLAP OR ABUT ROLL EDGES PER MANUFACTURER RECOMMENDATIONS. OVERLAP ROLL ENDS BY 6 INCHES (MINIMUM), WITH THE UPSLOPE MAT OVERLAPPING ON TOP OF THE DOWNSLOPE MAT.
7. KEY IN THE UPSLOPE END OF MAT 6 INCHES (MINIMUM) BY DIGGING A TRENCH, PLACING THE MATTING ROLL END IN THE TRENCH, STAPLING THE MAT IN PLACE, REPLACING THE EXCAVATED MATERIAL, AND TAMPING TO SECURE THE MAT END IN THE KEY.
8. STAPLE/STAKE MAT IN A STAGGERED PATTERN ON 4 FOOT (MAXIMUM) CENTERS THROUGHOUT AND 2 FOOT (MAXIMUM) CENTERS ALONG SEAMS, JOINTS, AND ROLL ENDS.
9. ESTABLISH AND MAINTAIN VEGETATION SO THAT REQUIREMENTS FOR ADEQUATE VEGETATIVE ESTABLISHMENT ARE CONTINUOUSLY MET IN ACCORDANCE WITH SECTION B-4 VEGETATIVE STABILIZATION.

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL
U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE | 2011 | MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL B-4-6-C PERMANENT SOIL STABILIZATION MATTING CHANNEL APPLICATION

STANDARD SYMBOL: PSSMC – * lb/ft² (* INCLUDE SHEAR STRESS)



CONSTRUCTION SPECIFICATIONS

1. USE MATTING THAT HAS A DESIGN VALUE FOR SHEAR STRESS EQUAL TO OR HIGHER THAN THE SHEAR STRESS DESIGNATED ON APPROVED PLANS.
2. USE PERMANENT SOIL STABILIZATION MATTING MADE OF OPEN WEAVE SYNTHETIC, NON-DEGRADABLE FIBERS OR ELEMENTS OF UNIFORM THICKNESS AND DISTRIBUTION THROUGHOUT. CHEMICALS USED IN THE MAT MUST BE NON-LEACHING AND NON-TOXIC TO VEGETATION AND SEED GERMINATION AND NON-INJURIOUS TO THE SKIN. IF PRESENT, NETTING MUST BE EXTRUDED PLASTIC WITH A MAXIMUM MESH OPENING OF 2x2 INCHES AND SUFFICIENTLY BONDED OR SEWN ON 2 INCH CENTERS ALONG LONGITUDINAL AXIS OF THE MATERIAL TO PREVENT SEPARATION OF THE NET FROM THE PARENT MATERIAL.
3. SECURE MATTING USING STEEL STAPLES OR WOOD STAKES. STAPLES MUST BE "U" OR "T" SHAPED STEEL WIRE HAVING A MINIMUM GAUGE OF NO. 11 AND NO. 8 RESPECTIVELY. "U" SHAPED STAPLES MUST AVERAGE 1 TO 1½ INCHES WIDE AND BE A MINIMUM OF 6 INCHES LONG. "T" SHAPED STAPLES MUST HAVE A MINIMUM 8 INCH MAIN LEG, A MINIMUM 1 INCH SECONDARY LEG, AND MINIMUM 4 INCH HEAD. WOOD STAKES MUST BE ROUGH-SAWN HARDWOOD, 12 TO 24 INCHES IN LENGTH, 1x3 INCH IN CROSS SECTION, AND WEDGE SHAPE AT THE BOTTOM.
4. PERFORM FINAL GRADING, TOPSOIL APPLICATION, SEEDBED PREPARATION, AND PERMANENT SEEDING IN ACCORDANCE WITH SPECIFICATIONS. PLACE MATTING WITHIN 48 HOURS OF COMPLETING SEEDING OPERATIONS, UNLESS END OF WORKDAY STABILIZATION IS SPECIFIED ON THE APPROVED EROSION AND SEDIMENT CONTROL PLAN.
5. UNROLL MATTING IN DIRECTION OF WATER FLOW, CENTERING THE FIRST ROLL ON THE CHANNEL CENTER LINE. WORK FROM CENTER OF CHANNEL OUTWARD WHEN PLACING ROLLS. LAY MATTING SMOOTHLY AND FIRMLY UPON THE SEEDED SURFACE. AVOID STRETCHING THE MATTING.
6. OVERLAP OR ABUT EDGES OF MATTING ROLLS PER MANUFACTURER RECOMMENDATIONS. OVERLAP ROLL ENDS BY 6 INCHES (MINIMUM), WITH THE UPSTREAM MAT OVERLAPPING ON TOP OF THE NEXT DOWNSTREAM MAT.
7. KEY IN THE TOP OF SLOPE END OF MAT 6 INCHES (MINIMUM) BY DIGGING A TRENCH, PLACING THE MATTING ROLL END IN THE TRENCH, STAPLING THE MAT IN PLACE, REPLACING THE EXCAVATED MATERIAL, AND TAMPING TO SECURE THE MAT END IN THE KEY.
8. STAPLE/STAKE MAT IN A STAGGERED PATTERN ON 4 FOOT (MAXIMUM) CENTERS THROUGHOUT AND 2 FOOT (MAXIMUM) CENTERS ALONG SEAMS, JOINTS, AND ROLL ENDS.
9. IF SPECIFIED BY THE DESIGNER OR MANUFACTURER AND DEPENDING ON THE TYPE OF MAT BEING INSTALLED, ONCE THE MATTING IS KEYED AND STAPLED IN PLACE, FILL THE MAT VOIDS WITH TOP SOIL OR GRANULAR MATERIAL AND LIGHTLY COMPACT OR ROLL TO MAXIMIZE SOIL/MAT CONTACT WITHOUT CRUSHING MAT.
10. ESTABLISH AND MAINTAIN VEGETATION SO THAT REQUIREMENTS FOR ADEQUATE VEGETATIVE ESTABLISHMENT ARE CONTINUOUSLY MET IN ACCORDANCE WITH SECTION B-4 VEGETATIVE STABILIZATION.

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL
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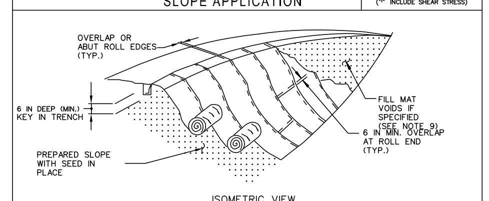
DETAIL B-4-6-D PERMANENT SOIL STABILIZATION MATTING SLOPE APPLICATION

STANDARD SYMBOL: PSSMS – * lb/ft² (* INCLUDE SHEAR STRESS)



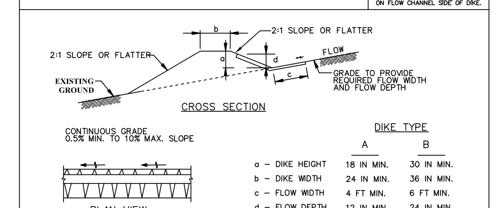
CONSTRUCTION SPECIFICATIONS

1. USE MATTING THAT HAS A DESIGN VALUE FOR SHEAR STRESS EQUAL TO OR HIGHER THAN THE SHEAR STRESS DESIGNATED ON APPROVED PLANS.
2. USE PERMANENT SOIL STABILIZATION MATTING MADE OF OPEN WEAVE SYNTHETIC, NON-DEGRADABLE FIBERS OR ELEMENTS OF UNIFORM THICKNESS AND DISTRIBUTION THROUGHOUT. CHEMICALS USED IN THE MAT MUST BE NON-LEACHING AND NON-TOXIC TO VEGETATION AND SEED GERMINATION AND NON-INJURIOUS TO THE SKIN. IF PRESENT, NETTING MUST BE EXTRUDED PLASTIC WITH A MAXIMUM MESH OPENING OF 2x2 INCHES AND SUFFICIENTLY BONDED OR SEWN ON 2 INCH CENTERS ALONG LONGITUDINAL AXIS OF THE MATERIAL TO PREVENT SEPARATION OF THE NET FROM THE PARENT MATERIAL.
3. SECURE MATTING USING STEEL STAPLES OR WOOD STAKES. STAPLES MUST BE "U" OR "T" SHAPED STEEL WIRE HAVING A MINIMUM GAUGE OF NO. 11 AND NO. 8 RESPECTIVELY. "U" SHAPED STAPLES MUST AVERAGE 1 TO 1½ INCHES WIDE AND BE A MINIMUM OF 6 INCHES LONG. "T" SHAPED STAPLES MUST HAVE A MINIMUM 8 INCH MAIN LEG, A MINIMUM 1 INCH SECONDARY LEG, AND MINIMUM 4 INCH HEAD. WOOD STAKES MUST BE ROUGH-SAWN HARDWOOD, 12 TO 24 INCHES IN LENGTH, 1x3 INCH IN CROSS SECTION, AND WEDGE SHAPE AT THE BOTTOM.
4. PERFORM FINAL GRADING, TOPSOIL APPLICATION, SEEDBED PREPARATION, AND PERMANENT SEEDING IN ACCORDANCE WITH SPECIFICATIONS. PLACE MATTING WITHIN 48 HOURS OF COMPLETING SEEDING OPERATIONS, UNLESS END OF WORKDAY STABILIZATION IS SPECIFIED ON THE APPROVED EROSION AND SEDIMENT CONTROL PLAN.
5. UNROLL MATTING DOWN SLOPE. LAY MATTING SMOOTHLY AND FIRMLY UPON THE SEEDED SURFACE. AVOID STRETCHING THE MATTING.
6. OVERLAP OR ABUT EDGES OF MATTING ROLLS PER MANUFACTURER RECOMMENDATIONS. OVERLAP ROLL ENDS BY 6 INCHES (MINIMUM), WITH THE UPSTREAM MAT OVERLAPPING ON TOP OF THE DOWNSLOPE MAT.
7. KEY IN THE TOP OF SLOPE END OF MAT 6 INCHES (MINIMUM) BY DIGGING A TRENCH, PLACING THE MATTING ROLL END IN THE TRENCH, STAPLING THE MAT IN PLACE, REPLACING THE EXCAVATED MATERIAL, AND TAMPING TO SECURE THE MAT END IN THE KEY.
8. STAPLE/STAKE MAT IN A STAGGERED PATTERN ON 4 FOOT (MAXIMUM) CENTERS THROUGHOUT AND 2 FOOT (MAXIMUM) CENTERS ALONG SEAMS, JOINTS, AND ROLL ENDS.
9. IF SPECIFIED BY THE DESIGNER OR MANUFACTURER AND DEPENDING ON THE TYPE OF MAT BEING INSTALLED, ONCE THE MATTING IS KEYED AND STAPLED IN PLACE, FILL THE MAT VOIDS WITH TOP SOIL OR GRANULAR MATERIAL AND LIGHTLY COMPACT OR ROLL TO MAXIMIZE SOIL/MAT CONTACT WITHOUT CRUSHING MAT.
10. ESTABLISH AND MAINTAIN VEGETATION SO THAT REQUIREMENTS FOR ADEQUATE VEGETATIVE ESTABLISHMENT ARE CONTINUOUSLY MET IN ACCORDANCE WITH SECTION B-4 VEGETATIVE STABILIZATION.

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL
U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE | 2011 | MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL C-1 EARTH DIKE

STANDARD SYMBOL: A-1 — PLACE DESIGNATION (e.g. A-1) ON FLOW CHANNEL SIDE OF DIKE.



	DIKE TYPE A	DIKE TYPE B
a – DIKE HEIGHT	18 IN MIN.	30 IN MIN.
b – DIKE WIDTH	24 IN MIN.	36 IN MIN.
c – FLOW WIDTH	4 FT MIN.	6 FT MIN.
d – FLOW DEPTH	12 IN MIN.	24 IN MIN.

FLOW CHANNEL STABILIZATION

A-1 SEED WITH STRAW MULCH AND TACK. (NOT ALLOWED FOR CLEAR WATER DIVERSION.)

A-2/B-2 SEED WITH SOIL STABILIZATION MATTING OR LINE WITH SOD.

A-3/B-3 4 TO 7 INCH STONE OR EQUIVALENT RECYCLED CONCRETE PRESSED INTO SOIL A MINIMUM OF 7 INCHES AND FLUSH WITH GROUND.

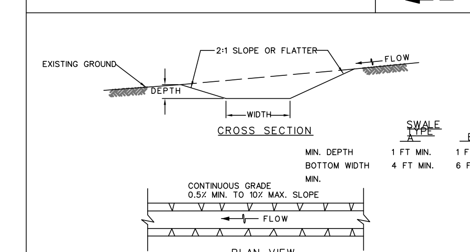
CONSTRUCTION SPECIFICATIONS

1. REMOVE AND DISPOSE OF ALL TREES, BRUSH, STUMPS, OBSTRUCTIONS, AND OTHER OBJECTIONABLE MATERIAL SO AS NOT TO INTERFERE WITH PROPER FUNCTION OF EARTHDIKE.
2. EXCAVATE OR SHAPE EARTH DIKE TO LINE, GRADE, AND CROSS SECTION AS SPECIFIED. BANK PROJECTIONS OR OTHER IRREGULARITIES ARE NOT ALLOWED.
3. COMPACT FILL.
4. CONSTRUCT FLOW CHANNEL ON AN UNINTERRUPTED, CONTINUOUS GRADE, ADJUSTING THE LOCATION DUE TO FIELD CONDITIONS AS NECESSARY TO MAINTAIN POSITIVE DRAINAGE.
5. PROVIDE OUTLET PROTECTION AS REQUIRED ON APPROVED PLAN.
6. STABILIZE EARTH DIKE WITHIN THREE DAYS OF INSTALLATION. STABILIZE FLOW CHANNEL FOR CLEAR WATER DIVERSION WITHIN 24 HOURS OF INSTALLATION.
7. MAINTAIN LINE, GRADE, AND CROSS SECTION. REMOVE ACCUMULATED SEDIMENT AND DEBRIS, AND MAINTAIN POSITIVE DRAINAGE. KEEP EARTH DIKE AND POINT OF DISCHARGE FREE OF EROSION, AND CONTINUOUSLY MEET REQUIREMENTS FOR ADEQUATE VEGETATIVE ESTABLISHMENT IN ACCORDANCE WITH SECTION B-4 VEGETATIVE STABILIZATION.
8. UPON REMOVAL OF EARTH DIKE, GRADE AREA FLUSH WITH EXISTING GROUND. WITHIN 24 HOURS OF REMOVAL STABILIZE DISTURBED AREA WITH TOPSOIL, SEED, AND MULCH, OR AS SPECIFIED ON APPROVED PLAN.

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL
U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE | 2011 | MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL C-2 TEMPORARY SWALE

STANDARD SYMBOL: A-1



SWALE TYPE	A	B
MIN. DEPTH	1 FT MIN.	1 FT MIN.
BOTTOM WIDTH MIN.	4 FT MIN.	6 FT

FLOW CHANNEL STABILIZATION

A-1 SEED WITH STRAW MULCH AND TACK. (NOT ALLOWED FOR CLEAR WATER DIVERSION.)

A-2/B-2 SEED WITH SOIL STABILIZATION MATTING OR LINE WITH SOD.

A-3/B-3 4 TO 7 INCH STONE OR EQUIVALENT RECYCLED CONCRETE PRESSED INTO SOIL A MINIMUM OF 7 INCHES AND FLUSH WITH GROUND.

CONSTRUCTION SPECIFICATIONS

1. REMOVE AND DISPOSE OF ALL TREES, BRUSH, STUMPS, OBSTRUCTIONS, AND OTHER OBJECTIONABLE MATERIAL SO AS NOT TO INTERFERE WITH PROPER FUNCTION OF TEMPORARY SWALE.
2. EXCAVATE OR SHAPE TEMPORARY SWALE TO LINE, GRADE, AND CROSS SECTION AS SPECIFIED. BANK PROJECTIONS OR OTHER IRREGULARITIES ARE NOT ALLOWED.
3. STABILIZE TEMPORARY SWALE WITHIN THREE DAYS OF INSTALLATION. STABILIZE SWALES USED FOR CLEAR WATER DIVERSION WITHIN 24 HOURS OF INSTALLATION.
4. CONSTRUCT FLOW CHANNEL ON AN UNINTERRUPTED, CONTINUOUS GRADE, ADJUSTING THE LOCATION DUE TO FIELD CONDITIONS AS NECESSARY TO MAINTAIN POSITIVE DRAINAGE.
5. PROVIDE OUTLET PROTECTION AS REQUIRED ON APPROVED PLAN.
6. MAINTAIN LINE, GRADE, AND CROSS SECTION. REMOVE ACCUMULATED SEDIMENT AND DEBRIS, AND MAINTAIN POSITIVE DRAINAGE. KEEP TEMPORARY SWALE AND POINT OF DISCHARGE FREE OF EROSION, AND CONTINUOUSLY MEET REQUIREMENTS FOR ADEQUATE VEGETATIVE ESTABLISHMENT IN ACCORDANCE WITH SECTION B-4 VEGETATIVE STABILIZATION.
7. UPON REMOVAL OF TEMPORARY SWALE, GRADE AREA FLUSH WITH EXISTING GROUND. WITHIN 24 HOURS OF REMOVAL STABILIZE DISTURBED AREA WITH TOPSOIL, SEED, AND MULCH, OR AS SPECIFIED ON APPROVED PLAN.

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL
U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE | 2011 | MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

MDE NO. XX-SF-XXXX
NOTE TO CONTRACTOR:
SEDIMENT CONTROL WILL BE STRICTLY ENFORCED

FOR EROSION AND SEDIMENT CONTROL ONLY.

COMPANY NAME

COMPANY NAME
COMPANY ADDRESS
CITY, STATE ZIP CODE
COMPANY PHONE NO. COMPANY FAX NO.

DESIGNED: ———
DRAWN: ———
CHECKED: ———
APPROVED: ———

"PROFESSIONAL CERTIFICATION:
I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND."
LICENSE NO. _______
EXPIRATION DATE: ________

REVISION NO.	REVISION DATE	DESCRIPTIONS

XX% SUBMISSION

BWI THURGOOD MARSHALL OR MARTIN STATE LOGO

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
OFFICE OF DESIGN AND CONSTRUCTION

PROJECT TITLE: PROJECT TITLE

SHEET TITLE: EROSION AND SEDIMENT CONTROL DETAILS 1

SCALE: NONE | DATE: DATE

CONTRACT NO.: MAA-CO-XX-XXX

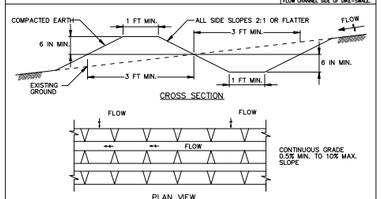
SHEET NO.: — — —

PATH/FILENAME

DETAIL C-3 PERIMETER DIKE/SWALE

STANDARD SYMBOL: PDS-1

PLACE DESIGNATION (PDS-1 OR 2) ON FLOW CHANNEL SIDE OF DIKE-SWALE.



FLOW CHANNEL STABILIZATION

PDS-1 SEED AND MULCH AND TACK (DRAINING < 1 ACRE) (NOT ALLOWED FOR CLEAN WATER DIVERSION).

PDS-2 SEED WITH SOIL STABILIZATION MATTING OR LINE WITH SOD (DRAINING BETWEEN 1 AND 2 ACRES)

NOTE: THE MAXIMUM DRAINAGE AREA FOR THIS PRACTICE IS 2 ACRES.

CONSTRUCTION SPECIFICATIONS

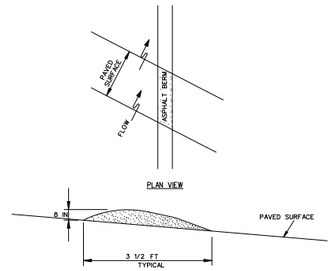
1. REMOVE AND DISPOSE OF ALL TREES, BRUSH, STUMPS, OBSTRUCTIONS, AND OTHER OBJECTIONABLE MATERIAL SO AS NOT TO INTERFERE WITH PROPER FUNCTION OF DIKE/SWALE.
2. EXCAVATE OR SHAPE DIKE/SWALE TO LINE, GRADE, AND CROSS SECTION AS SPECIFIED. BANK PROJECTIONS OR OTHER IRREGULARITIES ARE NOT ALLOWED.
3. COMPACT FILL.
4. CONSTRUCT DIKE/SWALE ON AN UNINTERRUPTED, CONTINUOUS GRADE, ADJUSTING THE LOCATION DUE TO FIELD CONDITIONS AS NECESSARY TO MAINTAIN POSITIVE DRAINAGE.
5. PROVIDE OUTLET PROTECTION AS REQUIRED ON APPROVED PLAN.
6. STABILIZE DIKE/SWALE WITHIN 3 DAYS OF INSTALLATION. STABILIZE DIKE/SWALES USED FOR CLEAR WATER DIVERSION WITHIN 24 HOURS OF INSTALLATION.
7. MAINTAIN LINE, GRADE, AND CROSS SECTION. REMOVE ACCUMULATED SEDIMENT AND DEBRIS, AND MAINTAIN POSITIVE DRAINAGE. KEEP PERIMETER DIKE/SWALE AND POINT OF DISCHARGE FREE OF EROSION AND CONTINUOUSLY MEET REQUIREMENTS FOR ADEQUATE VEGETATIVE ESTABLISHMENT IN ACCORDANCE WITH SECTION B-4 VEGETATIVE STABILIZATION.
8. UPON REMOVAL OF DIKE/SWALE, GRADE AREA FLUSH WITH EXISTING GROUND. WITHIN 24 HOURS OF REMOVAL STABILIZE DISTURBED AREA WITH TOPSOIL, SEED, MULCH, OR AS SPECIFIED ON APPROVED PLAN.

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL C-5 TEMPORARY ASPHALT BERM

STANDARD SYMBOL: TAB



CONSTRUCTION SPECIFICATIONS

1. CONSTRUCT BERM ON AN UNINTERRUPTED, CONTINUOUS GRADE.
2. INSTALL BERM TO CONFORM TO CROSS SECTION DIMENSIONS OF A UNIFORM HEIGHT OF 8 INCHES MINIMUM AND APPROXIMATE WIDTH OF 3½ FEET.
3. PROVIDE OUTLET PROTECTION AS REQUIRED ON PLAN.
4. COMPACT ASPHALT BERM.
5. REPAIR DAMAGED ASPHALT. REMOVE ACCUMULATED SEDIMENT AND DEBRIS. MAINTAIN POSITIVE DRAINAGE.
6. UPON REMOVAL OF ASPHALT BERM, RETURN TO ORIGINAL CONDITIONS OR AS SPECIFIED ON APPROVED PLAN.

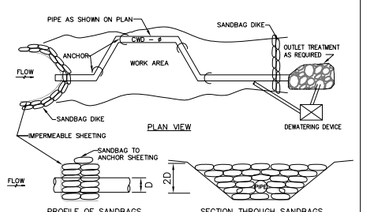
MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL C-6 CLEAR WATER DIVERSION PIPE

STANDARD SYMBOL: CWD - 12

DESIGNATION CWD-12 REFERS TO 12 INCH CLEAR WATER DIVERSION.



CONSTRUCTION SPECIFICATIONS

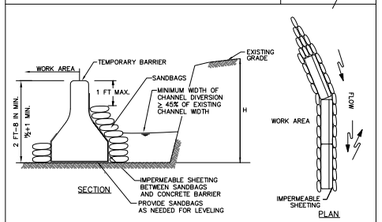
1. FLEXIBLE PIPE IS PREFERRED. HOWEVER, CORRUGATED METAL PIPE OR EQUIVALENT PVC PIPE CAN BE USED. MAKE ALL JOINTS WATERTIGHT.
2. FOR SANDBAGS USE MATERIALS THAT ARE RESISTANT TO ULTRA-VIOLENT RADIATION, TEARING, AND PUNCTURE AND WOVEN TIGHTLY ENOUGH TO PREVENT LEAKAGE OF FILL MATERIAL.
3. USE 10 MIL OR THICKER, UV RESISTANT, IMPERMEABLE SHEETING OR OTHER APPROVED MATERIAL THAT IS IMPERMEABLE AND RESISTANT TO PUNTURING AND TEARING.
4. PLACE IMPERMEABLE SHEETING SUCH THAT UPGRADE PORTION OVERLAPS DOWNGRADE PORTION BY A MINIMUM OF 18 INCHES.
5. SET HEIGHT OF SANDBAG DIKE AT TWICE THE PIPE DIAMETER. MAINTAIN HEIGHT ALONG LENGTH OF SANDBAG DIKE. PLACE DOUBLE ROW OF SANDBAGS.
6. AT A MINIMUM, SECURELY ANCHOR DIVERSION PIPE AT EACH DOWNGRADE JOINT.
7. SET OUTLET END OF DIVERSION PIPE LOWER THAN INLET END.
8. PROVIDE OUTLET PROTECTION AS REQUIRED ON APPROVED PLAN.
9. DEWATER WORK AREA USING AN APPROVED EROSION AND SEDIMENT CONTROL PRACTICE AS SPECIFIED ON APPROVED PLAN.
10. KEEP POINT OF DISCHARGE FREE OF EROSION. MAINTAIN WATER TIGHT CONNECTIONS AND POSITIVE DRAINAGE. REPLACE SANDBAGS AND IMPERMEABLE SHEETING IF TORN.

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL C-7 TEMPORARY BARRIER DIVERSION

STANDARD SYMBOL: TBD



CONSTRUCTION SPECIFICATIONS

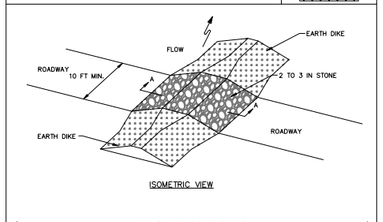
1. FOR SANDBAGS USE MATERIALS THAT ARE RESISTANT TO ULTRA-VIOLET RADIATION, TEARING, AND PUNCTURE AND WOVEN TIGHTLY ENOUGH TO PREVENT LEAKAGE OF FILL MATERIAL.
2. USE BARRIER MADE OF CONCRETE OR OTHER APPROVED MATERIAL.
3. USE 10 MIL OR THICKER, UV RESISTANT, IMPERMEABLE SHEETING OR OTHER APPROVED MATERIAL THAT IS IMPERMEABLE AND RESISTANT TO PUNCTURING AND TEARING.
4. ESTABLISH TOP ELEVATION AT H/2 + 1 FOOT FOR PROJECTS OF DURATION LESS THAN 2 WEEKS OR AS SPECIFIED ON APPROVED PLAN.
5. INSTALL DIVERSION STRUCTURE FROM UPGRADE TO DOWNGRADE.
6. PLACE IMPERMEABLE SHEETING SUCH THAT UPGRADE PORTION OVERLAPS DOWNGRADE PORTION BY A MINIMUM OF 18 INCHES.
7. USE SANDBAG BASE FOR LEVELING AND TO ESTABLISH MINIMUM TOP ELEVATION OF THE BARRIER AS REQUIRED.
8. DISPOSE OF ALL EXCAVATED MATERIALS IN AN APPROVED DISPOSAL AREA OUTSIDE OF THE 100-YEAR FLOODPLAIN.
9. DEWATER WORK AREA USING AN APPROVED EROSION AND SEDIMENT CONTROL PRACTICE AS SPECIFIED ON APPROVED PLAN.
10. KEEP ABUTMENTS BETWEEN CONCRETE BARRIERS WATER TIGHT. REPLACE SANDBAGS AND IMPERMEABLE SHEETING IF TORN.

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL C-8 MOUNTABLE BERM

STANDARD SYMBOL: MB



CONSTRUCTION SPECIFICATIONS

1. USE MINIMUM WIDTH OF 10 FEET TO ALLOW FOR VEHICULAR PASSAGE.
2. PLACE NONWOVEN GEOTEXTILE, AS SPECIFIED IN SECTION H-1 MATERIALS, OVER THE EARTH MOUND PRIOR TO PLACING STONE.
3. PLACE 2 TO 3 INCH STONE OR EQUIVALENT RECYCLED CONCRETE AT LEAST 6 INCHES DEEP OVER THE LENGTH AND WIDTH OF THE MOUNTABLE BERM.
4. MAINTAIN LINE, GRADE, AND CROSS SECTION. ADD STONE OR MAKE OTHER REPAIRS AS CONDITIONS DEMAND TO MAINTAIN SPECIFIED DIMENSIONS. REMOVE ACCUMULATED SEDIMENT AND DEBRIS. MAINTAIN POSITIVE DRAINAGE.

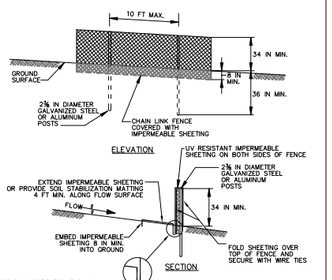
MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL C-9 DIVERSION FENCE

STANDARD SYMBOL: DF

MAXIMUM DRAINAGE AREA = 2 ACRES



CONSTRUCTION SPECIFICATIONS

1. USE 42 INCH HIGH, 9 GAUGE OR THICKER CHAIN LINK FENCING (2⅜ INCH MAXIMUM OPENING).
2. USE 2½ INCH DIAMETER GALVANIZED STEEL POSTS OF 0.095 INCH WALL THICKNESS AND SIX FOOT LENGTH SPACED NO FURTHER THAN 10 FEET APART. THE POSTS DO NOT NEED TO BE SET IN CONCRETE.
3. FASTEN CHAIN LINK FENCE SECURELY TO THE FENCE POSTS WITH WIRE TIES.
4. SECURE 10 MIL OR THICKER UV RESISTANT, IMPERMEABLE SHEETING TO CHAIN LINK FENCE WITH TIES SPACED EVERY 24 INCHES AT TOP, MID SECTION, AND BELOW GROUND SURFACE.
5. EXTEND SHEETING A MINIMUM OF 4 FEET ALONG FLOW SURFACE AND EMBED END A MINIMUM OF 8 INCHES INTO GROUND. SOIL STABILIZATION MATTING MAY BE USED IN LIEU OF IMPERMEABLE SHEETING ALONG FLOW SURFACE.
6. WHEN TWO SECTIONS OF SHEETING ADJOIN EACH OTHER, OVERLAP BY 6 INCHES AND FOLD WITH SEAM FACING DOWNGRADE.
7. KEEP FLOW SURFACE ALONG DIVERSION FENCE AND POINT OF DISCHARGE FREE OF EROSION. REMOVE ACCUMULATED SEDIMENT AND DEBRIS. MAINTAIN POSITIVE DRAINAGE. REPLACE IMPERMEABLE SHEETING IF TORN. IF UNDERMINING OCCURS, REINSTALL FENCE.

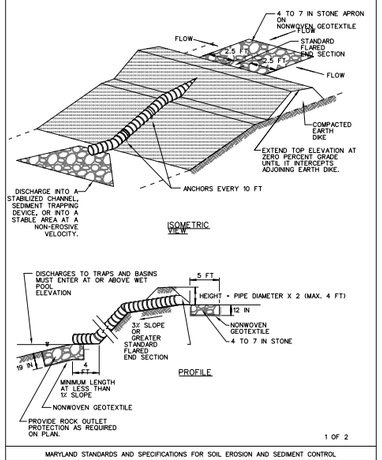
MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL D-1 PIPE SLOPE DRAIN

STANDARD SYMBOL: PSD - 12

DESIGNATION PSD-12 REFERS TO 12 IN PIPE SLOPE DRAIN.



1 OF 2

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL D-1 PIPE SLOPE DRAIN

STANDARD SYMBOL: PSD - 12

DESIGNATION PSD-12 REFERS TO 12 IN PIPE SLOPE DRAIN.

CONSTRUCTION SPECIFICATIONS

1. THE HEIGHT OF THE EARTH DIKE MUST BE AT LEAST 2 TIMES THE PIPE DIAMETER MEASURED FROM THE INVERT OF THE PIPE. EXTEND THE TOP ELEVATION OF DIKE AT ZERO PERCENT GRADE UNTIL IT INTERCEPTS THE TOP OF THE ADJOINING EARTH DIKE.
2. FLEXIBLE PIPE IS PREFERRED. HOWEVER, CORRUGATED METAL PIPE OR EQUIVALENT PVC PIPE CAN BE USED. ALL CONNECTIONS MUST BE WATERTIGHT.
3. ATTACH A FLARED END SECTION TO THE INLET END OF PIPE WITH A WATERTIGHT CONNECTION. AT THE INLET OF THE PIPE SLOPE DRAIN, INSTALL 4 TO 7 INCH STONE OR EQUIVALENT RECYCLED CONCRETE PLACED 12 INCHES IN DEPTH ON NONWOVEN GEOTEXTILE AND EXTEND OUT 5 FEET FROM THE INLET IN ALL DIRECTIONS.
4. PROVIDE NONWOVEN GEOTEXTILE, AS SPECIFIED IN SECTION H-1 MATERIALS, UNDER THE BOTTOM AND ALONG SIDES OF ALL RIPRAP.
5. SECURELY ANCHOR THE PIPE SLOPE DRAIN (PSD) TO THE SLOPE. SPACE THE ANCHORS EVERY 10 FEET.
6. HAND TAMP THE SOIL AROUND AND UNDER THE PIPE AND END SECTION IN 4 INCH LIFTS TO THE TOP OF THE EARTH DIKE.
7. UPON COMPLETING INSTALLATION OF THE PSD, STABILIZE ASSOCIATED DISTURBANCES WITH SEED, MULCH, AND TACK.
8. INSTALL OUTLET PROTECTION AS SPECIFIED ON APPROVED PLAN.
9. KEEP POINTS OF INFLOW AND OUTFLOW FREE OF EROSION. MAINTAIN WATER TIGHT CONNECTIONS AND POSITIVE DRAINAGE. REMOVE ACCUMULATED SEDIMENT AND DEBRIS.

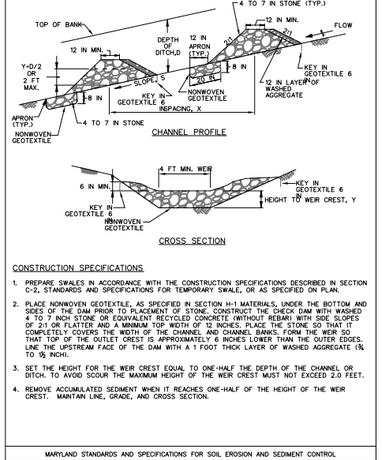
2 OF 2

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL D-2 STONE CHECK DAM

STANDARD SYMBOL: CD



CONSTRUCTION SPECIFICATIONS

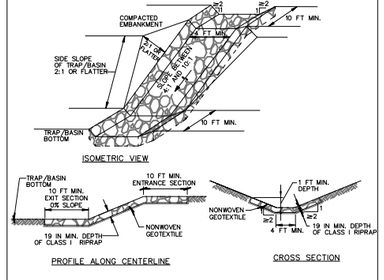
1. PREPARE SWALES IN ACCORDANCE WITH THE CONSTRUCTION SPECIFICATIONS DESCRIBED IN SECTION C-2, STANDARDS AND SPECIFICATIONS FOR TEMPORARY SWALE, OR AS SPECIFIED ON PLAN.
2. PLACE NONWOVEN GEOTEXTILE, AS SPECIFIED IN SECTION H-1 MATERIALS, UNDER THE BOTTOM AND SIDES OF THE DAM PRIOR TO PLACEMENT OF STONE. CONSTRUCT THE CHECK DAM WITH WASHED 4 TO 7 INCH STONE OR EQUIVALENT RECYCLED CONCRETE (WITHOUT REBAR) WITH SIDE SLOPES OF 2:1 OR FLATTER AND A MINIMUM TOP WIDTH OF 12 INCHES. PLACE THE STONE SO THAT IT COMPLETELY COVERS THE WIDTH OF THE CHANNEL AND CHANNEL BANKS. FORM THE WEIR SO THAT TOP OF THE OUTLET CREST IS APPROXIMATELY 6 INCHES LOWER THAN THE OUTER EDGES. LINE THE UPSTREAM FACE OF THE DAM WITH A 1 FOOT THICK LAYER OF WASHED AGGREGATE (¾ TO 1½ INCH).
3. SET THE HEIGHT FOR THE WEIR CREST EQUAL TO ONE-HALF THE DEPTH OF THE CHANNEL OR DITCH. TO AVOID SCOUR THE MAXIMUM HEIGHT OF THE WEIR CREST MUST NOT EXCEED 2.0 FEET.
4. REMOVE ACCUMULATED SEDIMENT WHEN IT REACHES ONE-HALF OF THE HEIGHT OF THE WEIR CREST. MAINTAIN LINE, GRADE, AND CROSS SECTION.

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL D-3-1 RIPRAP INFLOW PROTECTION

STANDARD SYMBOL: RRP



CONSTRUCTION SPECIFICATIONS

1. PROVIDE NONWOVEN GEOTEXTILE, AS SPECIFIED IN SECTION H-1 MATERIALS, UNDER THE BOTTOM AND ALONG SIDES OF ALL RIPRAP.
2. CONSTRUCT INFLOW CHANNEL WITH CLASS I RIPRAP OR EQUIVALENT RECYCLED CONCRETE LINING TO A MINIMUM DEPTH OF 19 INCHES (2 x D_{50}) AND A 1 FOOT DEEP FLOW CHANNEL. INFLOW RIPRAP PROTECTION CHANNEL MUST HAVE A TRAPEZOIDAL CROSS SECTION WITH 2:1 OR FLATTER SIDE SLOPES AND A 4 FOOT MINIMUM BOTTOM WIDTH.
3. INSTALL ENTRANCE AND EXIT SECTIONS AS SHOWN ON THE PROFILE.
4. BLEND RIPRAP INTO EXISTING GROUND.
5. MAINTAIN LINE, GRADE, AND CROSS SECTION. REMOVE ACCUMULATED SEDIMENT AND DEBRIS. KEEP POINTS OF INFLOW AND OUTFLOW FREE OF EROSION.

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

MDE NO. XX-SF-XXXX
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FOR EROSION AND SEDIMENT CONTROL ONLY.

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COMPANY NAME
COMPANY ADDRESS
CITY, STATE ZIP CODE
COMPANY PHONE NO. COMPANY FAX NO.

DESIGNED: ___
DRAWN: ___
CHECKED: ___
APPROVED: ___

"PROFESSIONAL CERTIFICATION:

I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND."

LICENSE NO. _____

EXPIRATION DATE: _____

REVISION NO.	REVISION DATE	DESCRIPTIONS

XX% SUBMISSION

BWI THURGOOD MARSHALL OR MARTIN STATE LOGO

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION

OFFICE OF DESIGN AND CONSTRUCTION

PROJECT TITLE: PROJECT TITLE

SHEET TITLE: EROSION AND SEDIMENT CONTROL DETAILS 2

SCALE: NONE

DATE: DATE

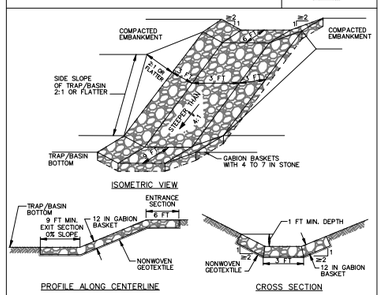
CONTRACT NO.: MAA-CO-XX-XXX

SHEET NO.: ___

PATH/FILENAME

DETAIL D-3-2 GABION INFLOW PROTECTION

STANDARD SYMBOL: GP



CONSTRUCTION SPECIFICATIONS

1. PROVIDE NONWOVEN GEOTEXTILE, AS SPECIFIED IN SECTION H-1 MATERIALS, UNDER THE BOTTOM AND ALONG SIDES OF ALL GABION BASKETS.
2. USE BASKETS MADE OF MINIMUM 11 GAUGE WIRE.
3. CONSTRUCT GABION INFLOW PROTECTION BY ARRANGING 9 X 3 X 1 FOOT GABION BASKETS TO FORM A TRAPEZOIDAL SECTION WITH A 3 FOOT BOTTOM WIDTH, 1 FOOT MINIMUM DEPTH, 3 FOOT SIDE WALLS, AND 2:1 OR FLATTER SIDE SLOPES. FILL GABION BASKETS WITH 4 TO 7 INCH STONE OR EQUIVALENT RECYCLED CONCRETE. WITHOUT REBAR OR WERI MESH.
4. INSTALL ENTRANCE AND EXIT SECTIONS AS SHOWN ON THE PROFILE.
5. INSTALL GABIONS IN ACCORDANCE WITH MANUFACTURER RECOMMENDATIONS.
6. BLEND GABIONS INTO EXISTING GROUND.
7. MAINTAIN LINE, GRADE, AND CROSS SECTION. REMOVE ACCUMULATED SEDIMENT AND DEBRIS. KEEP POINTS OF INFLOW AND OUTFLOW FREE OF EROSION

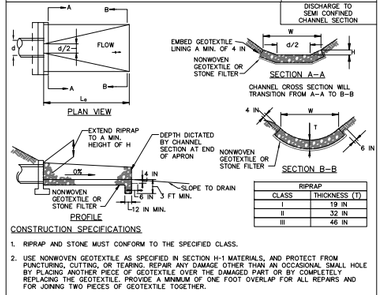
MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL D-4-1-A ROCK OUTLET PROTECTION I

STANDARD SYMBOL: ROP1

DISCHARGE TO SEMI CONFINED CHANNEL SECTION



RIPRAP	
CLASS	THICKNESS (T)
I	19 IN
II	32 IN
III	46 IN

CONSTRUCTION SPECIFICATIONS

1. RIPRAP AND STONE MUST CONFORM TO THE SPECIFIED CLASS.
2. USE NONWOVEN GEOTEXTILE AS SPECIFIED IN SECTION H-1 MATERIALS, AND PROTECT FROM PUNCTURING, CUTTING, OR TEARING. REPAIR ANY DAMAGE OTHER THAN AN OCCASIONAL SMALL HOLE BY PLACING ANOTHER PIECE OF GEOTEXTILE OVER THE DAMAGED PART OR BY COMPLETELY REPLACING THE GEOTEXTILE. PROVIDE A MINIMUM OF ONE FOOT OVERLAP FOR ALL REPAIRS AND FOR JOINING TWO PIECES OF GEOTEXTILE TOGETHER.
3. PREPARE THE SUBGRADE FOR GEOTEXTILE OR STONE FILTER (⅜ TO ½ INCH STONE FOR 6 INCH MINIMUM DEPTH) AND RIPRAP TO THE REQUIRED LINES AND GRADES. COMPACT ANY FILL REQUIRED IN THE SUBGRADE TO A DENSITY OF APPROXIMATELY THAT OF THE SURROUNDING UNDISTURBED MATERIAL.
4. EXTEND GEOTEXTILE AT LEAST 6 INCHES BEYOND EDGES OF RIPRAP AND EMBED AT LEAST 4 INCHES AT SIDES OF THE RIPRAP.
5. CONSTRUCT RIPRAP OUTLET TO FULL COURSE THICKNESS IN ONE OPERATION AND IN SUCH A MANNER AS TO AVOID DISPLACEMENT OF UNDERLYING MATERIALS. PLACE STONE FOR RIPRAP OUTLET IN A MANNER THAT WILL ENSURE THAT IT IS REASONABLY HOMOGENOUS WITH THE SMALLER STONES AND SPALLS FILLING THE VOIDS BETWEEN THE LARGER STONES. PLACE RIPRAP IN A MANNER TO PREVENT DAMAGE TO THE STONE FILTER BLANKET OR GEOTEXTILE. HAND PLACE TO THE EXTENT NECESSARY.
6. WHERE NO ENDWALL IS USED, CONSTRUCT THE UPSTREAM END OF THE APRON SO THAT THE WIDTH IS TWO TIMES THE DIAMETER OF THE OUTLET PIPE, AND EXTEND THE STONE UNDER THE OUTLET BY A MINIMUM OF 18 INCHES.
7. CONSTRUCT APRON WITH 0% SLOPE ALONG ITS LENGTH AND WITHOUT OBSTRUCTIONS. PLACE STONE SO THAT IT BLENDS IN WITH EXISTING GROUND.
8. MAINTAIN LINE, GRADE, AND CROSS SECTION. KEEP OUTLET FREE OF EROSION. REMOVE ACCUMULATED SEDIMENT AND DEBRIS. AFTER HIGH FLOWS INSPECT FOR SCOUR AND DISLODGED RIPRAP. MAKE NECESSARY REPAIRS IMMEDIATELY.

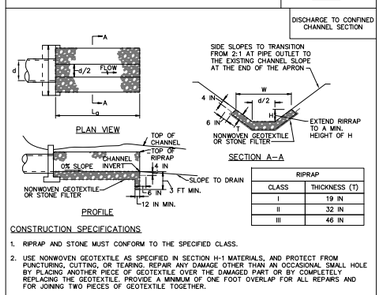
MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL D-4-1-B ROCK OUTLET PROTECTION II

STANDARD SYMBOL: ROPII

DISCHARGE TO CONFINED CHANNEL SECTION



RIPRAP	
CLASS	THICKNESS (T)
I	19 IN
II	32 IN
III	46 IN

CONSTRUCTION SPECIFICATIONS

1. RIPRAP AND STONE MUST CONFORM TO THE SPECIFIED CLASS.
2. USE NONWOVEN GEOTEXTILE AS SPECIFIED IN SECTION H-1 MATERIALS, AND PROTECT FROM PUNCTURING, CUTTING, OR TEARING. REPAIR ANY DAMAGE OTHER THAN AN OCCASIONAL SMALL HOLE BY PLACING ANOTHER PIECE OF GEOTEXTILE OVER THE DAMAGED PART OR BY COMPLETELY REPLACING THE GEOTEXTILE. PROVIDE A MINIMUM OF ONE FOOT OVERLAP FOR ALL REPAIRS AND FOR JOINING TWO PIECES OF GEOTEXTILE TOGETHER.
3. PREPARE THE SUBGRADE FOR GEOTEXTILE OR STONE FILTER (⅜ TO ½ INCH STONE FOR 6 INCH MINIMUM DEPTH) AND RIPRAP TO THE REQUIRED LINES AND GRADES. COMPACT ANY FILL REQUIRED IN THE SUBGRADE TO A DENSITY OF APPROXIMATELY THAT OF THE SURROUNDING UNDISTURBED MATERIAL.
4. EXTEND GEOTEXTILE AT LEAST 6 INCHES BEYOND EDGES OF RIPRAP AND EMBED AT LEAST 4 INCHES AT SIDES OF RIPRAP.
5. CONSTRUCT RIPRAP OUTLET TO FULL COURSE THICKNESS IN ONE OPERATION AND IN SUCH A MANNER AS TO AVOID DISPLACEMENT OF UNDERLYING MATERIALS. PLACE STONE FOR RIPRAP OUTLET IN A MANNER THAT WILL ENSURE THAT IT IS REASONABLY HOMOGENOUS WITH THE SMALLER STONES AND SPALLS FILLING THE VOIDS BETWEEN THE LARGER STONES. PLACE RIPRAP IN A MANNER TO PREVENT DAMAGE TO THE STONE FILTER BLANKET OR GEOTEXTILE. HAND PLACE TO THE EXTENT NECESSARY.
6. WHERE NO ENDWALL IS USED, CONSTRUCT THE UPSTREAM END OF THE APRON SO THAT THE WIDTH IS TWO TIMES THE DIAMETER OF THE OUTLET PIPE, AND EXTEND THE STONE UNDER THE OUTLET BY A MINIMUM OF 18 INCHES.
7. CONSTRUCT APRON WITH 0% SLOPE ALONG ITS LENGTH AND WITHOUT OBSTRUCTIONS. PLACE STONE SO THAT IT BLENDS IN WITH EXISTING GROUND.
8. MAINTAIN LINE, GRADE, AND CROSS SECTION. KEEP OUTLET FREE OF EROSION. REMOVE ACCUMULATED SEDIMENT AND DEBRIS. AFTER HIGH FLOWS INSPECT FOR SCOUR AND RIPRAP DISLODGED RIPRAP. MAKE NECESSARY REPAIRS IMMEDIATELY.

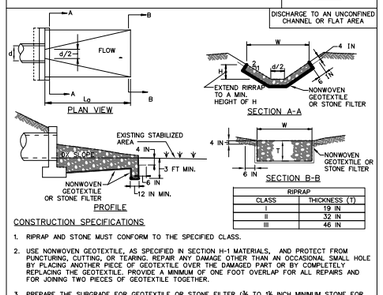
MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL D-4-1-C ROCK OUTLET PROTECTION III

STANDARD SYMBOL: ROPIII

DISCHARGE TO AN UNCONFINED CHANNEL OR FLAT AREA



RIPRAP	
CLASS	THICKNESS (T)
I	19 IN
II	32 IN
III	46 IN

CONSTRUCTION SPECIFICATIONS

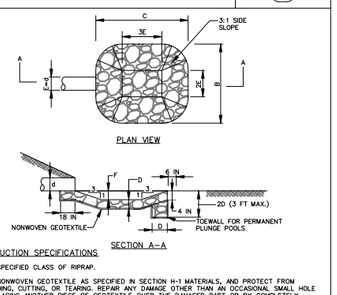
1. RIPRAP AND STONE MUST CONFORM TO THE SPECIFIED CLASS.
2. USE NONWOVEN GEOTEXTILE, AS SPECIFIED IN SECTION H-1 MATERIALS, AND PROTECT FROM PUNCTURING, CUTTING, OR TEARING. REPAIR ANY DAMAGE OTHER THAN AN OCCASIONAL SMALL HOLE BY PLACING ANOTHER PIECE OF GEOTEXTILE OVER THE DAMAGED PART OR BY COMPLETELY REPLACING THE GEOTEXTILE. PROVIDE A MINIMUM OF ONE FOOT OVERLAP FOR ALL REPAIRS AND FOR JOINING TWO PIECES OF GEOTEXTILE TOGETHER.
3. PREPARE THE SUBGRADE FOR GEOTEXTILE OR STONE FILTER (⅜ TO ½ INCH MINIMUM STONE FOR 6 INCH MINIMUM DEPTH) AND RIPRAP TO THE REQUIRED LINES AND GRADES. COMPACT ANY FILL REQUIRED IN THE SUBGRADE TO A DENSITY OF APPROXIMATELY THAT OF THE SURROUNDING UNDISTURBED MATERIAL.
4. EXTEND GEOTEXTILE AT LEAST 6 INCHES BEYOND EDGES OF RIPRAP AND EMBED AT LEAST 4 INCHES AT SIDES OF RIPRAP.
5. CONSTRUCT RIPRAP OUTLET TO FULL COURSE THICKNESS IN ONE OPERATION AND IN SUCH A MANNER AS TO AVOID DISPLACEMENT OF UNDERLYING MATERIALS. PLACE STONE FOR RIPRAP OUTLET IN A MANNER THAT WILL ENSURE THAT IT IS REASONABLY HOMOGENOUS WITH THE SMALLER STONES AND SPALLS FILLING THE VOIDS BETWEEN THE LARGER STONES. PLACE RIPRAP IN A MANNER TO PREVENT DAMAGE TO THE FILTER BLANKET OR GEOTEXTILE. HAND PLACE TO THE EXTENT NECESSARY.
6. WHERE NO ENDWALL IS USED, CONSTRUCT THE UPSTREAM END OF THE APRON SO THAT THE WIDTH IS TWO TIMES THE DIAMETER OF THE OUTLET PIPE, AND EXTEND THE STONE UNDER THE OUTLET BY A MINIMUM OF 18 INCHES.
7. CONSTRUCT APRON WITH 0% SLOPE ALONG ITS LENGTH AND WITHOUT OBSTRUCTIONS. PLACE STONE SO THAT IT BLENDS IN WITH EXISTING GROUND.
8. MAINTAIN LINE, GRADE, AND CROSS SECTION. KEEP OUTLET FREE OF EROSION. REMOVE ACCUMULATED SEDIMENT AND DEBRIS. AFTER HIGH FLOWS INSPECT FOR SCOUR AND RIPRAP DISLODGED RIPRAP. MAKE NECESSARY REPAIRS IMMEDIATELY.

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL D-4-2 PLUNGE POOL

STANDARD SYMBOL: PP



CONSTRUCTION SPECIFICATIONS

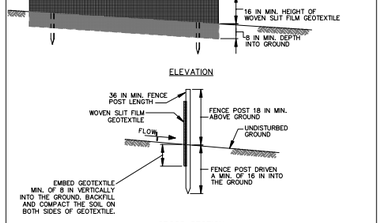
1. USE SPECIFIED CLASS OF RIPRAP.
2. USE NONWOVEN GEOTEXTILE AS SPECIFIED IN SECTION H-1 MATERIALS, AND PROTECT FROM PUNCHING, CUTTING, OR TEARING. REPAIR ANY DAMAGE OTHER THAN AN OCCASIONAL SMALL HOLE BY PLACING ANOTHER PIECE OF GEOTEXTILE OVER THE DAMAGED PART OR BY COMPLETELY REPLACING THE GEOTEXTILE. PROVIDE A MINIMUM OF ONE FOOT OVERLAP FOR ALL REPAIRS AND FOR JOINING TWO PIECES OF GEOTEXTILE.
3. PREPARE THE SUBGRADE FOR THE PLUNGE POOL TO THE REQUIRED LINES AND GRADES. COMPACT ANY FILL REQUIRED IN THE SUBGRADE TO A DENSITY OF APPROXIMATELY THAT OF THE SURROUNDING UNDISTURBED MATERIAL.
4. EMBED THE GEOTEXTILE A MINIMUM OF 4 INCHES AND EXTEND THE GEOTEXTILE A MINIMUM OF 6 INCHES BEYOND THE EDGE OF THE SCOUR HOLE.
5. STONE FOR THE PLUNGE POOL MAY BE PLACED BY EQUIPMENT. CONSTRUCT TO THE FULL COURSE THICKNESS IN ONE OPERATION AND IN SUCH A MANNER AS TO AVOID DISPLACEMENT OF UNDERLYING MATERIALS. DELIVER AND PLACE THE STONE FOR THE PLUNGE POOL IN A MANNER THAT WILL ENSURE THAT IT IS REASONABLY HOMOGENEOUS WITH THE SMALLER STONES AND SPALLS FILLING THE VOIDS BETWEEN THE LARGER STONES. PLACE STONE FOR THE PLUNGE POOL IN A MANNER TO PREVENT DAMAGE TO THE GEOTEXTILE. HAND PLACE TO THE EXTENT NECESSARY.
6. AT THE PLUNGE POOL OUTLET, PLACE THE STONE SO THAT IT MEETS THE EXISTING GRADE.
7. MAINTAIN LINE, GRADE, AND CROSS SECTION. KEEP OUTLET FREE OF EROSION. REMOVE ACCUMULATED SEDIMENT AND DEBRIS. AFTER HIGH FLOWS INSPECT FOR SCOUR AND RIPRAP DISLODGED RIPRAP. MAKE NECESSARY REPAIRS IMMEDIATELY.

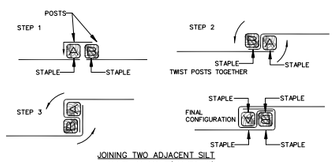
MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL E-1 SILT FENCE

STANDARD SYMBOL: SF





JOINING TWO ADJACENT SILT FENCE SECTIONS (TOP VIEW)

1 OF 2

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL E-1 SILT FENCE

STANDARD SYMBOL: SF

CONSTRUCTION SPECIFICATIONS

1. USE WOOD POSTS 1⅛ X 1⅛ ± 1/8 INCH (MINIMUM) SQUARE CUT OF SOUND QUALITY HARDWOOD. AS AN ALTERNATIVE TO WOODEN POST USE STANDARD "T" OR "U" SECTION STEEL POSTS WEIGHING NOT LESS THAN 1 POUND PER LINEAR FOOT.
2. USE 36 INCH MINIMUM POSTS DRIVEN 16 INCH MINIMUM INTO GROUND NO MORE THAN 6 FEET APART.
3. USE WOVEN SLIT FILM GEOTEXTILE AS SPECIFIED IN SECTION H-1 MATERIALS AND FASTEN GEOTEXTILE SECURELY TO UPSLOPE SIDE OF FENCE POSTS WITH WIRE TIES OR STAPLES AT TOP AND MID-SECTION.
4. PROVIDE MANUFACTURER CERTIFICATION TO THE AUTHORIZED REPRESENTATIVE OF THE INSPECTION/ENFORCEMENT AUTHORITY SHOWING THAT THE GEOTEXTILE USED MEETS THE REQUIREMENTS IN SECTION H-1 MATERIALS.
5. EMBED GEOTEXTILE A MINIMUM OF 8 INCHES VERTICALLY INTO THE GROUND. BACKFILL AND COMPACT THE SOIL ON BOTH SIDES OF FABRIC.
6. WHERE TWO SECTIONS OF GEOTEXTILE ADJOIN OVERLAP, TWIST, AND STAPLE TO POST IN ACCORDANCE WITH THIS DETAIL.
7. EXTEND BOTH ENDS OF THE SILT FENCE A MINIMUM OF FIVE HORIZONTAL FEET UPSLOPE AT 45 DEGREES TO THE MAIN FENCE ALIGNMENT TO PREVENT RUNOFF FROM GOING AROUND THE ENDS OF THE SILT FENCE.
8. REMOVE ACCUMULATED SEDIMENT AND DEBRIS WHEN BULGES DEVELOP IN SILT FENCE OR WHEN SEDIMENT REACHES 25% OF FENCE HEIGHT. REPLACE GEOTEXTILE IF TORN. IF UNDERMINING OCCURS, REINSTALL FENCE.

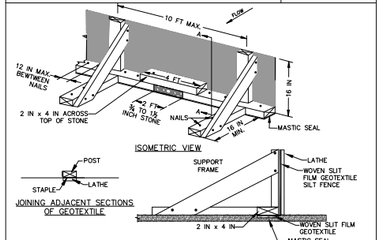
2 OF 2

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL E-2 SILT FENCE ON PAVEMENT

STANDARD SYMBOL: SFOP



CONSTRUCTION SPECIFICATIONS

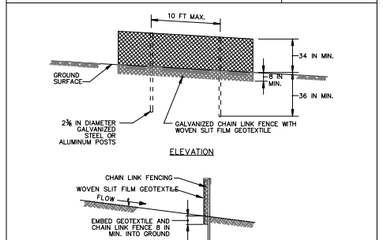
1. USE NOMINAL 2 INCH X 4 INCH LUMBER.
2. USE WOVEN SLIT FILM GEOTEXTILE, AS SPECIFIED IN SECTION H-1 MATERIALS.
3. PROVIDE MANUFACTURER CERTIFICATION TO THE AUTHORIZED REPRESENTATIVE OF THE INSPECTION/ENFORCEMENT AUTHORITY SHOWING THAT THE GEOTEXTILE USED MEETS THE REQUIREMENTS IN SECTION H-1 MATERIALS.
4. SPACE UPRIGHT SUPPORTS NO MORE THAN 10 FEET APART.
5. PROVIDE A TWO FOOT OPENING BETWEEN EVERY SET OF SUPPORTS AND PLACE STONE IN THE OPENING OVER GEOTEXTILE.
6. KEEP SILT FENCE TAUT AND SECURELY STAPLE TO THE UPSLOPE SIDE OF UPRIGHT SUPPORTS. EXTEND GEOTEXTILE UNDER 2x4.
7. WHERE TWO SECTIONS OF GEOTEXTILE ADJOIN OVERLAP, FOLD, AND STAPLE TO POST IN ACCORDANCE WITH THIS DETAIL. ATTACH LATHE.
8. PROVIDE A MASTIC SEAL BETWEEN PAVEMENT, GEOTEXTILE, AND 2x4 TO PREVENT SEDIMENT-LADEN WATER FROM ESCAPING BENEATH SILT FENCE INSTALLATION.
9. SECURE BOARDS TO PAVEMENT WITH 40D 5 INCH MINIMUM LENGTH NAILS.
10. REMOVE ACCUMULATED SEDIMENT AND DEBRIS WHEN BULGES DEVELOP IN SILT FENCE OR WHEN SEDIMENT REACHES 25% OF FENCE HEIGHT. REPLACE GEOTEXTILE IF TORN. MAINTAIN WATER TIGHT SEAL ALONG BOTTOM. REPLACE STONE IF DISPLACED.

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL E-3 SUPER SILT FENCE

STANDARD SYMBOL: SSF



CONSTRUCTION SPECIFICATIONS

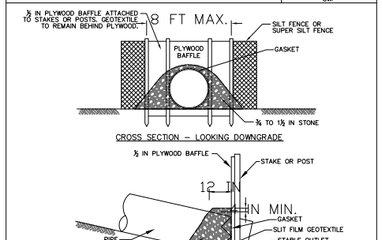
1. INSTALL 2⅜ INCH DIAMETER GALVANIZED STEEL POSTS OF 0.095 INCH WALL THICKNESS AND SIX FOOT LENGTH SPACED NO FURTHER THAN 10 FEET APART. DRIVE THE POSTS A MINIMUM OF 36 INCHES INTO THE GROUND.
2. FASTEN 9 GAUGE OR HEAVIER GALVANIZED CHAIN LINK FENCE (2⅜ INCH MAXIMUM OPENING) 42 INCHES IN HEIGHT SECURELY TO THE FENCE POSTS WITH WIRE TIES OR HOG RINGS.
3. FASTEN WOVEN SLIT FILM GEOTEXTILE AS SPECIFIED IN SECTION H-1 MATERIALS, SECURELY TO THE UPSLOPE SIDE OF CHAIN LINK FENCE WITH TIES SPACED EVERY 24 INCHES AT THE TOP AND MID SECTION. EMBED GEOTEXTILE AND CHAIN LINK FENCE A MINIMUM OF 8 INCHES INTO THE GROUND.
4. WHERE ENDS OF THE GEOTEXTILE COME TOGETHER, THE ENDS SHALL BE OVERLAPPED BY 6 INCHES, FOLDED, AND STAPLED TO PREVENT SEDIMENT BY PASS.
5. EXTEND BOTH ENDS OF THE SUPER SILT FENCE A MINIMUM OF FIVE HORIZONTAL FEET UPSLOPE AT 45 DEGREES TO THE MAIN FENCE ALIGNMENT TO PREVENT RUNOFF FROM GOING AROUND THE ENDS OF THE SUPER SILT FENCE.
6. PROVIDE MANUFACTURER CERTIFICATION TO THE INSPECTION/ENFORCEMENT AUTHORITY SHOWING THAT GEOTEXTILE USED MEETS THE REQUIREMENTS IN SECTION H-1 MATERIALS.
7. REMOVE ACCUMULATED SEDIMENT AND DEBRIS WHEN BULGES DEVELOP IN FENCE OR WHEN SEDIMENT REACHES 25% OF FENCE HEIGHT. REPLACE GEOTEXTILE IF TORN. IF UNDERMINING OCCURS, REINSTALL CHAIN LINK, WOVEN SLIT FILM GEOTEXTILE, AND/OR SUPER SILT FENCE.

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL E-4 CLEAR WATER PIPE THROUGH SILT FENCE OR SUPER SILT FENCE

STANDARD SYMBOL: CWP



CONSTRUCTION SPECIFICATIONS

1. INSTALL SILT FENCE OR SUPER SILT FENCE IN ACCORDANCE WITH DETAIL E-1 OR DETAIL E-2.
2. AT THE PIPE LOCATION, CUT AND PULL BACK THE WOVEN SLIT FILM GEOTEXTILE AND CHAIN LINK FENCING. SECURE GEOTEXTILE TO PIPE WITH GASKET. INSTALL ADDITIONAL STAKES OR POSTS IF NECESSARY TO ACCOMMODATE THE INSTALLATION OF THE BAFFLE BOARD.
3. ENTRENCH ½ INCH PLYWOOD BAFFLE A MINIMUM OF 8 INCHES AND SECURE TO THE UPGRADE SIDE OF THE FENCE STAKES OR POSTS. BAFFLE SHOULD BE AT LEAST THE HEIGHT OF THE FENCE.
4. PLACE ¾ TO 1½ INCH STONE OR EQUIVALENT RECYCLED CONCRETE BEHIND THE PLYWOOD BAFFLE ON NONWOVEN GEOTEXTILE AND EXTEND 12 INCH MIN. ALONG TOP OF PIPE AND TO A HEIGHT OF 4 INCHES ABOVE THE TOP OF PIPE.
5. USE NONWOVEN AND WOVEN SLIT FILM GEOTEXTILES AS SPECIFIED IN SECTION H-1 MATERIALS.
6. REMOVE ACCUMULATED SEDIMENT AND DEBRIS WHEN SEDIMENT REACHES 6 INCHES IN HEIGHT. REPLACE GEOTEXTILE IF TORN. IF UNDERMINING OCCURS, REINSTALL BAFFLE, CHAIN LINK, AND GEOTEXTILE. REPLACE STONE IF DISPLACED. KEEP POINT OF DISCHARGE FREE OF EROSION.

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

MDE NO. XX-SF-XXXX
NOTE TO CONTRACTOR:
SEDIMENT CONTROL WILL BE STRICTLY ENFORCED

FOR EROSION AND SEDIMENT CONTROL ONLY.

COMPANY NAME

COMPANY NAME
COMPANY ADDRESS
CITY, STATE ZIP CODE
COMPANY PHONE NO. COMPANY FAX NO.

DESIGNED: ---
DRAWN: ---
CHECKED: ---
APPROVED: ---

"PROFESSIONAL CERTIFICATION:

I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND."

LICENSE NO. _____

EXPIRATION DATE: _____

REVISION NO.	REVISION DATE	DESCRIPTIONS

XX% SUBMISSION

BWI THURGOOD MARSHALL OR MARTIN STATE LOGO

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION

OFFICE OF DESIGN AND CONSTRUCTION

PROJECT TITLE: PROJECT TITLE

SHEET TITLE: EROSION AND SEDIMENT CONTROL DETAILS 3

SCALE: NONE

DATE: DATE

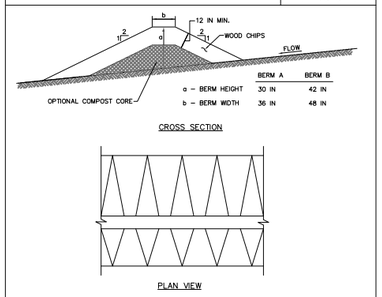
CONTRACT NO.: MAA-CO-XX-XXX

SHEET NO.: ---

PATH/FILENAME

DETAIL E-5 FILTER BERM

STANDARD SYMBOL: |---FB-A---| |---FB-B---|



CROSS SECTION

PLAN VIEW

CONSTRUCTION SPECIFICATIONS

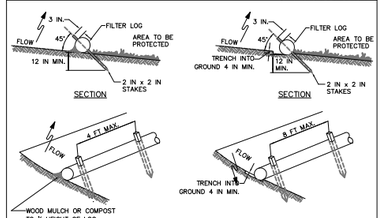
1. PLACE BERM ON THE CONTOUR WITH ENDS TURNED UPGRADE TO PREVENT BYPASS. DO NOT EXCEED GRADES OF 5 PERCENT ALONG THE BERM FOR A DISTANCE GREATER THAN 50 FEET.
2. CONSTRUCT BERM OF CLEAN WOOD CHIPS A MINIMUM SIZE OF 1X2 INCH AND A MAXIMUM OF 3X3 INCH.
3. COMPACT AND SHAPE MATERIAL TO CONFORM TO DIMENSIONS SPECIFIED ON THE APPROVED PLAN.
4. DO NOT PLACE UN-CHIPPED TREE PIECES, BRUSH, OR STUMPS IN THE BERM. BERM MUST BE FREE OF BANK PROJECTIONS OR OTHER IRREGULARITIES.
5. THE BERM MAY CONTAIN UP TO 50% COMPOST MATERIAL IN ACCORDANCE WITH SECTION H-1 MATERIALS.
6. MAINTAIN LINE, GRADE, AND CROSS SECTION. ADD WOOD CHIPS OR MAKE OTHER REPAIRS AS CONDITIONS DEMAND TO MAINTAIN SPECIFIED DIMENSIONS. REMOVE ACCUMULATED SEDIMENT AND DEBRIS WHEN THEY REACH 25% OF BERM HEIGHT.

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL E-6 FILTER LOG

STANDARD SYMBOL: |----FL-18----| DESIGNATION FL-18 REFERS TO 18 INCH DIAMETER FILTER LOG



1 OF 2

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL E-6 FILTER LOG

STANDARD SYMBOL: |----FL-18----| DESIGNATION FL-18 REFERS TO 18 INCH DIAMETER FILTER LOG

CONSTRUCTION SPECIFICATIONS

1. PRIOR TO INSTALLATION, CLEAR ALL OBSTRUCTIONS INCLUDING ROCKS, CLODS, AND DEBRIS GREATER THAN ONE INCH THAT MAY INTERFERE WITH PROPER FUNCTION OF FILTER LOG.
2. FILL LOG NETTING UNIFORMLY WITH COMPOST (IN ACCORDANCE WITH SECTION H-1 MATERIALS), OR OTHER APPROVED BIODEGRADABLE MATERIAL TO DESIRED LENGTH SUCH THAT LOGS DO NOT DEFORM.
3. INSTALL FILTER LOGS PERPENDICULAR TO THE FLOW DIRECTION AND PARALLEL TO THE SLOPE WITH THE BEGINNING AND END OF THE INSTALLATION POINTING SLIGHTLY UP THE SLOPE CREATING A "J" SHAPE AT EACH END TO PREVENT BYPASS.
4. FOR UNTRENCHED INSTALLATION BLOW OR HAND PLACE MULCH OR COMPOST ON UPHILL SIDE OF THE SLOPE ALONG LOG.
5. STAKE FILTER LOG EVERY 4 FEET OR CLOSER ALONG ENTIRE LENGTH OF LOG OR TRENCH LOG INTO GROUND A MINIMUM OF 4 INCHES AND STAKE LOG EVERY 8 FEET OR CLOSER.
6. USE STAKES WITH A MINIMUM NOMINAL CROSS SECTION OF 2X2 INCH AND OF SUFFICIENT LENGTH TO ATTAIN A MINIMUM OF 12 INCHES INTO THE GROUND AND 3 INCHES PROTRUDING ABOVE LOG.
7. WHEN MORE THAN ONE LOG IS NEEDED, OVERLAP ENDS 12 INCHES MINIMUM AND STAKE.
8. REMOVE SEDIMENT WHEN IT HAS ACCUMULATED TO A DEPTH OF ½ THE EXPOSED HEIGHT OF LOG AND REPLACE MULCH. REPLACE FILTER LOG IF TORN. REINSTALL FILTER LOG IF UNDERMINING OR DISLODGING OCCURS. REPLACE CLOGGED FILTER LOGS. FOR PERMANENT APPLICATIONS, ESTABLISH AND CONTINUOUSLY MEET REQUIREMENTS FOR ADEQUATE VEGETATIVE ESTABLISHMENT IN ACCORDANCE WITH SECTION B-4 VEGETATIVE STABILIZATION.

2 OF 2

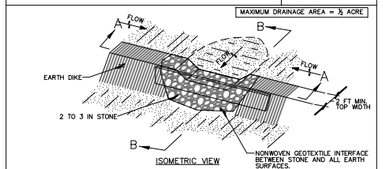
MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

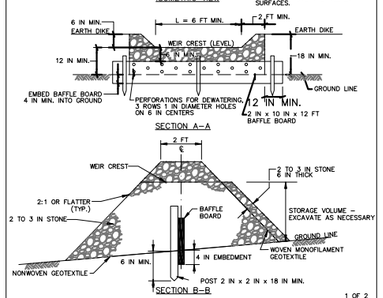
U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL E-7 TEMPORARY STONE OUTLET STRUCTURE

STANDARD SYMBOL: TSOS

MAXIMUM DRAINAGE AREA = ½ ACRE





1 OF 2

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL E-7 TEMPORARY STONE OUTLET STRUCTURE

STANDARD SYMBOL: TSOS

CONSTRUCTION SPECIFICATIONS

1. PROVIDE STORAGE VOLUME AS SPECIFIED ON APPROVED PLANS.
2. USE NONWOVEN GEOTEXTILE ON INTERFACE BETWEEN GROUND AND STONE.
3. PERFORATE BAFFLE BOARD WITH 3 ROWS OF 1 INCH DIAMETER HOLES 6 INCHES ON CENTER, EMBED A MINIMUM OF 4 INCHES INTO GROUND, AND EXTEND BAFFEL BOARD MINIMUM OF 12 INCHES INTO EARTH DIKE.
4. USE CLEAN 2 TO 3 INCH STONE OR EQUIVALENT RECYCLED CONCRETE. PLACE WOVEN MONOFILAMENT GEOTEXTILE ON UPSTREAM FACE AND COVER WITH A MINIMUM OF 6 INCHES OF ADDITIONAL STONE.
5. USE NONWOVEN AND WOVEN MONOFILAMENT GEOTEXTILES AS SPECIFIED IN SECTION H-1 MATERIALS.
6. SET WEIR CREST OF STONE 6 INCHES LOWER THAN THE TOP OF EARTH DIKE. USE MINIMUM LENGTH OF 6 FEET FOR WEIR CREST.
7. REMOVE SEDIMENT WHEN IT HAS ACCUMULATED TO WITHIN 6 INCHES OF WEIR CREST. REPLACE GEOTEXTILE AND STONE FACING WHEN STRUCTURE CEASES TO DRAIN. MAINTAIN LINE, GRADE, AND CROSS SECTION.
8. UPON REMOVAL OF STONE OUTLET STRUCTURE, GRADE AREA FLUSH WITH EXISTING GROUND. WITHIN 24 HOURS STABILIZE DISTURBED AREA WITH TOPSOIL, SEED, AND MULCH, OR AS SPECIFIED ON APPROVED PLAN.

2 OF 2

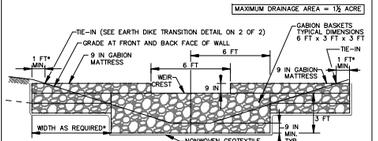
MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

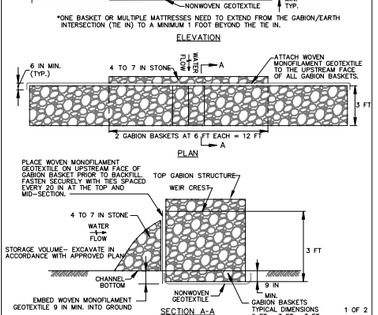
U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL E-8 TEMPORARY GABION OUTLET STRUCTURE

STANDARD SYMBOL: TGOS

MAXIMUM DRAINAGE AREA = 1½ ACRE





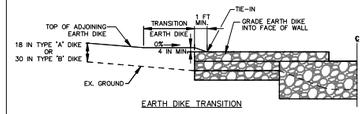
1 OF 2

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL E-8 TEMPORARY GABION OUTLET STRUCTURE

STANDARD SYMBOL: TGOS



NOTES:

1. PROVIDE TRANSITION LENGTH AND HEIGHT AS SPECIFIED ON PLAN. HEIGHT OF TRANSITION EARTH DIKE MUST EXCEED 4 INCH MINIMUM FREEBOARD ABOVE TOP OF GABION AND EXTEND AT THIS ELEVATION UNTIL IT INTERCEPTS THE TOP OF ADJOINING EARTH DIKE.
2. PROVIDE POSITIVE DRAINAGE ALONG EARTH DIKE TO GABION OUTLET STRUCTURE.
3. COMPACT FILL.
4. SHAPE EARTH DIKE TO LINE, GRADE, AND CROSS SECTION AS SPECIFIED ON PLAN. BANK PROJECTIONS OR IRREGULARITIES ARE NOT ALLOWED.

CONSTRUCTION SPECIFICATIONS

1. PROVIDE STORAGE VOLUME AS SPECIFIED ON APPROVED PLANS.
2. USE BASKETS MADE OF 11 GAUGE WIRE OR HEAVIER.
3. USE NONWOVEN AND WOVEN MONOFILAMENT GEOTEXTILES AS SPECIFIED IN SECTION H-1 MATERIALS.
4. INSTALL GABIONS IN ACCORDANCE WITH MANUFACTURER RECOMMENDATIONS.
5. EMBED THE GABION OUTLET STRUCTURE INTO THE SOIL A MINIMUM OF 9 INCHES. PROVIDE NONWOVEN GEOTEXTILE UNDER ALL GABIONS.
6. FILL GABION BASKETS WITH CLEAN 4 TO 7 INCH STONE OR EQUIVALENT RECYCLED CONCRETE WITHOUT REBAR OR WIRE MESH.
7. MAKE THE WEIR CREST OF THE GABION OUTLET STRUCTURE 9 INCHES LOWER THAN THE TOP OF THE ADJACENT GABIONS.
8. PROVIDE A MINIMUM WEIR CREST OF 6 FEET.
9. ATTACH WOVEN MONOFILAMENT GEOTEXTILE TO THE UPSTREAM FACE OF GABION BASKETS AND COVER WITH 4 TO 7 INCH STONE.
10. REMOVE SEDIMENT WHEN IT HAS ACCUMULATED TO WITHIN 12 INCHES OF THE WEIR CREST. REPLACE GEOTEXTILE AND STONE FACING WHEN STRUCTURE CEASES TO FUNCTION. MAINTAIN LINE, GRADE, AND CROSS SECTION.
11. UPON REMOVAL OF GABION OUTLET STRUCTURE, GRADE AREA FLUSH WITH EXISTING GROUND. WITHIN 24 HOURS STABILIZE DISTURBED AREA WITH TOPSOIL, SEED, AND MULCH, OR AS SPECIFIED ON APPROVED PLAN.

2 OF 2

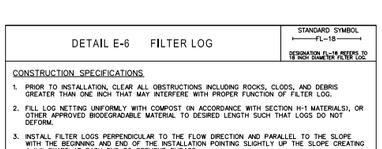
MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

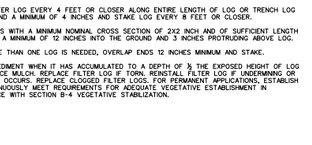
DETAIL E-9-1 STANDARD INLET PROTECTION

STANDARD SYMBOL: SIP

TYPE A MAXIMUM DRAINAGE AREA = ¾ ACRE
TYPE B MAXIMUM DRAINAGE AREA = 1 ACRE



ISOMETRIC VIEW



SECTION FOR TYPE A AND B

1 OF 2

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL E-9-1 STANDARD INLET PROTECTION

STANDARD SYMBOL: SIP

CONSTRUCTION SPECIFICATIONS

1. USE WOVEN SLIT FILM GEOTEXTILE AS SPECIFIED IN SECTION H-1 MATERIALS.
2. EXCAVATE COMPLETELY AROUND THE INLET TO A DEPTH OF 18 INCHES BELOW THE NOTCH ELEVATION.
3. FOR TYPE A, USE NOMINAL 2 INCH X 4 INCH CONSTRUCTION GRADE LUMBER POSTS, DRIVEN 1 FOOT INTO THE GROUND AT EACH CORNER OF THE INLET. PLACE NAIL STRIPS BETWEEN THE POSTS ON THE ENDS OF THE INLET. ASSEMBLE THE TOP PORTION OF THE 2X4 FRAME AS SHOWN. STRETCH ½ INCH GALVANIZED HARDWARE CLOTH TIGHTLY AROUND THE FRAME AND FASTEN SECURELY. FASTEN GEOTEXTILE SECURELY TO THE HARDWARE CLOTH WITH TIES SPACED EVERY 24 INCHES AT THE TOP AND MID SECTION. EMBED GEOTEXTILE AND HARDWARE CLOTH A MINIMUM OF 18 INCHES BELOW THE WEIR CREST. THE ENDS OF THE GEOTEXTILE MUST MEET AT A POST, BE OVERLAPPED AND FOLDED, THEN FASTENED TO THE POST.

   FOR TYPE B, USE 2½ INCH DIAMETER GALVANIZED STEEL POSTS OF 0.095 INCH WALL THICKNESS AND 6 FOOT LENGTH, DRIVEN A MINIMUM OF 36 INCHES BELOW THE WEIR CREST AT EACH CORNER OF THE STRUCTURE. FASTEN 9 GAUGE OR HEAVIER CHAIN LINK FENCE, 42 INCHES IN HEIGHT, SECURELY TO THE FENCE POSTS WITH WIRE TIES. FASTEN GEOTEXTILE SECURELY TO THE CHAIN LINK FENCE WITH TIES SPACED EVERY 24 INCHES AT THE TOP AND MID SECTION. EMBED GEOTEXTILE AND CHAIN LINK FENCE A MINIMUM OF 18 INCHES BELOW THE WEIR CREST.
4. BACKFILL AROUND THE INLET IN LOOSE 4 INCH LIFTS AND COMPACT UNTIL SOIL IS LEVEL WITH THE NOTCH ELEVATION ON THE ENDS AND TOP ELEVATION ON THE SIDES.
5. STORM DRAIN INLET PROTECTION REQUIRES FREQUENT MAINTENANCE. REMOVE ACCUMULATED SEDIMENT AFTER EACH RAIN EVENT TO MAINTAIN FUNCTION AND AVOID PREMATURE CLOGGING. IF INLET PROTECTION DOES NOT COMPLETELY DRAIN WITHIN 24 HOURS AFTER A STORM EVENT, IT IS CLOGGED. WHEN THIS OCCURS, REMOVE ACCUMULATED SEDIMENT AND CLEAN, OR REPLACE GEOTEXTILE AND STONE.

2 OF 2

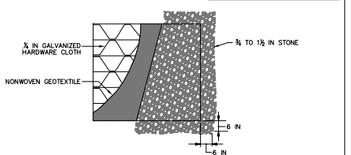
MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

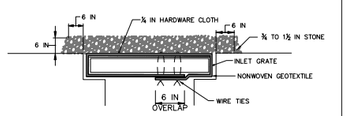
U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL E-9-2 AT-GRADE INLET PROTECTION

STANDARD SYMBOL: AGIP

MAXIMUM DRAINAGE AREA = 1 ACRE





CONSTRUCTION SPECIFICATIONS

1. USE NONWOVEN GEOTEXTILE AS SPECIFIED IN SECTION H-1 MATERIALS.
2. LIFT GRATE AND WRAP WITH NONWOVEN GEOTEXTILE TO COMPLETELY COVER ALL OPENINGS. SECURE WITH WIRE TIES AND SET GRATE BACK IN PLACE.
3. PLACE CLEAN ¾ TO 1½ INCH STONE OR EQUIVALENT RECYCLED CONCRETE 6 INCHES THICK ON THE GRATE.
4. STORM DRAIN INLET PROTECTION REQUIRES FREQUENT MAINTENANCE. REMOVE ACCUMULATED SEDIMENT AFTER EACH RAIN EVENT TO MAINTAIN FUNCTION AND AVOID PREMATURE CLOGGING. IF INLET PROTECTION DOES NOT COMPLETELY DRAIN WITHIN 24 HOURS AFTER A STORM EVENT, IT IS CLOGGED. WHEN THIS OCCURS, REMOVE ACCUMULATED SEDIMENT AND CLEAN, OR REPLACE GEOTEXTILE AND STONE.

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

MDE NO. XX-SF-XXXX
NOTE TO CONTRACTOR:
SEDIMENT CONTROL WILL BE STRICTLY ENFORCED

FOR EROSION AND SEDIMENT CONTROL ONLY.

COMPANY NAME

COMPANY NAME
COMPANY ADDRESS
CITY, STATE ZIP CODE
COMPANY PHONE NO. COMPANY FAX NO.

DESIGNED: ---
DRAWN: ---
CHECKED: ---
APPROVED: ---

"PROFESSIONAL CERTIFICATION:
I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND."

LICENSE NO. _____
EXPIRATION DATE: _____

REVISION NO.	REVISION DATE	DESCRIPTIONS

XX% SUBMISSION

BWI THURGOOD MARSHALL OR MARTIN STATE LOGO

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION

OFFICE OF DESIGN AND CONSTRUCTION

PROJECT TITLE: PROJECT TITLE

SHEET TITLE: EROSION AND SEDIMENT CONTROL DETAILS 4

SCALE: NONE

DATE: DATE

CONTRACT NO.: MAA-CO-XX-XXX

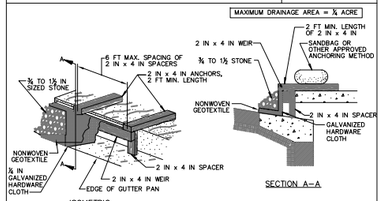
SHEET NO.: ---

PATH/FILENAME

DETAIL E-9-3 CURB INLET PROTECTION

STANDARD SYMBOL: CIP

MAXIMUM DRAINAGE AREA = ¼ ACRE



ISOMETRIC

SECTION A–A

CONSTRUCTION SPECIFICATIONS

1. USE NOMINAL 2 INCH x 4 INCH LUMBER
2. USE NONWOVEN GEOTEXTILE AS SPECIFIED IN SECTION H-1 MATERIALS.
3. NAIL THE 2x4 WEIR TO 9 INCH LONG VERTICAL SPACERS (MAXIMUM 6 FEET APART).
4. ATTACH A CONTINUOUS PIECE OF ¾ INCH GALVANIZED HARDWARE CLOTH, WITH A MINIMUM WIDTH OF 30 INCHES AND A MINIMUM LENGTH OF 4 FEET LONGER THAN THE THROAT OPENING, TO THE 2x4 WEIR, EXTENDING 1' 2 FEET BEYOND THROAT ON EACH SIDE.
5. PLACE A CONTINUOUS PIECE OF NONWOVEN GEOTEXTILE OF THE SAME DIMENSIONS AS THE HARDWARE CLOTH OVER THE HARDWARE CLOTH AND SECURELY ATTACH TO THE 2x4 WEIR.
6. PLACE THE ASSEMBLY AGAINST THE INLET THROAT AND NAIL TO 2x4 ANCHORS (MINIMUM 2 FEET LENGTH). EXTEND THE ANCHORS ACROSS THE INLET TOP AND HOLD IN PLACE BY SANDBAGS OR OTHER APPROVED ANCHORING METHOD.
7. INSTALL END SPACERS A MINIMUM OF 1 FOOT BEYOND THE ENDS OF THE THROAT OPENING.
8. FORM THE HARDWARE CLOTH AND THE GEOTEXTILE TO THE CONCRETE GUTTER AND FACE OF CURB TO SPAN THE INLET OPENING. COVER THE HARDWARE CLOTH AND GEOTEXTILE WITH CLEAN ¾ TO 1½ INCH STONE OR EQUIVALENT RECYCLED CONCRETE.
9. AT NON-SUMP LOCATIONS, INSTALL A TEMPORARY SANDBAG OR ASPHALT BERM TO PREVENT INLET BYPASS.
10. STORM DRAIN INLET PROTECTION REQUIRES FREQUENT MAINTENANCE. REMOVE ACCUMULATED SEDIMENT AFTER EACH RAIN EVENT TO MAINTAIN FUNCTION AND AVOID PREMATURE CLOGGING. IF INLET PROTECTION DOES NOT COMPLETELY DRAIN WITHIN 24 HOURS AFTER A STORM EVENT, IT IS CLOGGED. WHEN THIS OCCURS, REMOVE ACCUMULATED SEDIMENT AND CLEAN, OR REPLACE GEOTEXTILE AND STONE.

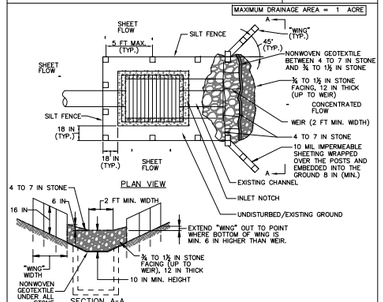
MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL E-9-4 MEDIAN INLET PROTECTION

STANDARD SYMBOL: MIP

MAXIMUM DRAINAGE AREA = 1 ACRE



CONSTRUCTION SPECIFICATIONS

1. USE NONWOVEN GEOTEXTILE AS SPECIFIED IN SECTION H-1 MATERIALS.
2. INSTALL SILT FENCE ON ALL SIDES OF INLET RECEIVING SHEET FLOW. FENCE IS TO BE INSTALLED IN ACCORDANCE WITH SILT FENCE DETAIL E-1, EXCEPT POSTS ARE TO BE SPACED A MAXIMUM OF 5 FEET APART.
3. INSTALL STONE STRUCTURE WITH THE WEIR 10 INCHES ABOVE THE INVERT OF THE CHANNEL AND THE WEIR OPENING THE SAME WIDTH AS THE CHANNEL BOTTOM OR 2 FEET MINIMUM. USE CLEAN 4 TO 7 INCH STONE OR EQUIVALENT RECYCLED CONCRETE. PLACE NONWOVEN GEOTEXTILE ON THE UPSTREAM FACE AND COVER WITH A 12 INCH THICK LAYER OF CLEAN ¾ TO 1½ INCH STONE OR EQUIVALENT RECYCLED CONCRETE.
4. CONSTRUCT "WINGS" IN ACCORDANCE WITH DIVERSION FENCE DETAIL C-9.
5. STORM DRAIN INLET PROTECTION REQUIRES FREQUENT MAINTENANCE. REMOVE ACCUMULATED SEDIMENT AFTER EACH RAIN EVENT TO MAINTAIN FUNCTION AND AVOID PREMATURE CLOGGING. IF INLET PROTECTION DOES NOT COMPLETELY DRAIN WITHIN 24 HOURS AFTER A STORM EVENT, IT IS CLOGGED. WHEN THIS OCCURS, REMOVE ACCUMULATED SEDIMENT AND CLEAN, OR REPLACE GEOTEXTILE AND STONE.

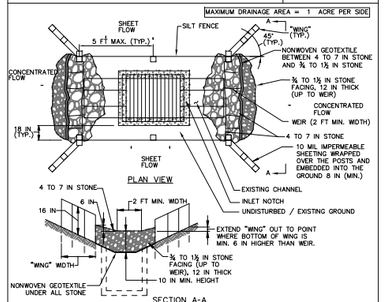
MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL E-9-5 MEDIAN SUMP INLET PROTECTION

STANDARD SYMBOL: MSIP

MAXIMUM DRAINAGE AREA = 1 ACRE PER SIDE



CONSTRUCTION SPECIFICATIONS

1. USE NONWOVEN GEOTEXTILE AS SPECIFIED IN SECTION H-1 MATERIALS.
2. INSTALL SILT FENCE ON ALL SIDES OF INLET RECEIVING SHEET FLOW. FENCE IS TO BE INSTALLED IN ACCORDANCE WITH SILT FENCE DETAIL E-1, EXCEPT POSTS ARE TO BE SPACED A MAXIMUM OF 5 FEET APART.
3. INSTALL EACH STONE STONE STRUCTURE WITH THE WEIR 10 INCHES ABOVE THE INVERT OF THE CHANNEL AND THE WEIR OPENING THE SAME WIDTH AS THE CHANNEL BOTTOM OR 2 FEET MINIMUM. USE CLEAN 4 TO 7 INCH STONE OR EQUIVALENT RECYCLED CONCRETE. PLACE NONWOVEN GEOTEXTILE ON THE UPSTREAM FACE AND COVER WITH A 12 INCH THICK LAYER OF CLEAN ¾ TO 1½ INCH STONE OR EQUIVALENT RECYCLED CONCRETE.
4. CONSTRUCT "WINGS" IN ACCORDANCE WITH DIVERSION FENCE DETAIL C-9.
5. STORM DRAIN INLET PROTECTION REQUIRES FREQUENT MAINTENANCE. REMOVE ACCUMULATED SEDIMENT AFTER EACH RAIN EVENT TO MAINTAIN FUNCTION AND AVOID PREMATURE CLOGGING. IF INLET PROTECTION DOES NOT COMPLETELY DRAIN WITHIN 24 HOURS AFTER A STORM EVENT, IT IS CLOGGED. WHEN THIS OCCURS, REMOVE ACCUMULATED SEDIMENT AND CLEAN, OR REPLACE GEOTEXTILE AND STONE.

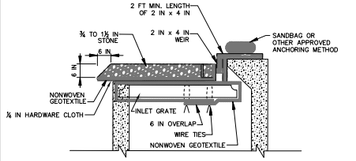
MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

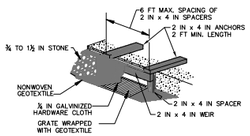
DETAIL E-9-6 COMBINATION INLET PROTECTION

STANDARD SYMBOL: COIP

MAXIMUM DRAINAGE AREA = ¼ ACRE



SECTION



ISOMETRIC VIEW

1 OF 2

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL E-9-6 COMBINATION INLET PROTECTION

STANDARD SYMBOL: COIP

CONSTRUCTION SPECIFICATIONS

1. USE NOMINAL 2 INCH x 4 INCH LUMBER.
2. USE NONWOVEN GEOTEXTILE AS SPECIFIED IN SECTION H-1 MATERIALS.
3. LIFT GRATE, AND WRAP WITH NONWOVEN GEOTEXTILE TO COMPLETELY COVER ALL OPENINGS, THEN SET GRATE BACK IN PLACE.
4. ATTACH A CONTINUOUS PIECE OF ¾ INCH GALVANIZED HARDWARE CLOTH WITH A MINIMUM WIDTH OF 30 INCHES AND A MINIMUM LENGTH OF 4 FEET LONGER THAN THE THROAT OPENING, TO THE 2X4 WEIR, EXTENDING 2 FEET BEYOND THROAT ON EACH SIDE.
5. PLACE A CONTINUOUS PIECE OF NONWOVEN GEOTEXTILE THE SAME DIMENSIONS AS THE HARDWARE CLOTH OVER THE HARDWARE CLOTH AND SECURELY ATTACH IT TO THE WEIR.
6. NAIL THE 2X4 WEIR TO THE TOP OF A 9 INCH LONG VERTICAL SPACER TO BE LOCATED BETWEEN THE WEIR AND THE INLET FACE (MAXIMUM 4 FEET APART).
7. PLACE THE ASSEMBLY AGAINST THE INLET THROAT AND NAIL TO 2X4 ANCHORS (MINIMUM 2 FOOT LENGTHS OF 2x4 INCH TO THE TOP OF THE WEIR AT SPACER LOCATIONS). EXTEND 2X4 ANCHORS ACROSS THE INLET TOP AND HOLD IN PLACE BY SANDBAGS OR OTHER APPROVED ANCHORING METHOD.
8. INSTALL END SPACERS A MINIMUM OF 1 FOOT BEYOND BOTH ENDS OF THE THROAT OPENING.
9. FORM THE ¾ INCH HARDWARE CLOTH AND THE GEOTEXTILE TO THE CONCRETE GUTTER AND AGAINST THE FACE OF THE CURB ON BOTH SIDES OF THE INLET. PLACE CLEAN ¾ TO 1½ INCH STONE OR EQUIVALENT RECYCLED CONCRETE OVER THE HARDWARE CLOTH AND GEOTEXTILE IN SUCH A MANNER TO PREVENT WATER FROM ENTERING THE INLET UNDER OR AROUND THE GEOTEXTILE.
10. AT NON-SUMP LOCATIONS, INSTALL A TEMPORARY SANDBAG OR ASPHALT BERM TO PREVENT INLET BYPASS.
11. STORM DRAIN INLET PROTECTION REQUIRES FREQUENT MAINTENANCE. REMOVE ACCUMULATED SEDIMENT AFTER EACH RAIN EVENT TO MAINTAIN FUNCTION AND AVOID PREMATURE CLOGGING. IF INLET PROTECTION DOES NOT COMPLETELY DRAIN WITHIN 24 HOURS AFTER A STORM EVENT, IT IS CLOGGED. WHEN THIS OCCURS, REMOVE ACCUMULATED SEDIMENT AND CLEAN, OR REPLACE GEOTEXTILE AND STONE.

2 OF 2

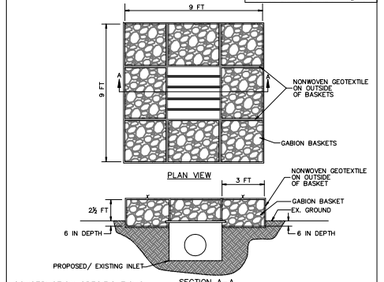
MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL E-9-7 GABION INLET PROTECTION

STANDARD SYMBOL: GIP

MAXIMUM DRAINAGE AREA = 1½ ACRE



CONSTRUCTION SPECIFICATIONS

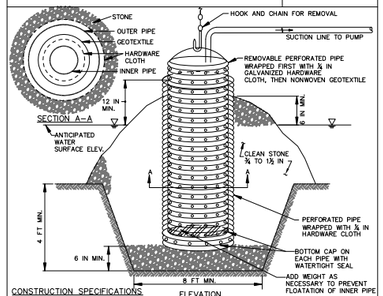
1. USE BASKETS MADE OF 11 GAUGE WIRE OR HEAVIER.
2. WRAP 3 FEET x 3 FEET GABION BASKETS (LENGTH VARIABLE) WITH NONWOVEN GEOTEXTILE, AS SPECIFIED IN SECTION H-1 MATERIALS, OVERLAPPING AT THE TOP AND FASTEN THE GEOTEXTILE AT THE TOP OF THE BASKET WITH WIRE FASTENERS (HOG RINGS) AT A MAXIMUM OF 1 FOOT INTERVALS ALONG THE SEAM.
3. AVOID TEARING OR DAMAGING GEOTEXTILE.
4. ENTRENCH GABION BASKETS TO A DEPTH OF 6 INCHES.
5. PLACE AND INTERLOCK GABION BASKETS WITH NO GAPS.
6. FILL GABION BASKETS WITH CLEAN 4 TO 7 INCH STONE OR EQUIVALENT RECYCLED CONCRETE WITHOUT REBAR OR MESH.
7. STORM DRAIN INLET PROTECTION REQUIRES FREQUENT MAINTENANCE. REMOVE ACCUMULATED SEDIMENT AFTER EACH RAIN EVENT TO MAINTAIN FUNCTION AND AVOID PREMATURE CLOGGING. IF INLET PROTECTION DOES NOT COMPLETELY DRAIN WITHIN 24 HOURS AFTER A STORM EVENT, IT IS CLOGGED. WHEN THIS OCCURS, REMOVE ACCUMULATED SEDIMENT AND CLEAN, OR REPLACE GEOTEXTILE AND STONE.

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL F-1 REMOVABLE PUMPING STATION

STANDARD SYMBOL: ☒RPS



CONSTRUCTION SPECIFICATIONS

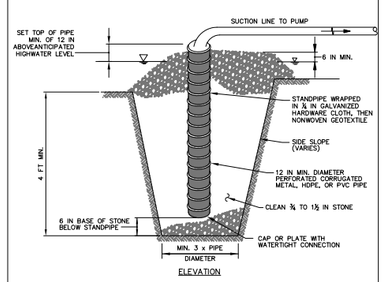
1. USE CORRUGATED METAL OR PLASTIC PIPE WITH 1 INCH DIAMETER PERFORATIONS 6 INCHES ON CENTER.
2. USE A MINIMUM 12 INCH DIAMETER INNER PIPE WITH AN OUTER PIPE, A MINIMUM 6 INCHES LARGER IN DIAMETER. BOTTOM OF EACH PIPE MUST BE CAPPED WITH WATERTIGHT SEAL.
3. WRAP EACH PIPE WITH ¾ INCH GALVANIZED HARDWARE CLOTH. ON INNER PIPE WRAP NONWOVEN GEOTEXTILE, AS SPECIFIED IN SECTION H-1 MATERIALS, OVER THE HARDWARE CLOTH.
4. EXCAVATE 8 FEET X 8 FEET X 4 FEET DEEP PIT FOR PIPE PLACEMENT. PLACE CLEAN ¾ TO 1½ INCH STONE OR EQUIVALENT RECYCLED CONCRETE, 6 INCHES IN DEPTH PRIOR TO PIPE PLACEMENT.
5. SET TOP OF INNER AND OUTER PIPES MINIMUM 12 INCHES ABOVE ANTICIPATED WATER SURFACE ELEVATION FOR RISER CREST ELEVATION WHEN DEWATERING A BASIN).
6. BACKFILL PIT AROUND THE OUTER PIPE WITH ¾ TO 1½ INCH CLEAN STONE OR EQUIVALENT RECYCLED CONCRETE AND EXTEND STONE A MINIMUM OF 6 INCHES ABOVE ANTICIPATED WATER SURFACE ELEVATION.
7. DISCHARGE TO A STABLE AREA AT A NONEROSIVE RATE.
8. A REMOVABLE PUMPING STATION REQUIRES FREQUENT MAINTENANCE. IF SYSTEM CLOGS, PULL OUT INNER PIPE AND REPLACE GEOTEXTILE. KEEP POINT OF DISCHARGE FREE OF EROSION.

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL F-2 SUMP PIT

STANDARD SYMBOL: ☒SP



CONSTRUCTION SPECIFICATIONS

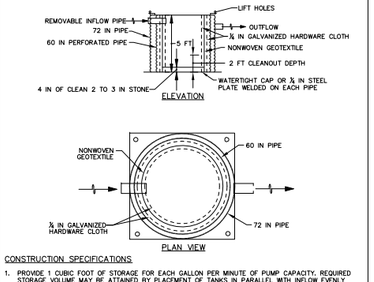
1. PROVIDE 1 CUBIC FOOT OF STORAGE FOR EACH GALLON PER MINUTE OF PUMP CAPACITY. REQUIRED STORAGE VOLUME MAY BE ATTAINED BY PLACEMENT OF TANKS IN PARALLEL WITH INFLOW EVENLY DISTRIBUTED AMONG TANKS. OVERTOPPING OF TANKS IS NOT PERMITTED.
2. USE 60 INCH CORRUGATED METAL OR PLASTIC PIPE WITH 1 INCH DIAMETER PERFORATIONS, 6 INCHES ON CENTER FOR THE INNER PIPE. LINE PIPE WITH NONWOVEN GEOTEXTILE, AS SPECIFIED IN SECTION H-1 MATERIALS, SANDWICHED BETWEEN, AND ATTACHED TO, ¾ INCH HARDWARE CLOTH.
3. OVERLAP GEOTEXTILE 8 INCHES MINIMUM AT VERTICAL SEAM AND AT THE BOTTOM PLATE.
4. ANCHOR GEOTEXTILE AT BOTTOM OF TANK WITH 4 INCHES OF 2 TO 3 INCH CLEAN STONE OR EQUIVALENT RECYCLED CONCRETE.
5. USE 72 INCH CORRUGATED METAL OR PLASTIC OUTER PIPE WITH PERMANENT OUTFLOW PIPE WITH INVERT LOWER THAN INFLOW PIPE
6. INFLOW PIPE MUST DISCHARGE INTO INNER PIPE AND BE REMOVABLE.
7. PLACE TANK ON LEVEL SURFACE AND DISCHARGE TO A STABLE AREA AT A NONEROSIVE RATE.
8. A PORTABLE SEDIMENT TANK REQUIRES FREQUENT MAINTENANCE. REMOVE ACCUMULATED SEDIMENT FROM INNER PIPE WHEN IT REACHES TWO FEET IN DEPTH. IF SYSTEM CLOGS, PULL OUT INNER PIPE, REMOVE ACCUMULATED SEDIMENT, AND REPLACE GEOTEXTILE. KEEP POINT OF DISCHARGE FREE OF EROSION.

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL F-3 PORTABLE SEDIMENT TANK

STANDARD SYMBOL: ☒PST



CONSTRUCTION SPECIFICATIONS

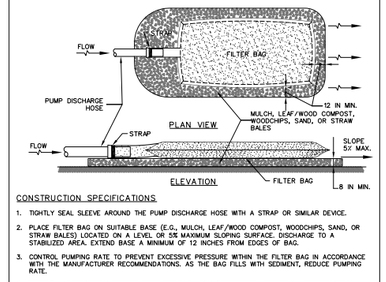
1. PROVIDE 1 CUBIC FOOT OF STORAGE FOR EACH GALLON PER MINUTE OF PUMP CAPACITY. REQUIRED STORAGE VOLUME MAY BE ATTAINED BY PLACEMENT OF TANKS IN PARALLEL WITH INFLOW EVENLY DISTRIBUTED AMONG TANKS. OVERTOPPING OF TANKS IS NOT PERMITTED.
2. USE 60 INCH CORRUGATED METAL OR PLASTIC PIPE WITH 1 INCH DIAMETER PERFORATIONS, 6 INCHES ON CENTER FOR THE INNER PIPE. LINE PIPE WITH NONWOVEN GEOTEXTILE, AS SPECIFIED IN SECTION H-1 MATERIALS, SANDWICHED BETWEEN, AND ATTACHED TO, ¾ INCH HARDWARE CLOTH.
3. OVERLAP GEOTEXTILE 8 INCHES MINIMUM AT VERTICAL SEAM AND AT THE BOTTOM PLATE.
4. ANCHOR GEOTEXTILE AT BOTTOM OF TANK WITH 4 INCHES OF 2 TO 3 INCH CLEAN STONE OR EQUIVALENT RECYCLED CONCRETE.
5. USE 72 INCH CORRUGATED METAL OR PLASTIC OUTER PIPE WITH PERMANENT OUTFLOW PIPE WITH INVERT LOWER THAN INFLOW PIPE
6. INFLOW PIPE MUST DISCHARGE INTO INNER PIPE AND BE REMOVABLE.
7. PLACE TANK ON LEVEL SURFACE AND DISCHARGE TO A STABLE AREA AT A NONEROSIVE RATE.
8. A PORTABLE SEDIMENT TANK REQUIRES FREQUENT MAINTENANCE. REMOVE ACCUMULATED SEDIMENT FROM INNER PIPE WHEN IT REACHES TWO FEET IN DEPTH. IF SYSTEM CLOGS, PULL OUT INNER PIPE, REMOVE ACCUMULATED SEDIMENT, AND REPLACE GEOTEXTILE. KEEP POINT OF DISCHARGE FREE OF EROSION.

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL F-4 FILTER BAG

STANDARD SYMBOL: ☒FB



CONSTRUCTION SPECIFICATIONS

1. TIGHTLY SEAL SLEEVE AROUND THE PUMP DISCHARGE HOSE WITH A STRAP OR SIMILAR DEVICE.
2. PLACE FILTER BAG ON SUITABLE BASE (E.G., MULCH, LEAF/WOOD COMPOST, WOODCHIPS, SAND, OR STRAW BALES) LOCATED ON A LEVEL OR 5% MAXIMUM SLOPING SURFACE. DISCHARGE TO A STABILIZED AREA. EXTEND BASE A MINIMUM OF 12 INCHES FROM EDGES OF BAG.
3. CONTROL PUMPING RATE TO PREVENT EXCESSIVE PRESSURE WITHIN THE FILTER BAG IN ACCORDANCE WITH THE MANUFACTURER RECOMMENDATIONS. AS THE BAG FILLS WITH SEDIMENT, REDUCE PUMPING RATE.
4. REMOVE AND PROPERLY DISPOSE OF FILTER BAG UPON COMPLETION OF PUMPING OPERATIONS OR AFTER BAG HAS REACHED CAPACITY, WHICHEVER OCCURS FIRST. SPREAD THE DEWATERED SEDIMENT FROM THE BAG IN AN APPROVED UPLAND AREA AND STABILIZE WITH SEED AND MULCH. BY THE END OF THE WORK DAY, RESTORE THE SURFACE AREA BENEATH THE BAG TO ORIGINAL CONDITION UPON REMOVAL OF THE DEVICE.
5. USE NONWOVEN GEOTEXTILE WITH DOUBLE STITCHED SEAMS USING HIGH STRENGTH THREAD. SIZE SLEEVE TO ACCOMMODATE A MAXIMUM 4 INCH DIAMETER PUMP DISCHARGE HOSE. THE BAG MUST BE MANUFACTURED FROM A NONWOVEN GEOTEXTILE THAT MEETS OR EXCEEDS MINIMUM AVERAGE ROLL VALUES (MARV) FOR THE FOLLOWING:

GRAB TENSILE	250 LB	ASTM D-4632
PUNCTURE	150 LB	ASTM D-4833
FLOW RATE	70 GAL/MIN/FT²	ASTM D-4491
PERMITTIVITY (SEC⁻¹)	1.2 SEC⁻¹	ASTM D-4491
UV RESISTANCE	70% STRENGTH @ 500 HOURS	ASTM D-4355
APPARENT OPENING SIZE (AOS)	0.15–0.18 MM	ASTM D-4751
SEAM STRENGTH	90%	ASTM D-4632

6. REPLACE FILTER BAG IF BAG CLOGS OR HAS RIPS, TEARS, OR PUNCTURES. DURING OPERATION KEEP CONNECTION BETWEEN PUMP HOSE AND FILTER BAG WATER TIGHT. REPLACE BEDDING IF IT BECOMES DISPLACED.

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

MDE NO. XX-SF-XXXX
NOTE TO CONTRACTOR:
SEDIMENT CONTROL WILL BE STRICTLY ENFORCED

FOR EROSION AND SEDIMENT CONTROL ONLY.

COMPANY NAME

COMPANY NAME
COMPANY ADDRESS
CITY, STATE ZIP CODE
COMPANY PHONE NO. COMPANY FAX NO.

DESIGNED: ---
DRAWN: ---
CHECKED: ---
APPROVED: ---

"PROFESSIONAL CERTIFICATION:

I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND."

LICENSE NO. _____

EXPIRATION DATE: _____

REVISION NO.	REVISION DATE	DESCRIPTIONS

XX% SUBMISSION

BWI THURGOOD MARSHALL OR MARTIN STATE LOGO

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION

OFFICE OF DESIGN AND CONSTRUCTION

PROJECT TITLE: PROJECT TITLE

SHEET TITLE: EROSION AND SEDIMENT CONTROL DETAILS 5

SCALE: NONE

DATE: DATE

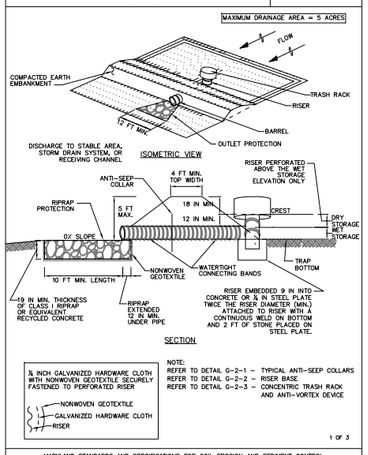
CONTRACT NO.: MAA-CO-XX-XXX

SHEET NO.: ---

PATH/FILENAME

DETAIL G-1-1 PIPE OUTLET SEDIMENT TRAP ST-I

STANDARD SYMBOL: ST-I



NOTE:
REFER TO DETAIL G-2-1 – TYPICAL ANTI-SEEP COLLARS
REFER TO DETAIL G-2-2 – RISER BASE
REFER TO DETAIL G-2-3 – CONCENTRIC TRASH RACK AND ANTI-VORTEX DEVICE

1 OF 3

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL G-1-1 PIPE OUTLET SEDIMENT TRAP ST-I

STANDARD SYMBOL: ST-I

CONSTRUCTION SPECIFICATIONS

1. CONSTRUCT TRAP IN SUCH A MANNER THAT EROSION AND WATER POLLUTION ARE AVOIDED.
2. CLEAR, GRUB, AND STRIP ANY VEGETATION AND ROOT MAT FROM THE AREA UNDER THE EMBANKMENT AND TRAP BOTTOM.
3. PERFORATE THE RISER WITH 1 INCH DIAMETER HOLES SPACED 6 INCHES ON CENTER WITH THE LOWEST PERFORATIONS AT THE WET STORAGE ELEVATION OR PROVIDE A HORIZONTAL OR VERTICAL DRAW-DOWN DEVICE PERFORATED ACCORDING TO APPROVED PLAN. DO NOT PERFORATE THE RISER WITHIN 6 INCHES OF THE TOP OF THE HORIZONTAL BARREL.
4. SET RISER/BARREL ASSEMBLY PRIOR TO EMBANKMENT CONSTRUCTION. MAKE ALL PIPE CONNECTIONS WATERTIGHT. OFFSET RISER FROM EMBANKEMENT TO ACCOMODATE PLACEMENT OF THE TRASH RACK. ANCHOR THE RISER WITH EITHER A REINFORCED CONCRETE BASE OR STEEL PLATE BASE TO PREVENT FLOTATION. MAKE CONCRETE BASES AT LEAST TWICE THE RISER DIAMETER AND 18 INCHES THICK WITH THE RISER EMBEDDED 9 INCHES.
5. USE FILL MATERIAL FREE OF ROOTS, WOODY VEGETATION, OVERSIZED STONES, ROCKS, ORGANIC MATERIAL, OR OTHER OBJECTIONABLE MATERIAL FOR THE EMBANKMENT.
6. HAND COMPACT IN 4 INCH LAYERS FILL MATERIAL AROUND THE PIPE SPILLWAY. PLACE A MINIMUM OF 2 FEET OF HAND COMPACTED BACKFILL OVER THE PIPE SPILLWAY BEFORE CROSSING IT WITH CONSTRUCTION EQUIPMENT.
7. CONSTRUCT TOP OF EMBANKMENT 1 FOOT MINIMUM ABOVE RISER CREST. COMPACT THE EMBANKMENT BY TRAVERSING WITH EQUIPMENT WHILE IT IS BEING CONSTRUCTED.
8. MAKE ALL CUT AND FILL SLOPES 2:1 OR FLATTER.
9. WRAP THE RISER WITH ¾ INCH GALVANIZED HARDWARE CLOTH THEN WRAP WITH NONWOVEN GEOTEXTILE. DO NOT WRAP WITH MORE THAN ONE LAYER OF GEOTEXTILE. EXTEND HARDWARE CLOTH AND GEOTEXTILE AT LEAST 6 INCHES ABOVE THE HIGHEST PERFORATIONS AND AT LEAST 8 INCHES BELOW THE LOWEST PERFORATIONS. OVERLAP, FOLD AND FASTEN WHERE ENDS OF GEOTEXTILE COME TOGETHER TO PREVENT BYPASS. REPLACE GEOTEXTILE AS NECESSARY TO PREVENT CLOGGING.
10. USE STRAPS OR CONNECTING BANDS AT THE TOP AND BOTTOM OF THE GEOTEXTILE TO HOLD THE GEOTEXTILE AND HARDWARE CLOTH IN PLACE.
11. USE NONWOVEN GEOTEXTILE AS SPECIFIED IN SECTION H-1 MATERIALS.
12. STABILIZE THE EMBANKMENT AND INTERIOR SLOPES WITH SEED AND MULCH. STABILIZE POINTS OF CONCENTRATED INFLOW AS SHOWN ON APPROVED PLAN.
13. CONSTRUCT AND MAINTAIN THE OUTLET ACCORDING TO THE APPROVED PLAN AND IN SUCH A MANNER THAT EROSION AT OR BELOW THE OUTLET DOES NOT OCCUR.
14. REMOVE SEDIMENT AND RESTORE TRAP TO ORIGINAL DIMENSIONS WHEN SEDIMENT HAS ACCUMULATED TO CLEANOUT ELEVATION (50% OF WET STORAGE DEPTH). DEPOSIT REMOVED SEDIMENT IN AN APPROVED AREA AND IN SUCH A MANNER THAT IT WILL NOT ERODE. KEEP POINTS OF INFLOW AND OUTFLOW AS WELL AS INTERIOR OF THE TRAP FREE FROM EROSION, AND REMOVE ACCUMULATED DEBRIS. MAINTAIN EMBANKMENTS TO CONTINUOUSLY MEET REQUIREMENTS FOR ADEQUATE VEGETATIVE ESTABLISHMENT IN ACCORDANCE WITH SECTION B-4 VEGETATIVE STABILIZATION. REMOVE ANY TREES, BRUSH, OR OTHER WOODY VEGETATION GROWING ON EMBANKMENT OR NEAR PRINCIPAL SPILLWAY. MAINTAIN LINE, GRADE, AND CROSS SECTION. MAINTAIN WATER TIGHT CONNECTIONS. REPLACE GEOTEXTILE AROUND PERFORATED RISER IF DRY STORAGE VOLUME DOES NOT DRAW DOWN WITHIN 10 HOURS.
15. WHEN DEWATERING TRAP, PASS REMOVED WATER THROUGH AN APPROVED SEDIMENT CONTROL PRACTICE.
16. UPON REMOVAL, GRADE AND STABILIZE THE AREA OCCUPIED BY TRAP.

2 OF 3

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL G-1-1 PIPE OUTLET SEDIMENT TRAP ST-I

STANDARD SYMBOL: ST-I

PIPE OUTLET SEDIMENT TRAP ST-I, TRAP NO._____		
DRAINAGE AREA – INITIAL		ACRES
DRAINAGE AREA – INTERIM		ACRES
DRAINAGE AREA – FINAL		ACRES
TOTAL STORAGE REQUIRED		CF
TOTAL STORAGE PROVIDED		CF
WET STORAGE REQUIRED		CF
WET STORAGE PROVIDED		CF
DRY STORAGE REQUIRED		CF
DRY STORAGE PROVIDED		CF
TRAP BOTTOM ELEVATION		FT
TRAP BOTTOM DIMENSIONS		FT x FT
RISER CREST (DRY STORAGE) ELEVATION		FT
OUTLET (WET STORAGE) ELEVATION		FT
CLEANOUT ELEVATION		FT
TOP OF EMBANKMENT ELEVATION		FT
SIDE SLOPE		H:V RATIO
EMBANKMENT TOP WIDTH		FT
PRINCIPAL SPILLWAY MATERIAL (BARREL, RISER, ANTI-SEEP COLLAR)		
RISER DIAMETER		IN
BARREL DIAMETER		IN
TRASH RACK DIAMETER		IN
TRASH RACK HEIGHT		IN
ANTI-SEEP COLLAR DIMENSIONS		FT
OUTLET PROTECTION – LENGTH		FT
OUTLET PROTECTION – WIDTH		FT
OUTLET PROTECTION – DEPTH		IN

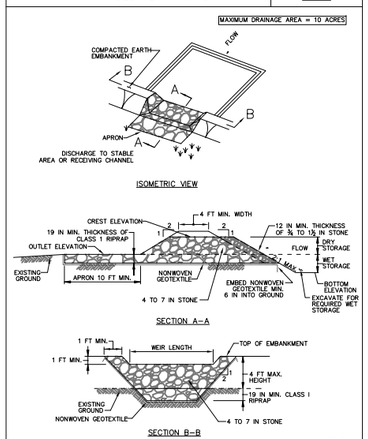
3 OF 3

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL G-1-2 STONE/RIPRAP OUTLET SEDIMENT TRAP ST-II

STANDARD SYMBOL: ST-II



1 OF 3

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL G-1-2 STONE/RIPRAP OUTLET SEDIMENT TRAP ST-II

STANDARD SYMBOL: ST-II

CONSTRUCTION SPECIFICATIONS

1. CONSTRUCT TRAP IN SUCH A MANNER THAT EROSION AND WATER POLLUTION ARE AVOIDED.
2. CLEAR, GRUB, AND STRIP ANY VEGETATION AND ROOT MAT FROM THE AREA UNDER THE EMBANKMENT AND TRAP BOTTOM.
3. USE FILL MATERIAL FREE OF ROOTS, WOODY VEGETATION, OVERSIZED STONES, ROCKS, ORGANIC MATERIAL, OR OTHER OBJECTIONABLE MATERIAL FOR THE EMBANKMENT.
4. CONSTRUCT TOP OF EMBANKMENT 1 FOOT MINIMUM ABOVE WEIR CREST. COMPACT THE EMBANKMENT BY TRAVERSING WITH EQUIPMENT WHILE IT IS BEING CONSTRUCTED.
5. MAKE ALL CUT AND FILL SLOPES 2:1 OR FLATTER.
6. PLACE NONWOVEN GEOTEXTILE, AS SPECIFIED IN SECTION H-1 MATERIALS, OVER THE BOTTOM AND SIDES OF OUTLET AND APRON PRIOR TO PLACEMENT OF RIPRAP. OVERLAP SECTIONS OF GEOTEXTILE AT LEAST 1 FOOT WITH THE SECTION NEARER TO THE TRAP PLACED ON TOP. EMBED GEOTEXTILE AT LEAST 6 INCHES INTO EXISTING GROUND AT ENTRANCE OF OUTLET CHANNEL.
7. USE CLEAN 4 TO 7 INCH RIPRAP TO CONSTRUCT THE WEIR. USE CLASS I RIPRAP FOR THE APRON. USE OF RECYCLED CONCRETE EQUIVALENT IS ACCEPTABLE.
8. PLACE 1 FOOT OF CLEAN ¾ TO 1½ INCH STONE OR EQUIVALENT RECYCLED CONCRETE ON THE UPSTREAM FACE OF THE WEIR.
9. CONSTRUCT AND MAINTAIN THE OUTLET ACCORDING TO APPROVED PLAN, AND IN SUCH A MANNER THAT EROSION AT OR BELOW THE OUTLET DOES NOT OCCUR.
10. STABILIZE THE EMBANKMENT AND INTERIOR SLOPES WITH SEED AND MULCH. STABILIZE POINTS OF CONCENTRATED INFLOW AS SHOWN ON APPROVED PLAN.
11. REMOVE SEDIMENT AND RESTORE TRAP TO ORIGINAL DIMENSIONS WHEN SEDIMENT HAS ACCUMULATED TO CLEANOUT ELEVATION (50% OF WET STORAGE DEPTH). DEPOSIT REMOVED SEDIMENT IN AN APPROVED AREA AND IN SUCH A MANNER THAT IT WILL NOT ERODE. KEEP POINTS OF INFLOW AND OUTFLOW AS WELL AS INTERIOR OF THE TRAP FREE FROM EROSION, AND REMOVE ACCUMULATED DEBRIS. MAINTAIN EMBANKMENTS TO CONTINUOUSLY MEET REQUIREMENTS FOR ADEQUATE VEGETATIVE ESTABLISHMENT IN ACCORDANCE WITH SECTION B-4 VEGETATIVE STABILIZATION. REMOVE ANY TREES, BRUSH, OR OTHER WOODY VEGETATION GROWING ON EMBANKMENT OR NEAR PRINCIPAL SPILLWAY. MAINTAIN LINE, GRADE, AND CROSS SECTION.
12. WHEN DEWATERING TRAP, PASS REMOVED WATER THROUGH AN APPROVED SEDIMENT CONTROL PRACTICE.
13. UPON REMOVAL, GRADE AND STABILIZE THE AREA OCCUPIED BY TRAP.

2 OF 3

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL G-1-2 STONE/RIPRAP OUTLET SEDIMENT TRAP ST-II

STANDARD SYMBOL: ST-II

STONE/RIPRAP OUTLET SEDIMENT TRAP ST-II, TRAP NO. _____		
DRAINAGE AREA – INITIAL		ACRES
DRAINAGE AREA – INTERIM		ACRES
DRAINAGE AREA – FINAL		ACRES
TOTAL STORAGE REQUIRED		CF
TOTAL STORAGE PROVIDED		CF
WET STORAGE REQUIRED		CF
WET STORAGE PROVIDED		CF
DRY STORAGE REQUIRED		CF
DRY STORAGE PROVIDED		CF
EXISTING GROUND ELEVATION AT OUTLET (WET STORAGE ELEVATION)		FT
TRAP BOTTOM ELEVATION		FT
TRAP BOTTOM DIMENSIONS		FT x FT
WEIR LENGTH		FT
WEIR CREST (DRY STORAGE) ELEVATION		FT
CLEANOUT ELEVATION		FT
TOP OF EMBANKMENT ELEVATION		FT
SIDE SLOPE		H:V RATIO
EMBANKMENT TOP WIDTH		FT
OUTLET PROTECTION – LENGTH		FT
OUTLET PROTECTION – DEPTH		IN

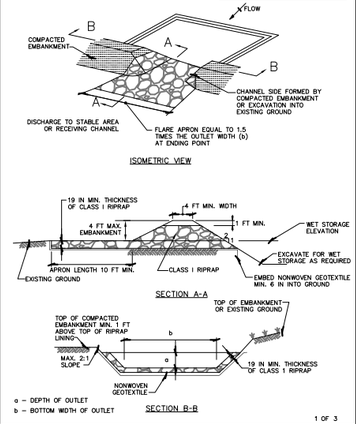
3 OF 3

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL G-1-3 RIPRAP OUTLET SEDIMENT TRAP ST-III

STANDARD SYMBOL: ST-III



1 OF 3

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL G-1-3 RIPRAP OUTLET SEDIMENT TRAP ST-III

STANDARD SYMBOL: ST-III

CONSTRUCTION SPECIFICATIONS

1. CONSTRUCT TRAP IN SUCH A MANNER THAT EROSION AND WATER POLLUTION ARE AVOIDED.
2. CLEAR, GRUB, AND STRIP ANY VEGETATION AND ROOT MAT FROM THE AREA UNDER THE EMBANKMENT AND TRAP BOTTOM.
3. USE FILL MATERIAL FREE OF ROOTS, WOODY VEGETATION, OVERSIZED STONES, ROCKS, ORGANIC MATERIAL, OR OTHER OBJECTIONABLE MATERIAL FOR THE EMBANKMENT.
4. CONSTRUCT TOP OF EMBANKMENT 1 FOOT MINIMUM ABOVE TOP OF RIPRAP OUTLET. COMPACT THE EMBANKMENT BY TRAVERSING WITH EQUIPMENT WHILE IT IS BEING CONSTRUCTED.
5. MAKE ALL CUT AND FILL SLOPES 2:1 OR FLATTER.
6. PLACE NONWOVEN GEOTEXTILE, AS SPECIFIED IN SECTION H-1 MATERIALS, OVER THE BOTTOM AND SIDES OF OUTLET AND APRON PRIOR TO PLACEMENT OF RIPRAP. OVERLAP SECTIONS OF GEOTEXTILE AT LEAST 1 FOOT WITH THE SECTION NEARER TO THE TRAP PLACED ON TOP. EMBED GEOTEXTILE AT LEAST 6 INCHES INTO EXISTING GROUND AT ENTRANCE OF OUTLET CHANNEL.
7. USE CLEAN CLASS I RIPRAP PLACED 19 INCHES IN DEPTH FOR THE OUTLET AND APRON. USE OF RECYCLED CONCRETE EQUIVALENT IS ACCEPTABLE.
8. CONSTRUCT AND MAINTAIN THE OUTLET ACCORDING TO APPROVED PLAN, AND IN SUCH A MANNER THAT EROSION AT OR BELOW THE OUTLET DOES NOT OCCUR.
9. STABILIZE THE EMBANKMENT AND INTERIOR SLOPES WITH SEED AND MULCH. STABILIZE POINTS OF CONCENTRATED INFLOW AS SHOWN ON APPROVED PLAN.
10. REMOVE SEDIMENT AND RESTORE TRAP TO ORIGINAL DIMENSIONS WHEN SEDIMENT HAS ACCUMULATED TO CLEANOUT ELEVATION (25% OF WET STORAGE DEPTH). DEPOSIT REMOVED SEDIMENT IN AN APPROVED AREA AND IN SUCH A MANNER THAT IT WILL NOT ERODE. KEEP POINTS OF INFLOW AND OUTFLOW AS WELL AS INTERIOR OF THE TRAP FREE FROM EROSION AND REMOVE ACCUMULATED DEBRIS. MAINTAIN EMBANKMENTS TO CONTINUOUSLY MEET REQUIREMENTS FOR ADEQUATE VEGETATIVE ESTABLISHMENT IN ACCORDANCE WITH SECTION B-4 VEGETATIVE STABILIZATION. REMOVE ANY TREES, BRUSH, OR OTHER WOODY VEGETATION GROWING ON EMBANKMENT OR NEAR PRINCIPAL SPILLWAY. MAINTAIN LINE, GRADE, AND CROSS SECTION.
11. WHEN DEWATERING TRAP, PASS THE REMOVED WATER THROUGH AN APPROVED SEDIMENT CONTROL PRACTICE.
12. UPON REMOVAL, GRADE AND STABILIZE THE AREA OCCUPIED BY TRAP.

2 OF 3

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL G-1-3 RIPRAP OUTLET SEDIMENT TRAP ST-III

STANDARD SYMBOL: ST-III

RIPRAP OUTLET SEDIMENT TRAP ST-III, TRAP NO._____		
DRAINAGE AREA – INITIAL		ACRES
DRAINAGE AREA – INTERIM		ACRES
DRAINAGE AREA – FINAL		ACRES
WET STORAGE REQUIRED		CF
WET STORAGE PROVIDED		CF
EXISTING GROUND ELEVATION AT OUTLET (WET STORAGE ELEVATION)		FT
TRAP BOTTOM ELEVATION		FT
TRAP BOTTOM DIMENSIONS		FT x FT
DEPTH OF OUTLET (a)		FT
BOTTOM WIDTH OF OUTLET (b)		FT
CLEANOUT ELEVATION		FT
TOP OF EMBANKMENT HEIGHT ELEVATION		FT
SIDE SLOPE		H:V RATIO
EMBANKMENT TOP WIDTH		FT
OUTLET PROTECTION – LENGTH		FT
OUTLET PROTECTION – DEPTH		IN

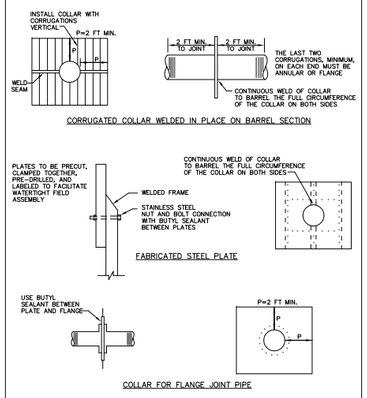
3 OF 3

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL G-2-1 TYPICAL ANTI-SEEP COLLARS

STANDARD SYMBOL:

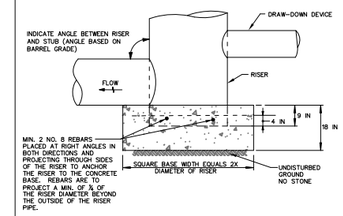


MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL G-2-2 CORRUGATED RISER BASE

STANDARD SYMBOL:



CONSTRUCTION SPECIFICATIONS

1. BOTTOM OF CONCRETE BASE TO BE PLACED ON UNDISTURBED, NATURAL GROUND.
2. NO STONE IS ALLOWED UNDER BASE. IF NECESSARY, TO ACHIEVE STABILITY INCREASE DEPTH OF CONCRETE BASE.

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

MDE NO. XX-SF-XXXX
NOTE TO CONTRACTOR:
SEDIMENT CONTROL WILL BE STRICTLY ENFORCED

FOR EROSION AND SEDIMENT CONTROL ONLY.

COMPANY NAME

COMPANY NAME
COMPANY ADDRESS
CITY, STATE ZIP CODE
COMPANY PHONE NO. COMPANY FAX NO.

DESIGNED: ---
DRAWN: ---
CHECKED: ---
APPROVED: ---

"PROFESSIONAL CERTIFICATION:
I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND."

LICENSE NO. _____
EXPIRATION DATE: _____

REVISION NO.	REVISION DATE	DESCRIPTIONS

XX% SUBMISSION

BWI THURGOOD MARSHALL OR MARTIN STATE LOGO

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION

OFFICE OF DESIGN AND CONSTRUCTION

PROJECT TITLE: PROJECT TITLE

SHEET TITLE: EROSION AND SEDIMENT CONTROL DETAILS 6

SCALE: NONE

DATE: DATE

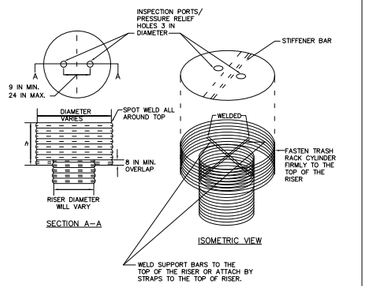
CONTRACT NO.: MAA-CO-XX-XXX

SHEET NO.: ---

PATH/FILENAME

DETAIL G-2-3 CONCENTRIC TRASH RACK AND ANTI-VORTEX DEVICE

STANDARD SYMBOL: TR



1 OF 2

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL G-2-3 CONCENTRIC TRASH RACK AND ANTI-VORTEX DEVICE

STANDARD SYMBOL: TR

RISER DIAM. (IN)	TRASH RACK CYLINDER DIAM. (IN)	THICKNESS (GAUGE)	h (IN)	MINIMUM SIZE SUPPORT BAR	MINIMUM TOP THICKNESS (GAUGE)	MINIMUM TOP STIFFENER
12	18	16	14	#6 REBAR	16	N/A
15	21	16	15	#6 REBAR	16	N/A
18	27	16	16	#6 REBAR	16	N/A
21	30	16	19	#6 REBAR	16	N/A
24	36	16	21	#6 REBAR	14	N/A
27	42	16	21	#6 REBAR	14	N/A
36	54	14	25	#8 REBAR	12	N/A
42	60	14	27	#8 REBAR	12	N/A
48	72	12	29	1¾ IN PIPE OR 1¾ x 1¾ x ¾ ANGLE	10	N/A
54	78	12	33	1¾ IN PIPE OR 1¼ x 1¼ x ¼ ANGLE	10	N/A
60	90	12	37	1½ IN PIPE OR 1½ x 1½ x ¾ ANGLE	8	N/A
66	96	10	41	2 IN PIPE OR 2 x 2 x 5/16 ANGLE	8	2 x 2 x ¼ ANGLE
72	102	10	44	2 IN PIPE OR 2 x 2 x 5/16 ANGLE	8	2½ x 2½ x ¼ ANGLE
78	114	10	47	2½ IN PIPE OR 2 x 2 x ¼ ANGLE	8	2½ x 2½ x ¼ ANGLE
84	120	10	50	2½ IN PIPE OR 2½ x 2½ x ¼ ANGLE	8	2½ x 2½ x 5/16 ANGLE

NOTE:
THE ABOVE TRASH RACK AND ANTI-VORTEX DEVICE INFORMATION IS FOR CORRUGATED METAL PIPE ONLY. CONCRETE RISERS MUST MEET THE REQUIREMENTS OF MD 378.

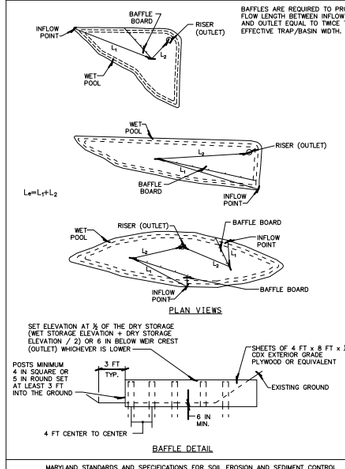
2 OF 2

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL G-2-4 BAFFLE BOARDS

STANDARD SYMBOL: BB

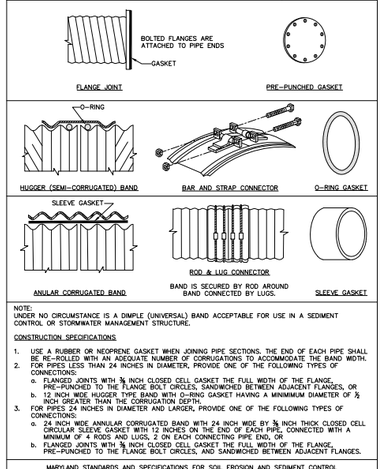


MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL G-2-5 TYPES OF COUPLERS FOR CORRUGATED STEEL PIPE

STANDARD SYMBOL:



NOTE:
UNDER NO CIRCUMSTANCE IS A DIMPLE (UNIVERSAL) BAND ACCEPTABLE FOR USE IN A SEDIMENT CONTROL OR STORMWATER MANAGEMENT STRUCTURE.

CONSTRUCTION SPECIFICATIONS

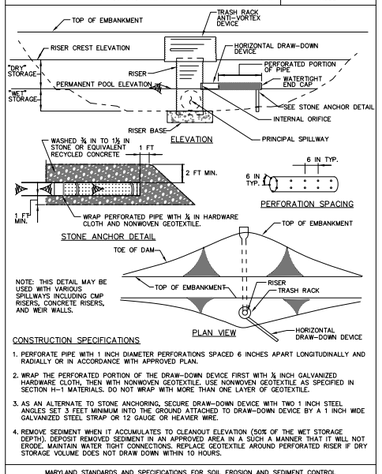
1. USE A RUBBER OR NEOPRENE GASKET WHEN JOINING PIPE SECTIONS. THE END OF EACH PIPE SHALL BE RE-ROLLED WITH AN ADEQUATE NUMBER OF CORRUGATIONS TO ACCOMMODATE THE BAND WIDTH.
2. FOR PIPES LESS THAN 24 INCHES IN DIAMETER, PROVIDE ONE OF THE FOLLOWING TYPES OF CONNECTIONS:
   a. FLANGED JOINTS WITH ⅜ INCH CLOSED CELL GASKET THE FULL WIDTH OF THE FLANGE, PRE-PUNCHED TO THE FLANGE BOLT CIRCLES, SANDWICHED BETWEEN ADJACENT FLANGES, OR
   b. 12 INCH WIDE HUGGER TYPE BAND WITH O-RING GASKET HAVING A MINIMMUM DIAMETER OF ½ INCH GREATER THAN THE CORRUGATION DEPTH.
3. FOR PIPES 24 INCHES IN DIAMETER AND LARGER, PROVIDE ONE OF THE FOLLOWING TYPES OF CONNECTIONS:
   a. 24 INCH WIDE ANNULAR CORRUGATED BAND WITH 24 INCH WIDE BY ⅜ INCH THICK CLOSED CELL CIRCULAR SLEEVE GASKET WITH 12 INCHES ON THE END OF EACH PIPE, CONNECTED WITH A MINIMUM OF 4 RODS AND LUGS, 2 ON EACH CONNECTING PIPE END, OR
   b. FLANGED JOINTS WITH ⅜ INCH CLOSED CELL GASKET THE FULL WIDTH OF THE FLANGE, PRE-PUNCHED TO THE FLANGE BOLT CIRCLES, AND SANDWICHED BETWEEN ADJACENT FLANGES.

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL G-2-6 SEDIMENT BASIN SCHEMATIC HORIZONTAL DRAW-DOWN DEVICE

STANDARD SYMBOL: HDDD



CONSTRUCTION SPECIFICATIONS

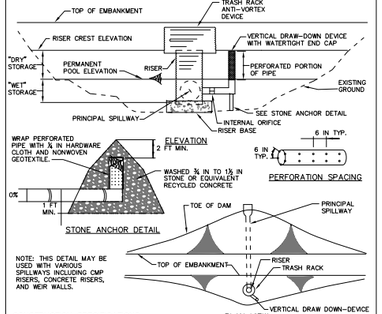
1. PERFORATE PIPE WITH 1 INCH DIAMETER PERFORATIONS SPACED 6 INCHES APART LONGITUDINALLY AND RADIALLY OR IN ACCORDANCE WITH APPROVED PLAN.
2. WRAP THE PERFORATED PORTION OF THE DRAW-DOWN DEVICE FIRST WITH ½ INCH GALVANIZED HARDWARE CLOTH, THEN WITH NONWOVEN GEOTEXTILE. USE NONWOVEN GEOTEXTILE AS SPECIFIED IN SECTION H-1 MATERIALS. DO NOT WRAP WITH MORE THAN ONE LAYER OF GEOTEXTILE.
3. AS AN ALTERNATE TO STONE ANCHORING, SECURE DRAW-DOWN DEVICE WITH TWO 1 INCH STEEL ANGLES SET 3 FEET MINIMUM INTO THE GROUND ATTACHED TO DRAW-DOWN DEVICE BY A 1 INCH WIDE GALVANIZED STEEL STRAP OR 12 GAUGE OR HEAVIER WIRE.
4. REMOVE SEDIMENT WHEN IT ACCUMULATES TO CLEANOUT ELEVATION (50% OF THE WET STORAGE DEPTH). DEPOSIT REMOVED SEDIMENT IN AN APPROVED AREA IN A SUCH A MANNER THAT IT WILL NOT ERODE. MAINTAIN WATER TIGHT CONNECTIONS. REPLACE GEOTEXTILE AROUND PERFORATED RISER IF DRY STORAGE VOLUME DOES NOT DRAW DOWN WITHIN 10 HOURS.

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL G-2-7 SEDIMENT BASIN SCHEMATIC VERTICAL DRAW-DOWN DEVICE

STANDARD SYMBOL: VDDD



CONSTRUCTION SPECIFICATIONS

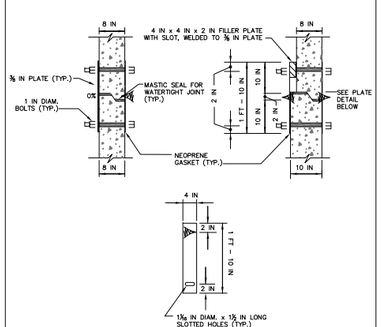
1. PERFORATE PIPE WITH 1 INCH DIAMETER PERFORATIONS SPACED 6 INCHES APART LONGITUDINALLY AND RADIALLY OR IN ACCORDANCE WITH APPROVED PLAN.
2. DO NOT EXTEND PERFORATIONS IN THE DRAW-DOWN DEVICE INTO WET STORAGE.
3. WRAP THE PERFORATED PORTION OF THE DRAW-DOWN DEVICE FIRST WITH ½ INCH GALVANIZED HARDWARE CLOTH, THEN WITH NONWOVEN GEOTEXTILE. USE NONWOVEN GEOTEXTILE AS SPECIFIED IN SECTION H-1 MATERIALS. DO NOT WRAP WITH MORE THAN ONE LAYER OF GEOTEXTILE.
4. AS AN ALTERNATE TO STONE ANCHORING, SECURE DRAW-DOWN DEVICE WITH TWO 1 INCH STEEL ANGLES SET 3 FEET MINIMUM INTO THE GROUND ATTACHED TO DRAW-DOWN DEVICE BY A 1 INCH WIDE GALVANIZED STEEL STRAP OR 12 GAUGE OR HEAVIER WIRE.
5. REMOVE SEDIMENT WHEN IT ACCUMULATES TO CLEANOUT ELEVATION (50% OF THE WET STORAGE DEPTH). DEPOSIT REMOVED SEDIMENT IN AN APPROVED AREA IN A SUCH A MANNER THAT IT WILL NOT ERODE. MAINTAIN WATER TIGHT CONNECTIONS. REPLACE GEOTEXTILE AROUND PERFORATED RISER IF DRY STORAGE VOLUME DOES NOT DRAW DOWN WITHIN 10 HOURS.

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL G-2-8 PRECAST RISER CONNECTOR

STANDARD SYMBOL:



CONSTRUCTION SPECIFICATIONS

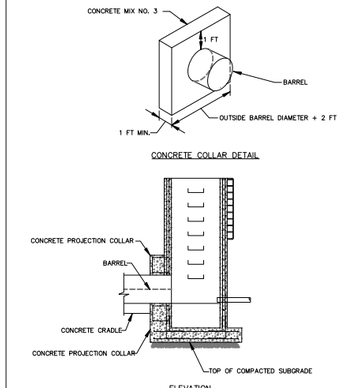
1. FABRICATE PLATE CONNECTORS FROM STAINLESS STEEL CONFORMING TO ASTM A666-72, GRADE A OR B.
2. USE TYPE 304 STAINLESS STEEL FOR BOLTS.
3. PROVIDE CONNECTORS AT CENTERLINE OF EACH PRECAST BOX FACE. FOR MANHOLES PROVIDE FOUR PLATES SPACED AT 90°.

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL G-2-9 PROJECTION COLLAR

STANDARD SYMBOL:



CONSTRUCTION SPECIFICATIONS

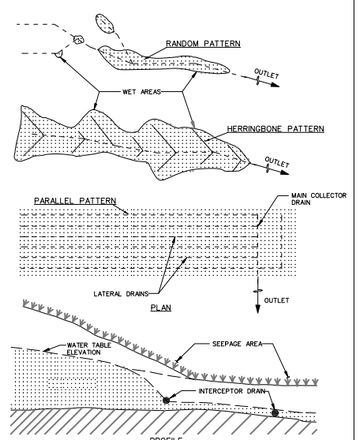
1. CAST 1 FOOT THICK CONCRETE COLLAR TO OUTLET STRUCTURE WITH FOUR #4 U-SHAPED REBARS.

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL H-2 SUBSURFACE DRAIN

STANDARD SYMBOL:



NOTE: AN MDE WETLANDS AND WATERWAYS PERMIT MAY BE REQUIRED

1 OF 2

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL H-2 SUBSURFACE DRAIN

STANDARD SYMBOL:

CONSTRUCTION SPECIFICATIONS

1. DO NOT USE DEFORMED, WARPED, OR OTHERWISE DAMAGED PIPE OR TUBING.
2. LAY ALL SUBSURFACE DRAINS TO A UNIFORM LINE AND COVER WITH ENVELOPE MATERIAL. LAY THE PIPE TUBING WITH PERFORATIONS DOWN AND ORIENTED SYMMETRICALLY ABOUT THE VERTICAL CENTER LINE. MAKE CONNECTIONS WITH MANUFACTURED COUPLING DEVICES COMPARABLE IN STRENGTH WITH SPECIFIED PIPE OR TUBING UNLESS OTHERWISE SPECIFIED. USE METHOD OF PLACEMENT AND BEDDING AS SPECIFIED ON THE DRAWING.
3. PROVIDE ENVELOPE MATERIAL CONSISTING OF WOVEN MONOFILAMENT GEOTEXTILE OR A SAND/GRAVEL MIXTURE WITH 100 PERCENT PASSING THE 1½ INCH SIEVE, 90 TO 100 PERCENT PASSING THE ¾ INCH SIEVE, AND NOT MORE THAN 10 PERCENT PASSING THE NUMBER 60 SIEVE.
4. USE WOVEN MONOFILAMENT GEOTEXTILE AS SPECIFIED IN SECTION H-1 MATERIALS.
5. CAP THE UPPER END OF EACH SUBSURFACE DRAINLINE WITH A TIGHT FITTING CAP OF THE SAME MATERIAL AS THE CONDUIT OR OTHER DURABLE MATERIAL UNLESS CONNECTED TO A STRUCTURE.
6. USE A CONTINUOUS 10 FOOT SECTION OF CORRUGATED METAL, CAST IRON, OR STEEL PIPE WITHOUT PERFORATIONS AT THE OUTLET END OF THE LINE WITH NO ENVELOPE MATERIAL AROUND THE 10 FOOT SECTION PIPE. INSTALL AN ANIMAL GUARD ON THE OUTLET END OF THE PIPE.
7. PLACE EARTH BACKFILL MATERIAL IN THE TRENCH IN SUCH A MANNER THAT DISPLACEMENT OF THE DRAIN WILL NOT OCCUR.
8. WHERE SURFACE WATER IS ENTERING THE SYSTEM, PROVIDE A SWING TYPE TRASH AND ANIMAL GUARD AT THE PIPE OUTLET SECTION OF THE SYSTEM.
9. KEEP POINT OF DISCHARGE FREE OF EROSION. MAINTAIN ANIMAL GUARD AT OUTLET.

2 OF 2

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

MDE NO. XX-SF-XXXX
NOTE TO CONTRACTOR:
SEDIMENT CONTROL WILL BE STRICTLY ENFORCED

FOR EROSION AND SEDIMENT CONTROL ONLY.

COMPANY NAME

COMPANY NAME
COMPANY ADDRESS
CITY, STATE ZIP CODE
COMPANY PHONE NO. COMPANY FAX NO.

DESIGNED: ---
DRAWN: ---
CHECKED: ---
APPROVED: ---

"PROFESSIONAL CERTIFICATION:
I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND."
LICENSE NO. _____
EXPIRATION DATE: _____

REVISION NO.	REVISION DATE	DESCRIPTIONS

XX% SUBMISSION

BWI THURGOOD MARSHALL OR MARTIN STATE LOGO

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
OFFICE OF DESIGN AND CONSTRUCTION

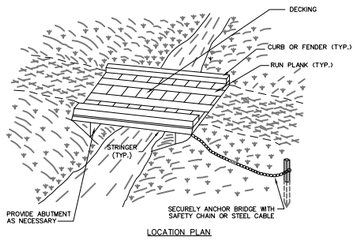
PROJECT TITLE: PROJECT TITLE
SHEET TITLE: EROSION AND SEDIMENT CONTROL DETAILS 7
SCALE: NONE
DATE: DATE

CONTRACT NO.: MAA-CO-XX-XXX
SHEET NO.: ---

PATH/FILENAME

DETAIL H-4-1 TEMPORARY ACCESS BRIDGE

STANDARD SYMBOL: TB



LOCATION PLAN

NOTE:
TIME OF YEAR RESTRICTIONS DO NOT APPLY TO THE CONSTRUCTION OR REMOVAL OF A TEMPORARY ACCESS BRIDGE UNLESS THERE IS DISTURBANCE TO THE STREAM CHANNEL.

1 OF 2

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL H-4-1 TEMPORARY ACCESS BRIDGE

STANDARD SYMBOL: TB

CONSTRUCTION SPECIFICATIONS

1. CONSTRUCT TEMPORARY BRIDGE STRUCTURE AT OR ABOVE THE BANK ELEVATION TO PREVENT IMPACTS FROM FLOATING MATERIALS AND DEBRIS.
2. PLACE ABUTMENTS PARALLEL TO, AND ON, STABLE BANKS.
3. CONSTRUCT BRIDGE TO SPAN ENTIRE CHANNEL UNLESS OTHERWISE INDICATED ON APPROVED PLAN.
4. USE STRINGERS CONSISTING OF LOGS, SAWN TIMBER, PRESTRESSED CONCRETE BEAMS, METAL BEAMS, OR OTHER APPROVED MATERIALS.
5. SELECT DECKING MATERIALS TO PROVIDE SUFFICIENT STRENGTH TO SUPPORT THE ANTICIPATED LOAD. PLACE ALL DECKING MEMBERS PERPENDICULAR TO THE STRINGERS, BUTT TIGHTLY, AND SECURELY FASTEN. DECKING MATERIALS MUST BE BUTTED TIGHTLY TO PREVENT ANY SOIL MATERIAL TRACKED ONTO THE BRIDGE FROM FALLING INTO THE WATERWAY BELOW.
6. SECURELY FASTEN OPTIONAL RUN PLANKING FOR THE LENGTH OF THE SPAN. PROVIDE A RUN PLANK FOR EACH TRACK OF THE EQUIPMENT WHEELS. ALTHOUGH RUN PLANKS ARE OPTIONAL, THEY MAY BE NECESSARY TO PROPERLY DISTRIBUTE LOADS.
7. INSTALL CURBS THE ENTIRE LENGTH OF THE OUTER SIDES OF THE DECK TO PREVENT SEDIMENT FROM ENTERING THE STREAM CHANNEL.
8. ANCHOR BRIDGE SECURELY AT ONLY ONE END USING STEEL CABLE OR CHAIN. ANCHORING AT ONLY ONE END WILL PREVENT CHANNEL OBSTRUCTION IN THE EVENT THAT FLOODWATERS FLOAT THE BRIDGE. ACCEPTABLE ANCHORS ARE LARGE TREES, LARGE BOULDERS, OR DRIVEN STEEL POSTS. ANCHOR MUST BE SUFFICIENT TO PREVENT THE BRIDGE FROM FLOATING DOWNSTREAM.
9. AREAS DISTURBED DURING BRIDGE INSTALLATION AND\OR REMOVAL MUST NOT BE LEFT UNSTABILIZED OVERNIGHT UNLESS THE RUNOFF IS DIRECTED TO AN APPROVED SEDIMENT CONTROL DEVICE.
10. STABILIZE APPROACH TO BRIDGE AND KEEP FREE OF EROSION. CLEAN SEDIMENT FROM DECKING AND CURBS DAILY BY SCRAPING, SWEEPING, AND/OR VACUUMING. ENSURE THAT DECKING AND CURBS REMAIN TIGHTLY BUTTED WITHOUT GAPS. REMOVE DEBRIS TRAPPED BY BRIDGE. MAINTAIN AREAS ADJACENT TO CROSSING TO CONTINUOUSLY MEET REQUIREMENTS FOR ADEQUATE VEGETATIVE ESTABLISHMENT IN ACCORDANCE WITH SECTION B-4 VEGETATIVE STABILIZATION.
11. AFTER THE TEMPORARY CROSSING IS NO LONGER NEEDED, REMOVE IT WITHIN 14 CALENDAR DAYS. IF SUBJECT TO THE USE DESIGNATION CLOSURE, REMOVE AT THE END OF CLOSURE PERIOD. PROTECT STREAM BANKS DURING BRIDGE REMOVAL AND STABILIZE ALL DISTURBED AREAS WITH EROSION CONTROL MATTING. ACCOMPLISH REMOVAL OF THE BRIDGE AND CLEAN UP OF THE AREA WITHOUT CONSTRUCTION EQUIPMENT WORKING IN THE WATERWAY CHANNEL. STORE ALL REMOVED MATERIALS IN AN APPROVED STAGING AREA.

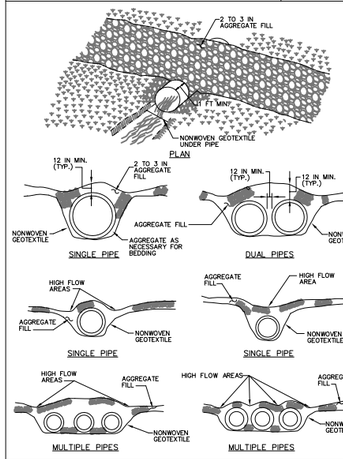
2 OF 2

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL H-4-2 TEMPORARY ACCESS CULVERT

STANDARD SYMBOL:



1 OF 2

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL H-4-2 TEMPORARY ACCESS CULVERT

STANDARD SYMBOL:

CONSTRUCTION SPECIFICATIONS

1. CONSTRUCTION OR REMOVAL OF A TEMPORARY ACCESS CULVERT WILL NOT BE PERMITTED DURING THE FOLLOWING PERIODS:

USE I AND IP	MARCH 1 - JUNE 15
USE II	JUNE 1 - SEPTEMBER 30 AND DECEMBER 16 - MARCH 14
USE III AND IIP	OCTOBER 1 - APRIL 30
USE IV	MARCH 1 - MAY 31
SAV* (ALL FLOWING STREAMS)	APRIL 15 - OCTOBER 15
*SUBMERGED AQUATIC VEGETATION	

2. EXTEND THE CULVERT(S) A MINIMUM OF ONE FOOT BEYOND THE UPSTREAM AND DOWNSTREAM TOE OF THE AGGREGATE PLACED AROUND THE CULVERT.
3. PLACE NONWOVEN GEOTEXTILE ON THE STREAM BED AND STREAM BANKS PRIOR TO PLACEMENT OF THE PIPE CULVERT(S) AND AGGREGATE. COVER THE STREAM BED WITH THE GEOTEXTILE AND EXTEND IT A MINIMUM SIX INCHES AND A MAXIMUM OF ONE FOOT BEYOND THE END OF THE CULVERT AND BEDDING MATERIAL. USE NONWOVEN GEOTEXTILE AS SPECIFIED IN SECTION H-1 MATERIALS. GEOTEXTILE REDUCES SETTLEMENT AND IMPROVES CROSSING STABILITY.
4. PLACE CULVERT(S) ON THE NATURAL STREAM BED GRADE TO MINIMIZE INTERFERENCE WITH FISH PASSAGE.
5. COVER THE CULVERT WITH A MINIMUM OF ONE FOOT OF WASHED AGGREGATE. FOR MULTIPLE CULVERTS PROVIDE AT LEAST 12 INCHES OF COMPACTED AGGREGATE FILL BETWEEN CULVERTS.
6. STABILIZE ALL AREAS DISTURBED DURING CULVERT INSTALLATION WITHIN 24 HOURS OF THE DISTURBANCE IN ACCORDANCE WITH STANDARDS FOR PERMANENT STABILIZATION, SECTION B-4-5, OR TEMPORARY STABILIZATION, SECTION B-4-4, AS APPLICABLE.
7. STABILIZE APPROACH TO CROSSING AND KEEP FREE OF EROSION. REPLACE DISPLACED STONE, AND MAINTAIN HIGH FLOW AREAS. REMOVE DEBRIS TRAPPED BY CULVERT. REPLACE DAMAGED PIPE(S). MAINTAIN AREAS ADJACENT TO CROSSING TO CONTINUOUSLY MEET REQUIREMENTS FOR ADEQUATE VEGETATIVE ESTABLISHMENT IN ACCORDANCE WITH SECTION B-4 VEGETATIVE STABILIZATION.
8. AFTER THE TEMPORARY CROSSING IS NO LONGER NEEDED, REMOVE IT WITHIN 14 CALENDAR DAYS. IF SUBJECT TO THE USE DESIGNATION CLOSURE, REMOVE AT THE END OF CLOSURE PERIOD. PROTECT STREAM BANKS DURING CULVERT REMOVAL AND STABILIZE ALL DISTURBED AREAS WITH EROSION CONTROL MATTING. ACCOMPLISH REMOVAL OF THE CULVERT AND CLEAN UP OF THE AREA WITHOUT CONSTRUCTION EQUIPMENT WORKING IN THE WATERWAY CHANNEL. STORE ALL REMOVED MATERIALS IN AN APPROVED STAGING AREA.

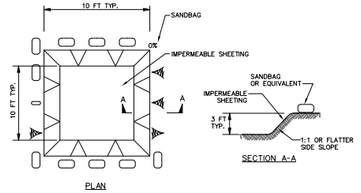
2 OF 2

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

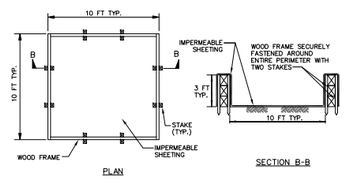
U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL H-6 ONSITE CONCRETE WASHOUT STRUCTURE

STANDARD SYMBOL: CWS



EXCAVATED WASHOUT STRUCTURE



WASHOUT STRUCTURE WITH WOOD PLANKS

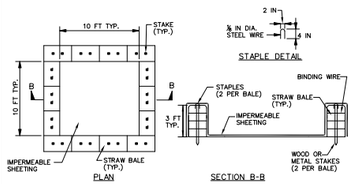
1 OF 2

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL H-6 ONSITE CONCRETE WASHOUT STRUCTURE

STANDARD SYMBOL: CWS



NOTE: CAN BE TWO STACKED BALES OR PARTIALLY EXCAVATED TO REACH 3 FT DEPTH

WASHOUT STRUCTURE WITH STRAW BALES

CONSTRUCTION SPECIFICATIONS

1. LOCATE WASHOUT STRUCTURE A MINIMUM OF 50 FEET AWAY FROM OPEN CHANNELS, STORM DRAIN INLETS, SENSITIVE AREAS, WETLANDS, BUFFERS AND WATER COURSES AND AWAY FROM CONSTRUCTION TRAFFIC.
2. SIZE WASHOUT STRUCTURE FOR VOLUME NECESSARY TO CONTAIN WASH WATER AND SOLIDS AND MAINTAIN AT LEAST 4 INCHES OF FREEBOARD. TYPICAL DIMENSIONS ARE 10 FEET X 10 FEET X 3 FEET DEEP.
3. PREPARE SOIL BASE FREE OF ROCKS OR OTHER DEBRIS THAT MAY CAUSE TEARS OR HOLES IN THE LINER. FOR LINER, USE 10 MIL OR THICKER UV RESISTANT, IMPERMEABLE SHEETING, FREE OF HOLES AND TEARS OR OTHER DEFECTS THAT COMPROMISE IMPERMEABILITY OF THE MATERIAL.
4. PROVIDE A SIGN FOR THE WASHOUT IN CLOSE PROXIMITY TO THE FACILITY.
5. KEEP CONCRETE WASHOUT STRUCTURE WATER TIGHT. REPLACE IMPERMEABLE LINER IF DAMAGED (E.G., RIPPED OR PUNCTURED). EMPTY OR REPLACE WASHOUT STRUCTURE THAT IS 75 PERCENT FULL, AND DISPOSE OF ACCUMULATED MATERIAL PROPERLY. DO NOT REUSE PLASTIC LINER. WET-VACUUM STORED LIQUIDS THAT HAVE NOT EVAPORATED AND DISPOSE OF IN AN APPROVED MANNER. PRIOR TO FORECASTED RAINSTORMS, REMOVE LIQUIDS OR COVER STRUCTURE TO PREVENT OVERFLOWS. REMOVE HARDENED SOLIDS, WHOLE OR BROKEN UP, FOR DISPOSAL OR RECYCLING. MAINTAIN RUNOFF DIVERSION AROUND EXCAVATED WASHOUT STRUCTURE UNTIL STRUCTURE IS REMOVED.

2 OF 2

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

SEDIMENT CONTROL WILL BE STRICTLY ENFORCED

FOR EROSION AND SEDIMENT CONTROL ONLY.

COMPANY NAME

COMPANY NAME
COMPANY ADDRESS
CITY, STATE ZIP CODE
COMPANY PHONE NO. COMPANY FAX NO.

DESIGNED: ___
DRAWN: ___
CHECKED: ___
APPROVED: ___

"PROFESSIONAL CERTIFICATION:

I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND."

LICENSE NO. _____

EXPIRATION DATE: _____

REVISION NO.	REVISION DATE	DESCRIPTIONS

XX% SUBMISSION

BWI THURGOOD MARSHALL OR MARTIN STATE LOGO

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION

OFFICE OF DESIGN AND CONSTRUCTION

PROJECT TITLE: PROJECT TITLE

SHEET TITLE: EROSION AND SEDIMENT CONTROL DETAILS 8

SCALE: NONE

DATE: DATE

CONTRACT NO.: MAA-CO-XX-XXX

SHEET NO.: ___

PATH/FILENAME

APPENDIX D

STANDARD SPECIFICATIONS

MARTIN STATE AIRPORT

BWI BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

STANDARD SPECIFICATIONS

MAA LANDSCAPE SPECIFICATIONS
- ITEM 900 – LANDSCAPING
- ITEM 901 – TOPSOIL
- ITEM 902 – PLANT INSTALLATION
- ITEM 903 – SEEDING
- ITEM 904 – SODDING
- ITEM 905 – MULCHING
- APPROVED SPECIES LIST
- APPROVED INSTALLATION METHODS

SOLE SOURCE SYSTEMS AND EQUIPMENT
- SECTION 02553 – NATURAL GAS DISTRIBUTION
- SECTION 08711 – DOOR HARDWARE
- SECTION 13851 – FIRE ALARM SYSTEM
- SECTION 16430 – POWER MONITORS FOR LOW VOLTAGE SWITCHGEAR
- SECTION 16442 – PANELBOARDS
- SECTION 16714 – FLEXIBLE RESPONSE SYSTEM
- SECTION 16724 – CONTROLLED ACCESS SECURITY SYSTEM
- SECTION 16740 – PUBLIC ADDRESS SYSTEM
- SECTION 16782 – CLOSED-CIRCUIT TELEVISION (CCTV) SYSTEM
- SECTION L-109 – MODIFICATIONS AND ADDITIONS TO AIRFIELD LIGHTING CONTROL SYSTEM

OPERATION AND MAINTENANCE DATA
- SECTION 017823 – OPERATION AND MAINTENANCE DATA

COMMUNICATIONS SYSTEMS AND INFRASTRUCTURE
- SECTION 270000-TC – COMMON WORK
- SECTION 270526-TC – GROUNDING AND BONDING
- SECTION 270528-TC – HANGERS AND SUPPORTS
- SECTION 270553-TC – IDENTIFICATION
- SECTION 271116-TC – CABINETS, RACKS, FRAMES AND ENCLOSURES
- SECTION 271119-TC – TERMINATION BLOCKS AND PATCH PANELS
- SECTION 271313-TC – CABLE SPLICING AND TERMINATION
- SECTION 271323-TC – OPTICAL FIBER SPLICING AND TERMINATIONS

- Section 271343-TC – Communications Services Cabling
- Section 271519-TC – Horizontal Cabling
- Section 271543-TC – Faceplates and Connectors for Systems
- Section 275116-TC – PA and Emergency Tenant Paging

Building Automation Systems
- Section 230519 (partial) – Air Flow Measuring System
- Section 230519 (partial) – Flow Meters
- Section 230900 – Building Automation Systems
- Section 262923 (partial)– Variable-Frequency Motor Controller

Security Requirements During Construction
- Item X-1 – Security Requirements During Construction

Sensitive Security Information
- Item X-2 – Sensitive Security Information (SSI) System Requirements During Construction

Maintenance, Repair and Operating Items (MROI)
- Item X-3 – Maintenance, Repair and Operating Items (MROI)

Management of Wastes
- Section X-105 – Management of Universal Wastes
- Section X-110 – Management of Radioactive Wastes

Crushed Aggregate Base Course
- Item P-209 – Crushed Aggregate Base Course

Plant Mix Bituminous Pavements
- Item P-401 – Plant Mix Bituminous Pavements

Passenger Boarding Bridge Specifications
- Item PBB-100 Apron Drive Passenger Boarding Bridges

MAA
LANDSCAPE SPECIFICATIONS

MARTIN STATE AIRPORT

BWI BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

ITEM 900 LANDSCAPING

INTRODUCTION: The Maryland Aviation Administration (MAA) faces many challenges with respect to local, State and Federal regulations regarding construction and construction-related activities at MAA owned and operated airport properties, including the Baltimore/Washington International (BWI) Airport. Maryland is the only state with a Forest Conservation Act (FCA) that regulates impacts to forested areas and that has enforceable planting requirements. The Federal Aviation Administration (FAA) mandates height restrictions for all objects that have the potential to penetrate imaginary air surfaces utilized by pilots during takeoff and landings, and it provides enforceable guidelines for activities that have the potential to attract hazardous wildlife. MAA considers the requirements set forth by both FAA and the State of Maryland when undertaking construction projects.

To comply with these regulations, MAA has completed a Forest Stand Delineation, Reforestation Master Plan, and Forest Management Plan (Draft) that comply with the multi-agency regulations and restrictions. The Reforestation Master Plan specifies areas set aside for forest conservation and retention. Long-term management of forested resources on BWI Airport property is addressed by the Forest Management Plan. As a responsible landowner, MAA insists that all construction and construction-related activities regarding temporary, short-term, or long-term landscaping activities comply with applicable State and Federal regulations. These regulations include:

- The State of Maryland Forest Conservation Act;
- The State of Maryland Forest Conservation Technical Manual;
- COMAR (Agricultural Article Sections 8-101 through 8-501; 8-801 through 8-806; 9-101 through 9-110; and 9-201 through 9-214.); and
- Federal Aviation Administration Advisory Circular 150/5370-10A, Items T-901 through T-908.

In addition, MAA requires all construction and construction-related activities be in accordance with the Reforestation Master Plan for BWI Airport and the Forest Conservation Plan for the specific project. The following documents are available upon request to assist contractors with adherence to these regulations:

- Reforestation Master Plan for Baltimore/Washington International Airport;
- Forest Conservation Plan for appropriate project;
- Maryland Forest Conservation Act;
- FAA Advisory Circular 150/5200-33, "Hazardous Wildlife Attractants On or Near Airports;"
- FAA Advisory Circular 150/5370 - 2 Items P-151 through 156 (as amended by MAA); and
- FAA Advisory Circular 150/5370-10A Items T-901 through T-908 (as amended by MAA).

Each construction project has its own Forest Conservation Plan that is prepared by the design consultant. ***A copy of the Forest Conservation Plan for the specific project shall be kept on site during all hours of operation.***

PURPOSE: These specifications are provided to Contractors performing landscaping and landscape-related work for MAA to ensure adequacy, consistency, and conformance with applicable state and federal regulations. In certain cases, such as planting, seeding, and sodding, specifications were intentionally designed to reduce the attractiveness of certain areas to wildlife, and thus reduce the risk of wildlife strikes by aircraft. Contractors performing activities related to landscaping for MAA shall adhere to these specifications.

SEQUENCING OF TASKS: Tasks performed by the Contractor shall occur in a logical and efficient sequence. The Contractor shall provide sufficient time for testing and analysis to be completed without compromising the sequencing of tasks. Coordination with the designated MAA Engineer is critical for efficient completion of tasks. MAA will not reimburse the Contractor for time or materials lost as a result of failure to comply with these standards, MAA plan reviews, or the State of Maryland Forest Conservation Act.

Limits of Disturbance and Forest Retention Areas shall be identified as follows:

- **Limits of Disturbance:** The limits of disturbance of the project area shall be clearly identified with "Forest Retention Area" signs attached to stakes placed at 50-foot intervals. Diversion dikes and silt fences shall be in place prior to any disturbance.

- **Forest Retention Area Boundaries:** For all projects conducted within 75 feet of a forest retention area, the Contractor will identify the boundary of the forest retention area with ½-inch blaze orange flagging at 100-foot intervals on perimeter trees. The contractor will install blaze orange plastic mesh fence (see Appendix B) along the entire forest retention area offset 45 feet from the forest retention area boundary. If necessary, "specimen tree signs" (see Appendix B) will be installed on specimen trees and appropriate protection measures will be followed as specified in the State Forest Conservation Technical Manual.

- **Pre-construction Site Inspection**: After the forest retention limits of disturbance (LOD) and boundaries have been delineated, the contractor will notify the Office of Facilities Planning and the Department of Natural Resources (DNR) Forest Service, to schedule a walk through inspection of the site. The DNR representative will inspect the forest retention boundary marking, discuss the proposed construction timetable, and discuss additional requirements that may be necessary. MAA and DNR shall approve all plans prior to the initiation of work.

Planting Plans: The following design standard should be used to determine appropriate plant material for use in landscaping and site stabilization in accordance with the FAA advisory circular 150/5200-33, "Hazardous Wildlife Attractants on or Near Airports":

- Use native plants whenever possible;
- Use plants with a minimal wildlife attractiveness value. See Draft List of Recommended species for Construction Plantings;
- Use sterile plants or plants that exhibit minimal seed production;
- Reduce mowing requirements in long narrow areas or areas less than 1,000 square feet by planting low growing shrubs or other alternative ground covers;
- Plant in clusters and group species in communities in large contiguous areas;
- Create distinct breaks between vegetation strata;
- Avoid planting low-growing trees, shrubs, brambles, and vines at the edges of a forest where the forest meets the turf or scrub/shrub areas to reduce the edge effect; and
- All plant material used by the contractor for temporary, short- term landscaping or long-term landscaping shall be from the MAA approved plant materials list (see Draft List of Recommended Species for Construction Plantings).

Deviations from these standards require specific justification and approval by the MAA Office of Facilities Planning.

Specifications: Landscape activities shall be conducted according to the document *Specifications for Performing Landscaping Activities on Baltimore/Washington International and Martin State Airport Properties.*

Compliance: MAA acknowledges that these specifications vary slightly from the Natural Resources Conservation Service Standards for Critical Area Planting (MD 342). However, this specification was approved by the Maryland Department of the Environment, Water Management Administration, the United States Department of Agriculture's Wildlife Services Division, and the Natural Resources Conservation Service in May 2001, and satisfies compliance for MD 378 projects.

Post Construction: Once construction activities (including reestablishment of vegetation) have ceased, the contractor is required to remove all flagging and protective measures (with the exception of forest retention signage) from both the forest retention area and the construction site. MAA has the right to retain final payment until aforementioned actions have been performed.

ITEM 901 TOPSOIL

DESCRIPTION

901-1 GENERAL. This item provides specifications for topsoil and for topsoil-related activities such as preparation of ground surfaces, removal of topsoil from designated areas, placement and spreading of topsoil, and soil stabilization methods. All activities shall conform with the standards described in this specification and occur at locations clearly indicated on site plans or as directed by the MAA Engineer.

MATERIALS

901-2.1 TOPSOIL. Topsoil is a component of soil, composed of the surface layer of soil containing organic matter and free from any admixture of refuse or other materials toxic to plant growth. Topsoil shall be reasonably free from subsoils as well as all stumps, roots, brush, stones (1 inch or more in diameter), clay lumps, or similar objects. Brush and other vegetation that will not be incorporated with the topsoil during handling operations shall be removed. Topsoil shall be free from any parts of Johnson grass (*Sorgum halepense*), Canada thistle (*Circium arvense*) or phragmites (*Phragmites australis*) in addition to the following state designated noxious weeds: annual bluegrass (*Poa annua*), Bermuda grass (*Cynodon dactylon*), bindweed (*Calystegia* spp.), cocklebur (*Xanthium* spp.), corn cockle (*Agrostemma githago*), dodder (*Cuscuta* spp.), giant foxtail (*Setaria magna*), horse nettle (*Solanum carolinense*), spurred anoda (*Anoda* spp.), wild garlic (*Allium vineale*), and wild onion (*Allium canadense*).

Topsoil shall conform to the standards required by the Maryland State Highway Administration as summarized below. Topsoil, unless otherwise specified or approved, shall have a pH range of approximately 6.0 to 7.5, as determined by laboratory testing. The organic content may not be less than 3% nor more than 20% as determined by the wet-combustion method (chromic acid reduction). Topsoil shall conform to the following size and texture specifications:

SIEVE SIZE	MINIMUM PERCENT SOIL PASSING BY WEIGHT
50.00 mm (2 in.)	100
4.75 mm (No. 4)	90
2.00 mm (No. 10)	80

SOIL PARTICLE SIZES AND TEXTURES	PERCENT PASSING BY WEIGHT
Sand (2.0-0.050 mm)	20-75
Silt (0.050-0.002 mm)	10-60
Clay (less than 0.002 mm)	5-30

901-2.2 INSPECTION AND TESTING. Within 10 days following acceptance of the bid, the Contractor shall notify the MAA Engineer of the proposed source of topsoil to be furnished for the project. The topsoil shall be inspected to determine whether the soil is appropriate for use and conforms to MAA standards. During the inspection, the Contractor may be required to collect representative soil samples from several locations within the area under consideration and to the proposed stripping depths for content analysis as described in Paragraph 2.1 of this Item. Samples shall be tested for pH, content of organic matter, particle size, and texture (percentage of sand, silt, and clay).

901-2.3 SOILS FOR REPAIR. Soils to be used for areas in need of repair shall be of equal quality or greater than those that exist in adjacent areas and shall meet the specifications described in Paragraph 901-2.1.

CONSTRUCTION METHODS

901-3.1 GENERAL. Areas receiving topsoil shall be clearly shown on the site plan. If topsoil is available on site, locations of stockpiles or areas to be stripped of topsoil and the associated stripping depths also shall be shown on site plans. Suitable equipment necessary for proper preparation and treatment of the ground surface, stripping of topsoil, and handling and placing of all required materials shall be on site, in good condition, and approved by the MAA Engineer before topsoil operations begin.

901-3.2 PREPARATION OF GROUND SURFACES. Prior to depositing and spreading topsoil on a given area, the surface shall be loosened by discs, spike-tooth harrows, or other means approved by the MAA Engineer, to a minimum depth of 2 inches to facilitate bonding of the topsoil with the soil. The surface of the area receiving topsoil shall be clear of all stones greater than 1 inch in diameter as well as any litter or other materials that may be detrimental to proper bonding, the rise of capillary moisture, or the proper growth of the desired plants. Areas that may be too compact to respond to these operations shall receive special scarification prior to application of any soil.

Grades on the area to receive topsoil, previously established by the Contractor or others, and shown on site plans, shall be maintained in a true and even condition. Where grades have not been established, the areas shall be smooth-graded and the surface left at a prescribed grade in an even and properly compacted condition to prevent, insofar as practical, the formation of low areas or pockets where water may stand. Damages caused by erosion or other forces that occur after the completion of grading shall be repaired prior to the application of topsoil. The Contractor will repair such damages, which may include filling gullies, smoothing irregularities, and repairing other incidental damages prior to the application of topsoil.

901-3.3 OBTAINING TOPSOIL. Prior to stripping of the topsoil from designated areas, all vegetation, briers, stumps and large roots, rubbish, and stones that might interfere with subsequent operations shall be removed using methods approved by the Engineer. Heavy sods or other cover shall be removed.

901-3.3.1 SALVAGED TOPSOIL (TOPSOIL OBTAINED ON SITE). When suitable topsoil is available on site, the Contractor shall salvage this material from the areas as indicated on site plans and to the depth directed by the MAA Engineer. The salvaged topsoil shall either be spread on areas that have already been tilled and smooth-graded or stockpiled in areas previously approved by the MAA Engineer and indicated by site plans. Any topsoil stockpiled by the Contractor shall be removed from the site and properly stored at an MAA-designated location for future use. Any topsoil that has been stockpiled on the site by others and is no longer required for topsoiling purposes shall be removed from the site and properly disposed of by the Contractor. All stockpile sites and adjacent areas that have been disturbed by the Contractor shall be graded and put into a condition acceptable for seeding or other landscaping activities.

901-3.3.2 FURNISHED TOPSOIL (TOPSOIL OBTAINED OFF SITE). When topsoil is secured off site, the Contractor shall locate and obtain the supply with the approval of the MAA Engineer. The Contractor shall notify the MAA Engineer sufficiently in advance of operations so that necessary measurements and tests can be performed. The Contractor shall only remove the topsoil from approved areas and to the depth as directed. The topsoil shall be hauled to the site of work and either placed for spreading by others or spread by the Contractor as specified by site plans. Any topsoil hauled to the site of work and stockpiled shall be removed from the site following completion of the task and properly stored at an MAA-designated location for future use.

901-3.4 SPREADING TOPSOIL. Topsoil shall be evenly spread to a minimum uniform depth of 4 inches after compaction on all areas, with the exception of those areas with a finished grade of 4:1 or steeper. In these sloped areas topsoil should be spread to a minimum depth of 4 inches. Spreading shall not occur when the ground or topsoil is frozen, excessively wet, or otherwise in a condition detrimental to the work. Spreading shall be conducted so that turfing operations can proceed with minimal soil preparation.

After spreading the topsoil the Contractor shall collect and dispose of rocks (1 inch or more in diameter), roots, litter, or any other foreign material occurring on the surface of the topsoil. Large stiff clods and hard lumps of soil shall be pulverized. After removal of such objects has been completed, the topsoil shall be graded. Any topsoil or other dirt falling upon pavements as a result of hauling or handling of topsoil shall be promptly removed and disposed of by the Contractor.

901-3.5 SOIL STABILIZATION MATTING. The need for soil stabilization matting will be approved by the MAA Engineer on a project-by-project basis. Soil stabilization matting shall consist of machine-produced mats of wood fibers, wood excelsior, or biodegradable man-made fibers and shall be 40 to 96 inches wide. Matting shall have a uniform thickness and distribution of fibers. All soil stabilization matting shall be smolder resistant. If chemicals are required during application of matting, the chemicals shall be non-leaching, nontoxic to vegetation (including the germination of seed), and non-injurious to the skin.

If excelsior matting is utilized, the top and bottom shall be covered by a biodegradable extruded plastic netting with a maximum mesh size of 2 square inches (50 by 50 mm) or be covered (on the topside) by netting machine sewn on 2-inch (50 mm) centers along the longitudinal axis of the material. The average breaking strength of any two strands of netting shall be at least 5 pounds. Netting shall be entwined with matting fibers in a manner that will provide adequate reinforcement against damage during handling and placement and shall resist degradation for a minimum of six months and a maximum of one year.

901-3.6 STAPLES. Staples shall be either U- or T-shaped steel wire with minimum gauges of No. 11 (3.061 mm) and No. 8 (4.115 mm) respectively. The U-shaped staples shall be at least 6 inches (150 mm) long and average between 1 and 1.5 inches (25 to 40 mm) wide. The T-shaped staples shall have a primary leg 8-inches (200-mm) long, a secondary leg 1-inch (25 mm) long, and a 4-inch (100-mm) head.

METHOD OF MEASUREMENT

Topsoil will be measured by volume in cubic yards computed by the method of end areas. The quantity of topsoil to be paid for will be measured by the number of square yards measured in place and will account for depth.

901-4.1 Salvaged topsoil (topsoil obtained on site) will be measured by the number of square yards of topsoil measured in its original position, and again after it has been stripped or excavated. Topsoil stockpiled by others and removed for topsoiling by the Contractor will be measured by the number of square yards of topsoil measured to a specific depth in the stockpile. Salvaged topsoil will be measured by volume in either cubic yards computed by the method of end areas or square yards at 1-, 2-, or 4-inch depths.

901-4.2 Furnished topsoil (topsoil obtained off site) will be measured by the number of square yards of topsoil measured in its original position, and again after it has been stripped or excavated. Furnished topsoil will be measured by volume in either cubic yards computed by the method of end areas or square yards at 1-, 2-, or 4-inch depths.

BASIS OF PAYMENT

901-5 Payment will be made at the contract unit price per cubic yard for topsoiling. This price will provide full compensation for furnishing all materials and for all preparations, placing, and spreading of materials, and for all labor, equipment, tolls, and incidentals necessary for the completion of the task.

Payment will be made under:

Item 901-5.1	Topsoil --per cubic yard
Item 901-5.2	Salvaged Topsoil – per square yard at 1-inch depth
Item 901-5.3	Furnished Topsoil – per square yard at 1-inch depth
Item 901-5.4	Salvaged Topsoil – per square yard at 2-inch depth
Item 901-5.5	Furnished Topsoil – per square yard at 2-inch depth
Item 901-5.6	Salvaged Topsoil – per square yard at 4-inch depth
Item 901-5.7	Furnished Topsoil – per square yard at 4-inch depth

END OF ITEM 901

ITEM 902 PLANT INSTALLATION

DESCRIPTION

902-1 GENERAL. This item provides specifications for plant materials to be used for landscaping activities. All activities shall conform to the standards described in this specification and occur at locations clearly indicated by site plans or as directed by the MAA Engineer.

MATERIALS

902-2.1 PLANTS.

902-2.1.1 SPECIES. Preferred species that appear in Appendix A "Approved Landscape Plant Material" shall be used unless otherwise approved by the MAA Engineer. The authority for all plant names shall be the current printing of *Hortus Third*[1]. Representative samples of every shipment of plant materials shall be labeled as to genus, species, and specified size.

902-2.1.2 HEALTH. All plants, unless otherwise specifically permitted, shall conform to the standards of the current edition of *American Standard for Nursery Stock*[2] as approved by the American Standards Institute, Inc. All plants, unless otherwise specifically permitted, shall be nursery grown and shall have been grown within plant hardiness zones 5, 6, 7, or the Virginia portion of zone 8A as recorded in the current edition of *USDA Plant Hardiness Zone Map*[3], prepared by the U.S. National Arboretum, Agricultural Research Service, U.S. Department of Agriculture. All plant materials shall have normal, well developed branches and a vigorous root system. They shall be healthy plants free from physical defects, plant diseases, and insect pests. Plant materials grown in fields or blocks that show evidence of containing any parts of Johnson grass (*Sorgum halepense*), Canada thistle (*Cirsium arvense*), or Phragmites (*Phragmites australis*) will not be accepted. Shade and flowering trees shall be symmetrically balanced. Major branches shall not have V-shaped crotches capable of causing structural weakness. Trunks shall be free of unhealed branch removal wounds greater than 1 inch (25 mm) in diameter. Shade trees shall have a single main trunk. Trunks shall be free of branches below the following heights:

- 1-1/2 to 2-1/2 inch (40- to 65-mm) caliper trees = 5 feet (1.5 meter) height
- 3-inch (75 mm)-caliper and greater trees = 6 feet (1.8 meter) height.

902-2.1.3 INSPECTION AND TESTING. The initial inspection for conformance with these specifications will be made at the nursery, holding area, or job site. The condition of all plant material will be subject to reinspection for the life of the Contract. Inspection and tagging of plant material with a MAA seal prior to digging will occur at the discretion of the MAA

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[1] Staff of the L.H. Bailey Hortorium, Cornell University, 1976. *Hortus Third; A Concise Dictionary of Plants Cultivated in the United States and Canada.* Barnes and Noble, Inc. New York, New York.
[2] American Nursery and Landscape Association, 1990. *American Standard for Nursery Stock.*
[3] US National Arboretum, Agricultural Research Service, US Department of Agriculture, 1990. *USDA Plant Hardiness Zone Map.*

Engineer. Material arriving with broken seals (if tagging is required), broken or loose root balls, mechanical damage, insufficient protection and/or shriveled or undeveloped roots will not be accepted. All container grown plants shall be well rooted, vigorous, and established in the size pot specified, shall have well balanced tops for the pot size, and shall not be root bound. All plant materials shall be declared and certified free from disease and insects of any kind as required by law for the necessary interstate or interdistrict transportation.

902-2.1.4 SUBSTITUTION OF PLANT MATERIALS. No substitutions shall be made without the permission of the MAA Office of Facilities Planning. In cases where plant materials are not available at the time of planting, the Contractor shall submit, in writing, evidence that the plants are unavailable. If necessary, MAA will determine suitable substitutions.

902-2.2 FERTILIZER. Fertilizer, if necessary, shall be standard commercial fertilizer and shall meet the requirements of applicable state and federal laws as well as standards set forth by the Association of Official Agricultural Chemists.

902-2.3 SOIL AMENDMENTS. Soil amendments shall be commercial grade and shall meet the requirements of applicable state and federal laws as well as standards set forth by the Association of Official Agricultural Chemists.

902-2.4 WATER. All water used shall be obtained from fresh water sources and shall be free from injurious chemicals and other toxic substances harmful to plant life. Brackish water shall not be used at any time. The Contractor shall identify all sources of water to the Engineer at least two weeks prior to use. The Engineer may take samples of the water at the source or from the tank at any time and submit the samples to a laboratory to identify chemical and saline content. The Contractor shall not use any water from any source that is disapproved by the Engineer following such tests.

CONSTRUCTION METHODS

902-3.1 GENERAL. This section provides approved methods for installation of plant material and includes specifications for soil preparation, fertilization, installation, and post-installation care. Prior to beginning any planting activities, a planting design prepared by a landscape architect or a qualified official shall be submitted to and approved by the MAA Office of Facilities Planning on behalf of the MAA Engineer. The planting design shall be to scale and clearly show the species to be planted, locations of individual plants, size of individual plants, and spacing requirements. The MAA Office of Facilities Planning shall approve deviations from an approved design. The approved planting design shall be kept on site during all working hours.

902-3.2 PREPARATION OF GROUND SURFACES. Areas designated for planting shall be properly prepared before plant installation occurs. The soil of a properly prepared planting bed shall be loose and friable to a minimum depth of 1 foot (30.5 cm), laboratory tested, and properly amended based on laboratory recommendations. The soil of a properly prepared planting bed shall be free of any stones larger than 1 inch in diameter, sticks, stumps, and/or other debris that may interfere with plant installation, growth of plant material, and subsequent maintenance of

planted areas. The soil of a properly prepared planting bed shall be properly graded to conform with the required lines, grades, and cross sections as shown on the planting design plan.

902-3.2.1 TOPSOIL. Topsoil, if necessary, shall conform to the standards and be incorporated with existing soils according to procedures described in Item 901 - "TOPSOILING" prior to laboratory analysis of soil and subsequent addition of any necessary soil amendments.

902-3.2.2 FERTILIZER. Fertilizer, if necessary, shall be applied at concentrations and rates suggested by the soil testing laboratory based on results of soil analysis. Fertilizer, unless otherwise specified, shall be added by hand on a plant-by-plant basis. Unless specifically required, lime shall not be added to areas to be planted.

902-3.2.3 SOIL AMENDMENTS. Soil amendments shall be added according to recommendations made by the laboratory based on analytical results. These recommendations shall be provided to and approved by the MAA Engineer prior to amendment of any soil.

902-3.3 OBTAINING PLANT MATERIAL. Plant material shall be free from all pests and diseases and conform to the standards described in Section 902-2 "MATERIALS."

902-3.3.1 NURSERY STOCK PLANTS. Nursery stock plants shall be obtained from a nursery certified by the Associated Landscape Contractors of America.

902-3.3.2 TRANSPLANTED PLANTS. Plants approved for transplanting shall be vigorous and free from all pest infestations and/or diseases. Potential plant materials for transplanting shall be inspected by a Licensed Arborist and subsequently approved by the MAA Engineer. Plants approved for transplanting shall be dug up, cared for, and transported according to the standards of the Associated Landscape Contractors of America.

902-3.4 PLACEMENT OF PLANT MATERIALS. Prior to installation of plant material, the site design shall be reviewed, and individual plants shall be placed at locations on the prepared bed as indicated by the site design. Once the design layout has been marked on the prepared bed, the Contractor shall determine if the proposed sizes and spacing of plants are reasonable. Alterations to the landscape design shall be performed by a qualified Landscape Architect and approved by the MAA Office of Facilities Planning on behalf of the MAA Engineer. The planted bed shall be graded to the specifications indicated by the site design.

902-3.5 INSTALLATION OF PLANT MATERIAL. All plant material shall be installed in satisfactorily prepared beds according to the methods detailed in *Landscape Specification Guidelines* published by the Associated Landscape Contractors of America. Portions of these guidelines relevant to digging, backfilling, and securing of plant materials are included as Appendix B.

If circumstances exist that delay installation of plant material, the Contractor shall provide adequate care required to maintain the plants in a healthy condition until installation can be performed. Such care may include watering, protection from excessive sun and wind exposure,

and protection from damage by wildlife. Plants must be stored in a location that does not cause an increased risk of wildlife strike hazards and is approved by the MAA Engineer (plant material must not be stored near aircraft operation areas or approach/departure paths). Materials that deteriorate beyond the potential for recovery shall not be installed. It will be the Contractor's responsibility to replace these items at no additional cost to MAA.

902-3.5 POST INSTALLATION. After installation of all plant materials to a bed, subsequent activities such as seeding, sodding, or mulching shall be conducted as indicated by the site design. Methods for completion of these activities shall conform to the standards set forth in Items 903 "Seeding," 904 "Sodding," and 905 "Mulching."

902-3.6 MAINTENANCE. Maintenance of installed plant material includes watering, weed and pest control, health inspections, and replacements as needed.

METHOD OF MEASUREMENT

902-4 This item will be measured on a per plant basis.

BASIS OF PAYMENT

902-5 This item will be paid for on a per plant basis.

Payment will be made under Item 902-5 Planting.

END OF ITEM 902

ITEM 903 SEEDING

DESCRIPTION

903-1.1 GENERAL. This item provides specifications for seeding of areas as designated on plans or as directed by the MAA Engineer. The species, mixtures, and methods of application provided in this item have been designed to reduce the attractiveness of airport grounds to wildlife. Only MAA-approved species, mixtures, and rates of application provided in this item may be used to establish vegetation. All activities associated with seeding including soil preparation, seed application, fertilization, and maintenance shall also conform to these approved standards.

MATERIALS

903-2.1 SEED. All seed shall comply with the Maryland Seed Law (Agricultural Article of the Annotated Code of Maryland). Only MAA-approved species, mixtures, and rates of application provided in this item may be used to establish vegetation. Seed will be sampled and tested by an inspector from the Turf and Seed Section, Maryland Department of Agriculture (MDA), Annapolis, Maryland. All lawn and turf seed and mixtures shall be free from the following state-listed restricted noxious weeds:

corn cockle (*Agrostemma githago*),
bentgrass (*Agrostis* spp.)[4],
redtop (*Agrostis gigantea*) [1]
wild onion (*Allium canadense*),
wild garlic (*Allium vineale*),
bindweed (*Calstegia* spp.),
dodder (*Cuscuta* spp.),
Bermuda grass (*Cynodon dactylon*),
orchardgrass (*Dactylis glomerata*),
tall fescue (*Festuca arundinacea*) [1]
meadow fescue (*Festuca pratensis*) [1],
velvetgrass (*Holcus lanatus*),
annual bluegrass (*Poa annua*),
rough bluegrass (*Poa trivialis*)[1],
timothy (*Phleum pratense*), and
Johnson grass (*Sorgum halepense*).

Restricted noxious-weed seed may not exceed 0.5 percent by weight of any seed mixture. In addition, all seeds sold in Maryland shall be free from the following listed prohibited noxious weeds: balloonvine (*Cardiospermum halicacabum*), quackgrass (*Elytrigia repens*), sicklepod (*Senna obtusifolia*), sorghum (*Sorghum* spp.), Canada thistle (*Cirsium arvense*), plumeless thistle

[4] These species may be included as a labeled component of a mixture when each is present in excess of five percent of the mixture by weight.

(*Carduus* spp.-includes musk thistle and curled thistle), and serrated tussock (*Nassella trichotoma*).

903-2.1.1 APPROVED SPECIES. The following table contains species that are approved by MAA for use in seed mixtures. Purity requirements and germination requirements are also provided.

APPROVED PLANT SPECIES
MAA SEED MIXTURES

	Purity[a] Not Less than %	Minimum % Germination[b]	Pure Live Seed Factor
Certified Turf-Type Tall Fescue (*Festuca arundinacea*)	98	90	1.13
Certified Kentucky Bluegrass (*Poa pratensis*)	90	80	1.39
Fowl Bluegrass (*Poa palustris*)	90	80	1.39
Hard Fescue (*Festuca longifolia*)	98	90	1.13
Chewings Red Fescue (*Festuca rubra commutata*)	98	90	1.13
Annual Ryegrass (*Lolium multiflorum*)	95	85	1.24
Perennial Ryegrass (*Lolium perenne*)	90	80	1.39
Creeping Bentgrass (*Agrostis stolonifera*)	90	80	1.39
Switchgrass (*Panicum virgatum*)	90	80	1.39
Little Bluestem (*Andropogon scoparius*)	62	94	1.71

[a] The percentage weight of pure seed present shall be free of any agriculture seeds, inert matter, and other seeds distinguishable by their appearance.
[b] The percentage of germination shall be actual sprouts and shall not include hard seeds unless specifically permitted by the MAA Engineer.

903-2.1.2 PURITY. All seed shall be free of all state-designated noxious weeds listed in Paragraph 2.1.1 and conform to MAA specifications. To ensure compliance, MAA requires sampling and testing of seed by the Turf and Seed Section, Maryland Department of Agriculture (MDA). The Contractor shall furnish the MAA Engineer with duplicate signed copies of a statement by the Turf and Seed Section certifying that each lot of seed has been laboratory tested within six months of date of delivery. This statement shall include the following information:

- name and address of laboratory,
- date of test,
- lot number,
- the results of tests as to name, percentages of purity and of germination,

- percentage of weed content for the seed furnished,
- and, in the case of a mixture, the proportions of each kind of seed.

Seed shall be furnished in standard containers with the seed name, lot number, net weight, percentages of purity, germination rate and hard seed, and percentage of maximum weed seed content clearly marked. All seed containers shall be tagged with a MDA supervised mix program seed tag.

903-2.1.3 MIXTURES AND APPLICATION RATES. Only seed mixtures and application rates described in this item may be used unless otherwise approved by the MAA Engineer. Seed mixtures shall meet criteria detailed in Paragraph 903-2.1.2. Seed mixtures have been formulated to minimize the attractiveness of areas to wildlife of common landscape scenarios. The appropriate seed mixture for application will be designated based on environmental conditions and may vary from site to site. All planting rates listed are in pounds of Pure Live Seed (PLS) per acre.

Seed mixtures, application scenarios, and rates *for permanent cool-season grasses* are as follows:

a. Seed Mixture No. 1 - relatively flat areas (grade less than 4:1) subject to normal conditions and regular mowing (Application rate = 234 lbs PLS/acre);
b. Seed Mixture No. 2 - sloped areas (grade greater than 4:1) not subject to regular mowing (Application rate = 115 lbs PLS/acre); and
c. Seed Mixture No. 3 - wetlands and their associated buffer zones (Application rate = 131 lbs PLS/acre).

Seed Mixture No. 1: Relatively flat areas regularly mowed and exposed to normal conditions (Application rate = 234 lbs PLS/acre)

Seed	Rate of Application (lbs of PLS/acre)
85% Certified Turf-Type Tall Fescue	192
10% Certified Kentucky Bluegrass	28
5% Perennial Ryegrass	14
Supplemental Seed	
Annual Ryegrass	25

Seed Mixture No. 2: Sloped areas not subject to regular mowing (Application rate = 115 lbs PLS/acre)

Seed	Rate of Application (lbs of PLS/acre)
75% Hard Fescue	85
20% Chewings Fescue	23
5% Kentucky Bluegrass	7
Supplemental Seed	
Redtop	3

Seed Mixture No. 3 - Wetland areas and their associated buffer zones (Application rate = 131 lbs PLS/acre)

Seed	Rate of Application (lbs of PLS/acre)
60% Creeping Bent Grass	83
30% Fowl Bluegrass	34
10% Switchgrass	14
Supplemental Seed	
Redtop	3

903-2.1.4 SEEDING SEASONS. Application of seed and seed mixtures shall occur within a specified seeding season unless otherwise approved by the MAA Engineer. No seed or seed mixtures are to be applied on frozen ground or when the temperature is at or below 35 degrees Farenheit (7.2 degrees Centigrade). Under these conditions, a layer of mulch should be applied in accordance with Item 905, Mulching, to stabilize the site, and permanent seeding should occur in the subsequent seeding season. Seed application may occur during the seeding season dates listed below. Seeding performed after October 20 should be a temporary cover of annual ryegrass and followed by overseeding of the appropriate seed mixture during the spring seeding season.

SEEDING SEASONS	
Permanent Cool-Season Grasses	March 1 to April 20 and August 1 to October 20, inclusive
Temporary Cover of Annual Rye/Redtop	March 1 to April 30 and August 1 to November 30, inclusive
Temporary Cover of Warm-Season Grasses *(Little Bluestem only)*	May 1 to July 31, inclusive. Rate of application should be 13.6 lbs. PLS per acre.

Seeding seasons are based on typical years and can be subject to variation, which may be modified by the MAA Engineer based on seasonal trends.

If the time required to complete any of the operations necessary under this item, within the specified planting season or any authorized extensions thereof, extends beyond the Contract period, then such time will be charged against the Contract time, and liquidated damages will be enforced with respect to this portion of work.

903-2.2 LIME. Lime shall consist of ground limestone and contain at least 85 percent total carbonates. Lime shall be ground to a fineness so that at least 90 percent will pass through a No. 20 mesh sieve and 50 percent will pass through a No. 100 mesh sieve. Dolomitic lime or a high magnesium lime shall contain at least 10 percent magnesium oxide. Lime shall be applied by approved methods detailed in Section 903-3.3 of this item. The rate of application will be based on results of soil tests.

903-2.3 FERTILIZER. Fertilizer shall be standard commercial fertilizer (supplied separately or in mixtures) and meet the requirements of applicable state and federal laws (O-F-241) as well as standards of the Association of Official Agricultural Chemists. Nitrogen-Phosphorus-Potassium (N-P-K) concentrations shall be determined from analysis of soil samples. Methods of fertilizer application shall conform to standards described in Section 903-3.3 of this item. Fertilizer shall be furnished in standard containers that are clearly labeled with name, weight, and guaranteed analysis of the contents (percentage of total nitrogen, available phosphoric acid, and water-soluble potash). Mixed fertilizers shall not contain any hydrated lime or cyanamide compounds. Fertilizers failing to meet the specified analysis may be approved by the MAA Engineer, providing sufficient materials are applied to conform with the specified nutrients per unit of measure without additional cost to MAA.

The fertilizers may be supplied in the following forms:

a. A dry, free-flowing fertilizer suitable for application by a common fertilizer spreader;

b. A finely ground fertilizer soluble in water, suitable for application by power sprayers; or

c. A granular or pellet form suitable for application by blower equipment.

The rate of application will be based on results of soil tests performed by the University of Maryland Soil Testing Laboratory. By law, persons applying fertilizer to State-owned land shall follow the recommendations of the University of Maryland as set forth in the "Plant Nutrient Recommendations Based on Soil Tests for Turf Maintenance" and the "Plant Nutrient Recommendations Based on Soil Tests for Sod Production" (see Appendix B). Application of the fertilizer shall be in a manner that is consistent with the recommendations of the University of Maryland Cooperative Extension.

CONSTRUCTION METHODS AND EQUIPMENT

903-3.1 GENERAL. This section provides approved methods for the application of and includes standards for seedbed preparation, methods of application, and equipment to be used during the process. Lime and fertilizer shall be applied to seeded areas before the seed is spread. The mixture of seed will be determined for sites based on environmental conditions as described in Paragraph 903-2.1.3.

903-3.2 ADVANCE PREPARATION. Areas designated for seeding shall be properly prepared in advance of seed application. The area shall be tilled and graded prior to application of lime and fertilizer, and the surface area shall be cleared of any stones larger than 1 inch in diameter, sticks, stumps, and other debris that might interfere with sowing of seed, growth of grasses, or subsequent maintenance of grass-covered areas. Damage caused by erosion or other forces that occur after the completion of grading shall be repaired prior to the application of fertilizer and lime. The Contractor will repair such damage, which may include filling gullies, smoothing irregularities, and repairing other incidental damage before beginning the application of fertilizer and ground limestone.

If an area to be seeded is sparsely sodded, weedy, barren and unworked, or packed and hard, all grass and weeds shall first be cut or otherwise satisfactorily disposed of, and the soil then scarified or otherwise loosened to a depth not less than 5 inches (125 mm). Clods shall be broken and the top 3 inches (75 mm) of soil shall be worked into a satisfactory condition by discing or by use of cultipackers, rollers, drags, harrows, or other appropriate means.

An area to be seeded shall be considered a satisfactory seedbed (without requiring additional treatment) if it has recently been thoroughly loosened and worked to a depth of not less than 5 inches; the top 3 inches of soil is loose, friable, and is reasonably free from large clods, rocks, large roots, or other undesirable matter; appropriate amounts of fertilizer and lime have been added; and, if it has been shaped to the required grade immediately prior to seeding. For slope areas steeper than 3:1 (three horizontal to one vertical), the subsoil shall be loose to a depth of 1 inch.

After completion of tilling and grading, lime and fertilizer shall be applied within 48 hours according to the specified rate (Paragraphs 903-2.2 and 2.3) and methods (Paragraphs 903-3.3.1 and 903-3.3.2) approved by MAA. The seeding mixture shall be applied within 48 hours after application of lime and fertilizer. To firm the seeded areas, cultipacking shall occur immediately after seeding.

903-3.3 METHODS OF APPLICATION. Lime, fertilizer, and seed mixes shall be applied by either the dry or wet application methods that have been approved by MAA and are detailed below.

903-3.3.1 DRY APPLICATION METHOD

a. Liming. If soil test results indicate that lime is needed, the following procedures will be used: following advance preparation of the seedbed, lime shall be applied prior to the application of any fertilizer or seed and only on seedbeds that have been prepared as described in paragraph 903-3.2. The lime shall be uniformly spread and worked into the top 2 inches of soil, after which the seedbed shall be properly graded again.

b. Fertilizing. Following advance preparations (and liming if necessary), fertilizer shall be spread uniformly at the specified rate to provide no less than the minimum quantity stated in Paragraph 903-2.3.

c. Seeding. Seed mixtures shall be sown immediately after fertilization of the seedbed. The fertilizer and seed shall be lightly raked to a depth of 1 inch for newly graded and disturbed areas.

d. Rolling. After the seed has been properly covered, the seedbed shall be immediately compacted using a cultipacker or an approved lawnroller.

903-3.3.2 WET APPLICATION METHOD/HYDROSEEDING

a. General. The Contractor may elect to apply seed and fertilizer as per Paragraphs c and d of this section in the form of an aqueous mixture by spraying over the previously prepared seedbed using methods and equipment approved by MAA. The rates of application shall be as specified in Paragraphs 903-2.1 through 903-2.3.

b. Spraying Equipment. The spraying equipment shall have a container or water tank equipped with a liquid level gauge capable of reading increments of 50 gallons or less over the entire range of the tank capacity. The liquid level gauge shall be mounted so as to be visible to the nozzle operator at all times. The container or tank shall also be equipped with a mechanical power-driven agitator capable of keeping all the solids in the mixture in complete suspension at all times until used.

The spraying equipment shall also include a pressure pump capable of delivering 100 gallons per minute at a pressure of 100 pounds per square inch. The pressure pump assemblage shall be configured to allow the mixture to flow through the tank when not being sprayed from the nozzle. All pump passages and pipelines shall be capable of providing clearance for 5/8-inch solids. The power unit for the pump and agitator shall have controls mounted so as to be accessible to the nozzle operator. A pressure gauge shall be connected to and mounted immediately behind the nozzle.

The nozzle pipe shall be mounted on an elevated supporting stand in such a manner that it can be rotated through 360 degrees horizontally and inclined vertically from at least 20 degrees below to at least 60 degrees above the horizontal. There shall be a quick-acting, three-way control valve connecting the recirculating line to the nozzle pipe and mounted so that the nozzle operator can control and regulate the amount of flow of mixture to be supplied so that mixtures may be properly sprayed over a distance varying from 20 feet to 100 feet. One shall be a close-range ribbon nozzle, one a medium-range ribbon nozzle, and one a long-range jet nozzle. For ease of removal and cleaning, all nozzles shall be connected to the nozzle pipe by means of quick-release couplings. In order to reach areas inaccessible to the regular equipment, an extension hose at least 50 feet in length shall be provided to which the nozzles may be connected.

c. Mixtures. Lime shall be applied separately in the quantity specified, prior to the fertilizing and seeding operations. Lime should be added to and mixed with water at a concentration not to exceed 220 pounds of lime for every 100 gallons of water. After lime has been applied, the tank should be emptied and rinsed with fresh water. Seed and fertilizer shall be mixed together in the relative proportions specified, but the resulting concentration should not exceed 220 pounds of mixture per 100 gallons of water and should be applied within 30 minutes to prevent fertilizer burn of the seeds.

All water used shall be obtained from fresh water sources and shall be free from injurious chemicals and other toxic substances harmful to plant life. Brackish water shall not be used at any time. The Contractor shall identify all sources of water to the MAA Engineer at least two weeks prior to use. The Engineer may take samples of the water at the source or from the tank at any time and have a laboratory test the samples for chemical and saline content. The Contractor shall not use any water from any source that is disapproved by the Engineer following such tests.

All mixtures shall be constantly agitated from the time they are mixed until they are finally applied to the seedbed. All such mixtures shall be used within 30 minutes from the time they were mixed or they shall be wasted and disposed of at a location acceptable to the Engineer.

d. Spraying. Lime shall be sprayed upon previously prepared seedbeds on which the lime, if required, shall have been worked in already. The mixtures shall be applied using a high-pressure spray which shall always be directed upward into the air so that the mixtures will fall to the ground in a uniform spray. Nozzles or sprays shall never be directed toward the ground in such a manner that might produce erosion or runoff. Particular care shall be exercised to ensure that the application is made uniformly, at the prescribed rate, and to guard against misses and overlapped areas. Predetermined quantities of the mixture shall be used in accordance with specifications to cover specified sections of known areas. To checks the rate and uniformity of application, the applicator will observe the degree of wetting of the ground or distribute test sheets of

paper or pans over the area at intervals and observe the quantity of material deposited thereon.

On surfaces that are to be mulched as indicated by the plans or designated by the MAA Engineer, seed and fertilizer applied by the spray method need not be raked into the soil or rolled. However, on surfaces on which mulch is not to be used, the raking and rolling operations will be required after the soil has dried.

903-3.4 MAINTENANCE OF SEEDED AREAS. The contractor shall protect seeded areas against traffic or other use by warning signs or barricades, as approved by the Engineer. Surfaces gullied or otherwise damaged following seeding shall be repaired by regrading and reseeding as directed. The Contractor shall mow, water as directed, and otherwise maintain seeded areas in a satisfactory condition until final inspection and acceptance of the work.

When either the dry or wet application method outlined above is used for work performed out of season, the Contractor will be required to establish a good stand of grass of uniform color and density to the satisfaction of the Engineer. If at the time when the contract has been otherwise completed it is not possible to make an adequate determination of the color, density, and uniformity of such stand of grass, payment for the unaccepted portions of the areas seeded out of season will be withheld until such time as these requirements have been met.

METHOD OF MEASUREMENT

903-4 The quantity of seeding to be paid for shall be the numbers of acres (or square yard) or portions thereof, measured on the ground surface, completed, and accepted. Separate measurements will be made of the areas seeded with the several seed mixtures specified. No distinction will be made between "graded" areas and "undisturbed" areas in arriving at the total acreage (or square yard) for each area seeded with specified seed mixes. No separate measurements will be made of graded and undisturbed areas for purposes of separate payments.

BASIS OF PAYMENT

903-5.1 The quantity, determined as provided above, will be paid for at the contract unit price per acre (or square yard), or fraction thereof, for seeding, which price and payment shall be full compensation for furnishing and placing all material, including fertilizers, and for all labor, equipment, tools, and incidentals necessary to complete the work prescribed in the item.

Payment will be made under:

Item 903-5.1 Seeding Mixture No. 1 -- per acre
Item 903-5.2 Seeding Mixture No. 1 -- per square yard
Item 903-5.3 Seeding Mixture No. 2 -- per acre
Item 903-5.4 Seeding Mixture No. 2 -- per square yard

Item 903-5.5 Seeding Mixture No. 3 -- per acre
Item 903-5.6 Seeding Mixture No. 3 -- per square yard
Item 903-5.7 Amendments – per acre
Item 903-5.8 Amendments – per square yard
Item 903-5.9 Fertilizer – per acre
Item 903-5.10 Fertilizer – per square yard

END OF ITEM 903

ITEM 904 SODDING

DESCRIPTION

904-1 This item provides standards for furnishing, hauling, and placing approved live sod on prepared areas as indicated on site plans. Sod will only be applied to landscape areas and shall be mowed frequently. All sodding activities shall conform to these specifications at the locations shown on site plans or as directed by the MAA Engineer.

MATERIALS

904-2.1 SOD. Sod furnished by the Contractor shall have a good cover of living or growing grass. This includes grass that is seasonally dormant during the cold or dry seasons and capable of renewing growth after the dormant period. All sod shall be obtained from areas in which the soil is reasonably fertile and contains a high percentage of loamy topsoil. Sod shall be cut or stripped from living, thickly matted turf relatively free of weeds or other undesirable foreign plants, large stones, roots, or other materials that might be detrimental to the development of the sod or to future maintenance. Grass sod shall be Maryland-certified or approved and shall comply with the Maryland Sod Law of the Annotated Code of Maryland (Agricultural Article Sections 9-101 through 9-110). Each load of sod shall bear a Maryland State Approved or Certified label at the time of delivery on the job. Sod shall be either: (1) Bluegrass sod containing not less than 80 percent Kentucky bluegrass (*Poa pratensis*) and not more than 20 percent Red Fescue (*Festuca rubra*); or (2) certified turf type-tall fescue (*Festuca arundinacea*) sod containing not less than 80 percent certified turf type-tall fescue (*Festuca arundinacea*) grass and not more than 20 percent Kentucky Bluegrass (*Poa pratensis*) and Red Fescue (*Festuca rubra*). Any vegetation more than 6 inches in height shall be mowed to a height of 3 inches or less before sod is lifted. Sod, including the soil containing the roots and the emergent plant growth, shall be cut uniformly to a thickness not less than that specified in Section 904-3.4.

904-2.2 LIME. Lime shall conform to standards described in Section 903, "Seeding."

904-2.3 FERTILIZER. Fertilizers and application methods shall conform to the standards previously described in Section 903, "Seeding."

904-2.4 WATER. All water shall conform to the standards previously described in Paragraph 902-2.4, "Water."

904-2.5 SOILS FOR REPAIR. All soils for repairs shall conform to the standards previously described in Paragraph 901-2.3, "Soils for Repair."

CONSTRUCTION REQUIREMENTS

904-3.1 GENERAL. Areas to be sodded shall be clearly indicated by site plans. Areas requiring special ground surface preparation, such as tilling, and those areas in a satisfactory condition that are to remain undisturbed shall also be shown on the plans.

Suitable equipment necessary for proper preparation of the ground surface and for the handling and placing of all required materials shall be on hand, in good condition, and shall be approved by the MAA Engineer before sodding operations begin. The Contractor shall demonstrate to the MAA Engineer, before starting the various operations, that the application of required materials, such as fertilizer and limestone, will be made at the specified rates.

904-3.2 ADVANCE PREPARATION. If the area to be sodded is sparsely vegetated, weedy, barren and unworked, or packed and hard, all existing herbaceous vegetation shall be removed. The soil shall then be scarified or otherwise loosened to a depth of at least 5 inches (125 mm). Clods shall be pulverized, and the top 3 inches (75 mm) of soil shall be worked into a satisfactory bed by discing or use of cultipackers, rollers, drags, harrows, or other equipment approved by the MAA Engineer. The area shall then be properly graded as indicated by site plans.

After grading of areas is complete and prior to the application of fertilizer and limestone, areas to be sodded shall be raked or otherwise cleared of stones larger than 1 inch in diameter, sticks, stumps, and other debris which might interfere with sodding, growth of grasses, or subsequent maintenance of grass-covered areas. If any damage by erosion or other causes has occurred after grading of areas and before beginning the application of fertilizer and ground limestone, the Contractor shall repair such damage. This may include filling gullies, smoothing irregularities, and repairing other incidental damage.

An area to be sodded will be considered a satisfactory seedbed without requiring additional treatment if it recently has been thoroughly loosened and worked to a depth of at least 5 inches as a result of grading operations and, if immediately prior to sodding, the top 3 inches of soil is loose, friable, reasonably free from large clods, rocks, large roots, or other undesirable matter, and is shaped to the required grade. For slope areas steeper than 3:1 (three horizontal to one vertical) the subsoil shall be loosened to a depth of 1 inch. Lime and fertilizer shall be applied within 48 hours after tilling as described in 903-3.3 and 3.4. The sod shall be applied immediately after the lime and fertilizer have been worked into the soil.

904-3.3 APPLICATION OF FERTILIZER AND LIME. Following ground surface preparation, fertilizer shall be uniformly spread as described in Section 903-3.3 at a rate that will provide at least the minimum quantity of fertilizer required. If the use of ground limestone is specified, it shall be spread as described in Section 903-3.3, "Methods of Application"; at a rate that will provide at least the minimum quantity of lime required. These materials shall be incorporated into the soil to a depth of at least 2 inches by discing, raking, or other methods

approved by the MAA Engineer. Any stones larger than 1 inch in diameter, large clods, roots, and other litter brought to the surface by this operation shall be removed.

904-3.4 OBTAINING AND DELIVERING SOD. The sod shall be well rooted, grown in the State of Maryland, and field grown for a minimum of 12 months. After inspection and approval of the sod by the MAA Engineer, the sod shall be cut with approved sod cutters to such a thickness that after placement on the prepared bed, but before compaction, it shall have a uniform attached soil thickness of at least 0.75 inch. Sod sections or strips shall be cut in uniform widths of at least 14 inches and in lengths of at least 18 inches, but not to lengths that might inhibit placement without breaking, tearing, or loss of soil. Where strips are required, the sod shall be rolled or folded undamaged, with the grass facing inward. The Contractor may be required to mow high grass before cutting sod.

Sod shall be transplanted within 24 hours from the time of harvest unless circumstances beyond the Contractor's control make storage necessary. In such cases, sod shall be stacked, kept moist, protected from exposure to the air and sun, and shall be kept from freezing. Sod shall only be harvested and moved when soil moisture conditions are such that favorable results can be expected. Where soil is too dry, permission to cut sod may be granted only after it has been sufficiently watered to moisten the soil to the depth at which the sod will be cut.

904-3.5 PLACING SOD. Sodding shall only be performed during seasons when satisfactory results can be expected. Frozen sod shall not be used and sod shall not be placed upon frozen soil. Sod may be transplanted during periods of drought with the approval of the MAA Engineer, provided the sod bed is watered to moisten the soil to a depth of at least 4 inches immediately prior to laying the sod.

The sod shall be moist and shall be placed on a bed, prepared according to Paragraphs 904-3.2 "Advance Preparation", and 904-3.3, "Application of Fertilizer and Lime" by hand. Pitchforks shall not be used to handle sod, and dumping from vehicles shall not be permitted. The sod shall be placed carefully by hand, edge to edge and with staggered joints, in rows at right angles to the slopes, starting at the base of the area to be sodded and working upward. The sod shall immediately be pressed firmly into contact with the sod bed by tamping or rolling with approved equipment to provide a true and even surface, and ensure knitting without displacement of the sod or deformation of the surfaces of sodded areas. Where the sod has been displaced during sodding operations, the workmen replacing it shall work from ladders or treaded planks to prevent further displacement. Where the grades are such that the flow of water will be from paved surfaces across sodded areas, the surface of the soil in the sod after compaction shall be set approximately 1.5 inches below the pavement edge. Where the flow will be over the sodded areas and onto the paved surfaces around manholes and inlets, the surface of the soil in the sod after compaction shall be placed flush with pavement edges.

On slopes steeper than 1:2.5 and in V-shaped or flat-bottom ditches or gutters, the sod shall be secured with wooden pegs at least 18 inches long and a cross-sectional area of at least 0.75-square inch, or by other methods of securing sod approved by the MAA Engineer. The pegs shall be driven flush with the surface of the sod. The pegs shall be of sufficient number and at

adequate spacing to secure sod from displacement. The use of sod staples or other means of securing the sod from displacement may be approved by the MAA Engineer provided satisfactory results are expected.

904-3.6 WATERING. Adequate water and watering equipment shall be on hand before sodding begins, and sod shall be kept moist until it has become established and its continued growth assured. In all cases, watering shall be done in a manner that will avoid erosion from the application of excessive quantities and will avoid damage to the finished surface.

904-3.7 ESTABLISHING TURF.

904-3.7.1 GENERAL. The Contractor shall provide general care for the sodded areas as soon as the sod has been laid and shall continue to provide such care until final inspection and acceptance of the work.

904-3.7.2 PROTECTION. All sodded areas shall be protected against traffic or other use by warning signs and barricades approved by the MAA Engineer.

904-3.7.3 MOWING. The Contractor shall mow the sodded areas with approved mowing equipment, depending upon climatic and growth conditions and the needs for mowing of specific areas. In the event that weeds or other undesirable vegetation establishes to such an extent that, either cut or uncut, they threaten to smother the sodded species, the weeds shall be mowed and the clippings raked and removed from the area. Spot applications of an appropriate herbicide by a licensed applicator shall be approved by the MAA Engineer to remove invasive species. The appropriate herbicide shall be determined on a case-by-case basis, depending on the location and type of weed.

904-3.7.4 REPAIR. When the surface has become gullied or otherwise damaged during the period covered by this contract, the affected areas shall be repaired to re-establish the grade and the condition of the soil and shall then be re-sodded as specified in Paragraph 904-3.5, "Placing Sod", at the Contractor's expense.

METHOD OF MEASUREMENT

904-4 This item will be measured on the basis of the area in square yards of the surface covered with sod and accepted.

BASIS OF PAYMENT

904-5 This item will be paid for on the basis of the contract unit price per square yard for sodding. The price will provide full compensation for all labor, equipment, material, staking, and incidentals necessary to satisfactorily complete the items as specified.

Payment will be made under:

Item 904-5.1 Sodding—per square yard.
Item 904-5.2 Amendments – per square yard
Item 904-5.3 Fertilizer – per square yard

END OF ITEM 904

ITEM 905 MULCHING

DESCRIPTION

905-1.1 GENERAL. This item provides the Contractor with MAA-approved specifications for mulch and the application of mulch including distribution of mulch and securing of mulched areas. Areas to be mulched will be clearly shown on site plans or otherwise designated by the MAA Engineer.

MATERIALS

905-2.1 TYPES OF MULCH. Acceptable mulch shall be composed of the materials listed below or composed of any locally available materials that are similar to those specified and approved by the MAA Engineer. Low-grade, shalely, soiled, partially rotted hay, straw, or other materials unfit for animal consumption will not be acceptable for use as mulch. Straw or other material that is fresh, excessively brittle, or is in such an advanced stage of decomposition as to smother or retard the planted grass, is not acceptable. Clean, weed-free straw may be used. Mulch materials containing matured seed with the potential to establish and be detrimental to the project or the surrounding area is not acceptable.

a. Shredded Hardwood Bark. Shredded hardwood bark shall consist of hardwood tree bark that has been milled and screened to ensure a maximum 4-inch (100-mm) particle size, provide a uniform texture, and be free from sawdust, toxic substances, and other foreign materials.

b. Wood Chips. Wood chips shall be produced by a chipping machine to a size specified by the MAA Engineer. Chips may not have been subjected to any conditions that would shorten their useful life or cause them to lose any of their value as mulch. Wood chips shall be free from bark, leaves, twigs, wood shavings, sawdust, toxic substances, and other foreign material.

c. Wood Cellulose Fiber. Wood cellulose fiber shall consist of a processed wood product with uniform fiber characteristics. The fiber shall be capable of remaining in a uniform suspension under agitation in water and blending with seed, fertilizer, and other additives to form a homogeneous slurry. The fiber shall perform satisfactorily in hydraulic seeding equipment without clogging or damaging the system. The slurry shall contain a green dye to provide easy visual inspection for uniformity of application.

Certification showing that the fiber material conforms to the following specifications shall be provided by the manufacturer:

Wood Cellulose Fiber Requirements	
Particle Length, in. (mm)	Approximately 1/2 (13)
Particle Thickness, in. (mm)	Approximately 1/16 (1.5)
Net dry Weight Content	Minimum as stated on bag
TAPPI* T 509, pH	4.0 to 8.5
Ash Content, TAPPI* Standard T 413, % max	7.0
Water Holding Capacity, % min	90

*Technical Association of Pulp and Paper Industry

The material shall be delivered in packages of uniform net weight of 75 lbs (34 kg) or less and shall be clearly labeled with the name of the manufacturer, net weight, and a supplemental statement of the net weight content.

905-2.2 INSPECTION. Within five days after acceptance of the bid, the Contractor shall provide representative samples of mulch material to be used to the MAA Engineer and identify the source of the material and quantities of mulch materials available. The samples provided may be used as standards with the approval of the MAA Engineer and any materials brought on the site that do not meet these standards may be rejected.

CONSTRUCTION REQUIREMENTS

905-3.1 ADVANCE PREPARATION. Before spreading mulch, all large clods, stumps, stones, brush, roots, and other foreign material shall be removed from the area to be mulched. Mulch shall be applied immediately after seeding unless otherwise specified. The application and spreading of mulch may be by hand methods, blower, or other mechanical methods, provided a uniform covering is obtained.

905-3.2 APPLICATION OF MULCH. The Contractor shall evenly apply mulch materials to areas indicated by site plans or otherwise designated by the MAA Engineer. Cellulose-fiber or wood-pulp mulch shall be applied at the rate of 1,500 pounds (dry weight) per acre. Mulch may be blown on the slopes and use of cutters in the equipment for this purpose will be permitted to the extent that at least 95 percent of the mulch in place on the slope is 6 inches or more in length. When mulch applied by the blowing methods is cut, the loose depth in place shall be 1 to 2 inches. Cellulose fiber or wood-pulp mulch shall be applied as an aqueous mixture by spraying at the rate of 1,500 pounds (dry weight) per acre using spraying equipment approved by the MAA Engineer.

905-3.3 SECURING MULCH. Mulch shall be held in place by light discing, a thin coating of topsoil, pins, stakes, wire mesh, or other methods approved by the MAA Engineer. If the "peg and string" method is used, the mulch shall be secured with stakes or wire pins driven into the ground on 5-foot centers or less. Binder twine shall be strung between adjacent stakes in straight

lines and crossed diagonally over the mulch. The stakes shall be firmly driven nearly flush to the ground to draw the twine down tightly onto the mulch.

905-3.4 MAINTENANCE OF MULCHED AREAS. The Contractor shall care for mulched areas until final acceptance of the project. Care required may consist of providing protection against traffic or other disturbances by placement of warning signs and/or barricades before or immediately after mulching has been completed.

The Contractor may be required to repair or replace any mulching that is defective or becomes damaged before the project is finished and deemed satisfactory by the MAA Engineer. When, in the judgment of the MAA Engineer, defects or damage result from poor workmanship or failure to meet the requirements of the specifications, the cost of the necessary repairs or replacement will be borne by the Contractor. However, once the Contractor has completed the mulching of an area in accordance with the provisions of the specifications and to the satisfaction of the Engineer, no additional work at his expense will be required. Any subsequent repairs and/or replacements deemed necessary by the Engineer may be made by the Contractor and will be paid for as additional or extra work.

METHOD OF MEASUREMENT

905-4 Mulching will be measured in square yards on the basis of the actual surface area acceptably mulched to depths of 1-, 2-, or 4-inch depths.

BASIS OF PAYMENT

905-5 Payment will be made at the contract unit price per square yard for mulching. This price will provide full compensation for furnishing all materials, for placing and anchoring the materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Item 905-5.1 Mulching – per square yard at 1-inch depth
Item 905-5.2 Mulching – per square yard at 2-inch depth
Item 905-5.3 Mulching – per square yard at 3-inch depth

END OF ITEM 905

APPENDIX A

APPROVED SPECIES LIST

Perennials, Ground Covers, Annuals & Bulbs

Scientific name	**Common name**
Alchemilla mollis	Lady's Mantle
Astilbe x arendsii	Hybrid Astilbe
Carex grayi	Morningstar Sedge
Carex stricta	Tussock Sedge
Ceratostigma plumbaginoides	Leadwort/Plumbago
Chrysanthemum x superbum	Shasta Daisy
Convallaria majalis	Lily-of-the-Valley
Coreopsis rosea	Rosy Coreopsis
Coreopsis verticillata	Threadleaf Coreopsis
Dryopteris erythrosora	Autumn Fern
Dryopteris marginalis	Leatherleaf Wood Fern
Echinacea purpurea 'Magnus'	Magnus Coneflower
Epigea repens	Trailing Arbutus
Eupatorium coelestinum	Hardy Ageratum
Eupatorium hyssopifolium	Hyssopleaf Thoroughwort
Eupatorium maculatum	Joe-Pye Weed
Eupatorium purpureum	Sweet Joe-Pye Weed
Geranium maculatum	Wild Geranium
Hedera helix	English Ivy
Hemerocallis spp.	Daylily
Hibiscus moscheutos	Rose Mallow
Hosta spp.	Plantain Lily
Hydrangea quercifolia	Oakleaf Hydrangea
Iris sibirica	Siberian Iris
Iris versicolor	Blue Flag Iris
Lantana camara	Yellow Sage
Liatris spicata	Gay-feather
Liriope muscari	Blue Lily-turf
Liriope variegata	Variegated Liriope
Lobelia siphilitica	Blue Cardinal Flower
Lonicera sempervirens	Coral Honeysuckle
Lythrum salicaria	Purple Loosestrife
Narcissus (all species and cultivars)	Daffodil
Nepeta x faassenii	Catmint
Onoclea sensibilis	Sensitive Fern
Osmunda cinnamomea	Cinnamon Fern
Pelargonium x domesticum	Mary Washington Geranium
Perovskia abrotanoides	Caspian/Russian Blue Sage
Phlox stolonifera	Creeping Phlox
Polygonum aubertii	Silver Lace Vine
Polystichum acrostichoides	Christmas Fern
Rudbeckia fulgida	Blackeyed Susan
Salvia nemorosa	May Night Salvia
Schizachyrium scoparium	Little Bluestem
Sedum spectabile	Stonecrop
Solidago rugosa	Goldenrod
Thelypteris noveboracensis	New York Fern
Tiarella cordifolia	Foam Flower
Tulipa spp.	Tulip

Perennials, Ground Covers, Annuals & Bulbs

Scientific name	**Common name**
Verbena canadensis	Rose Verbena
Veronica spp.	Speedwell
Vinca minor	Periwinkle
Yucca filamentosa	Adam's-needle Yucca

Trees (large, medium, small, ornamental & evergreen)

Scientific Name	**Common Name**
Abies concolor	White Fir
Abies nordmanniana	Nordman Fir
Acer campestre	Hedge Maple
Acer rubrum	Red Maple (seedless cultivars such as 'Celzam', 'Karpick', and 'Somerset' only)
Acer x freemanii	Freeman Maple (seedless cultivars such as 'Autumn Blaze', 'Celebration', 'Marmo' and 'Scarlet Sentinel' only)
Betula nigra	River Birch
Carpinus betulus 'Fastigiata'	Upright European Hornbeam
Carpinus caroliniana	American Hornbeam
Cedrus atlantica	Blue Atlas Cedar
Cedrus deodora	Deodor Cedar
Cercidiphyllum japonicum	Katsura tree
Cercis canadensis	Eastern Redbud
Chionanthus virginicus	White Fringetree (male only)
Crytomeria japonica	Japanese Cedar
Cupressocyparis x leylandii	Leyland Cypress
Fraxinus americana	White Ash (seedless cultivars such as 'Autumn Applause', 'Autumn Purple', Champaign County', 'Rosehill' and 'Skyline' only)
Fraxinus pennsylvanica	Green Ash (seedless cultivars such as 'Aerial', 'Bergeson', 'Honeyshade', 'Marshalls Seedless', 'Patmore' and 'Robinhood' only)
Ginkgo biloba	Ginko (male cultivars only)
Gleditsia triacanthos var. inermis	Thornless Common Honeylocust (seedless cultivars such as 'Imperial', 'Shademaster', 'Skyline', and 'Sunburst' only)
Ilex opaca	American Holly (male cultivars such as 'Jersey Knight' only)
Koelreutarea paniculata	Golden Raintree
Lagerstroemia indica	Crape Myrtle
Liriodendron tulipfera	Yellow Poplar
Liquidambar styraciflua	Sweetgum
Magnolia x loebneri	Loebneri Magnolia
Magnolia x soulangiana	Saucer Magnolia
Magnolia stellata	Star Magnolia
Magnolia virginiana	Sweetbay Magnolia
Malus spp.	Flowering Crabapple (non-fruiting cultivars such as 'American Beauty', 'Prince Georges', and 'Spring Snow' only)
Ostrya virginiana	American Hophornbeam
Oxydendrum arboreum	Sourwood
Picea abies	Norway Spruce
Picea glauca	White Spruce
Picea omorika	Serbian Spruce
Picea pungens	Colorado Spruce
Pinus echinata	Shortleaf Pine
Pinus mugo	Mugo Pine

Trees (large, medium, small, ornamental & evergreen)

Scientific Name	**Common Name**
Pinus rigida	Pitch Pine
Pinus strobus	Eastern White Pine
Pinus taeda	Loblolly Pine
Pinus thunbergii	Japanese Black Pine
Pinus virginiana	Virginia Pine
Platanus occidentalis	American Sycamore
Populus deltoides	Eastern Cottonwood
Populus grandidentata	Bigtooth Aspen
Prunus spp.	Flowering Cherry (non-fruiting cultivars only)
Prunus serrulata	Japanese Flowering Cherry (non-fruiting cultivars such as 'Kwanzan' only)
Prunus x yedoensis	Yoshino Cherry (non-fruiting cultivars only)
Salix nigra	Black Willow
Sophora japonica	Japanese Scholartree
Stewartia pseudocamellia	Japanese Stewartia
Styrax japonicus	Japanese Snowbell
Syringa reticulata	Japanese Tree Lilac
Taxodium distichum	Bald Cypress
Thuja occidentalis	American Arborvitae
Tilia americana	American Linden
Tilia cordata	Littleleaf Linden
Tilia tomentosa	Silver Linden
Tsuga canadensis	Canadian Hemlock
Tsuga caroliniana	Carolina Hemlock
Ulmus americana	American Elm
Ulmus parvifolia	Chinese Elm
Ulmus pumila	Siberian Elm
Zelkova serrata	Japanese Zelkova

Shrubs (large, medium, small, ornamental & evergreen)

Scientific name	**Common name**
Abelia "Edward Goucher"	Edward Goucher Abelia
Abelia x grandiflora	Glossy Abelia
Acer campestre	Hedge Maple
Berberis x mentorensis	Mentor Barberry
Buddleia davidii	Butterfly Bush
Calluna vulgaris	Common Heather
Clethra alnifolia	Sweet Pepperbush
Cotoneaster dammeri	Bearberry Cotoneaster
Deutzia gracilis	Slender Deutzia
Euonymus americanus	Strawberry Bush
Euonymus kiautschovicus	Spreading Euonymus
Forsythia x intermedia	Border Forsythia
Forsythia suspensa	Weeping Forsythia
Forsythia viridissima	Greenstem Forsythia
Hamamelis vernalis	Vernal Witchhazel
Hamamelis virginiana	Common Witchhazel
Hydrangea arborescens	Smooth Hydrangea
Hydrangea quercifolia	Oakleaf Hydrangea
Hypericum patulum	Goldencup St. Johnswort
Hypericum frondosum	Golden St. Johnswort
Ilex spp.	Holly species (male cultivars only)
Ilex x attenuata "Fosteri"	Foster's Holly (male cultivars only)
Ilex crenata	Japanese Holly (male cultivars such as 'Glass', 'Green Dragon', 'Green Island', 'Helleri', 'Howard', 'Northern Beauty' and 'Sentinel' only)
Ilex x "Edward J Stevens"	Edward Stevens Holly
Ilex glabra	Inkberry (male cultivars such as 'Chamzin' and 'Shamrock' only)
Ilex x meserveae	Meserve Hybrid Hollies (male cultivars such as 'Blue Boy', 'Blue Prince', 'Blue Stallion', and 'China Boy' only)
Ilex opaca	American Holly (male cultivars such as 'Jersey Knight' only)
Itea virginica	Virginia Sweetspire
Jasminum nudiflorum	Winter Jasmine
Juniperis conferta	Shore Juniper
Juniperis chinensis	Chinese Juniper (male cultivars such as 'Globosa' and 'Pfitzeriana Glauca' only)
Juniperis horizontalis	Creeping Juniper (male cultivars such as 'Fountain', 'Glomerata', 'Jade River', 'Jade Spreader', 'Plumosa' and 'Plumosa Compacta Youngstown' only)
Juniperis procumbens	Japgarden Juniper (male cultivars only)
Juniperis sabina	Savin Juniper (male cultivars only)
Juniperis scopulorum	Rocky Mountain Juniper (male cultivars such as 'Gray Gleam', 'Medora', and 'Silver King' only)
Kalmia latafolia	Mountain Laurel
Lavandula angustifolia	Common Lavender
Leucothoe axillaris	Fetterbush
Ligustrum japanicum	Japanese Privet
Lindera benzoin	Spicebush (use male cultivars such as 'Green Gold' and 'Rubra' only)

Shrubs (large, medium, small, ornamental & evergreen)

Scientific name	**Common name**
Magnolia virginiana	Sweetbay Magnolia
Microbiota decussata	Russian Arborvitae
Mynca pennsylvanica	Northern Bayberry (male cultivars such as 'Myriman' only)
Nandina domestica	Heavenly Bamboo (non-fruiting cultivars such as 'Atropurpurea Nana' only)
Osmanthus heterophyllus	False-holly
Photinia x fraseri	Fraser Photinia
Prunus laurocerasus	Common Cherrylaurel (only cultivars with non-showy fruit such as 'Schipkaensis' only)
Pyracantha koidzumii	Formosa Firethorn
Rhododendron arborescens	Sweet Azalea
Sarcococca hookeriana	Sweetbox
Spiraea spp.	Meadowsweet
Spiraea nipponica 'Snowmound'	Snowmound Spiraea
Syringa vulgaris	Common Lilac
Taxus baccata	English Yew (male cultivars only)
Taxus x media	Anglojap Yew (male cultivars such as 'Amherst', 'Brownii', 'Hatfieldii' and 'Sebian' only)
Viburnum x burkwoodii	Burkwood Viburnum
Viburnum plicatum var. tomentosum	Doublefile Viburnum (use non-fruiting cultivars such as 'Roseum' only)
Viburnum rhytidophyllum	Leatherleaf Viburnum
Weigela florida	Old-fashioned Wegelia

Grasses (Ornamental, Turf, Erosion Control)

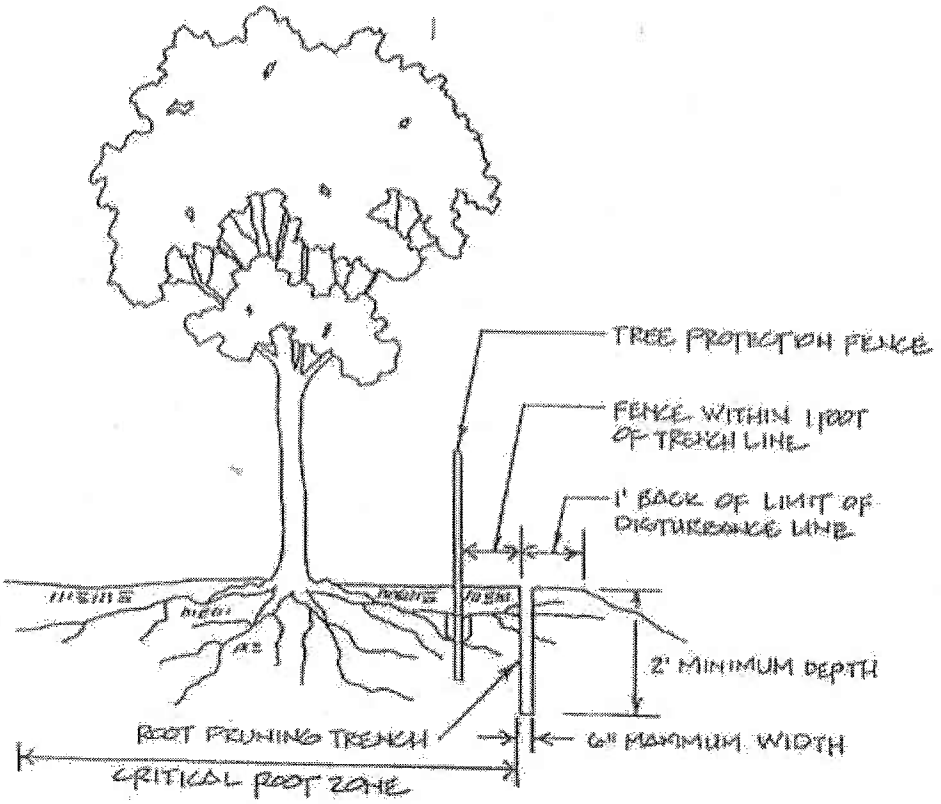
Scientific name	**Common name**
Andropogon scoparius	Little Bluestem
Calamagrostis x acutiflora	Feather Reed Grass
Calamagrostis arundinacea 'Karl Foerster'	Foerster's Feather Reed Grass
Calamagrostis stricta	Slimstem Reed Grass
Festuca arundinacea	Certified turf-type Tall Fescue
Festuca longifolia	Hard Fescue
Festuca rubra var. commutata	Chewings Fescue
Lolium multiflorum	Annual Ryegrass
Lolium perenne	Perennial Ryegrass
Miscanthus sinensis var. gracillimus	Maiden Grass
Panicum virgatum	Switch-grass
Pennisetum alopecuroides	Fountain Grass
Pennisetum alopecuroides 'Hameln'	'Hameln' Fountain Grass
Pennisetum alopecuroides 'Little Bunny'	'Little Bunny' Fountain Grass
Pennisetum villosum	Feathertop
Poa pratensis	Kentucky Bluegrass

APPENDIX B

APPROVED INSTALLATION METHODS

Figure J -1

Root Pruning

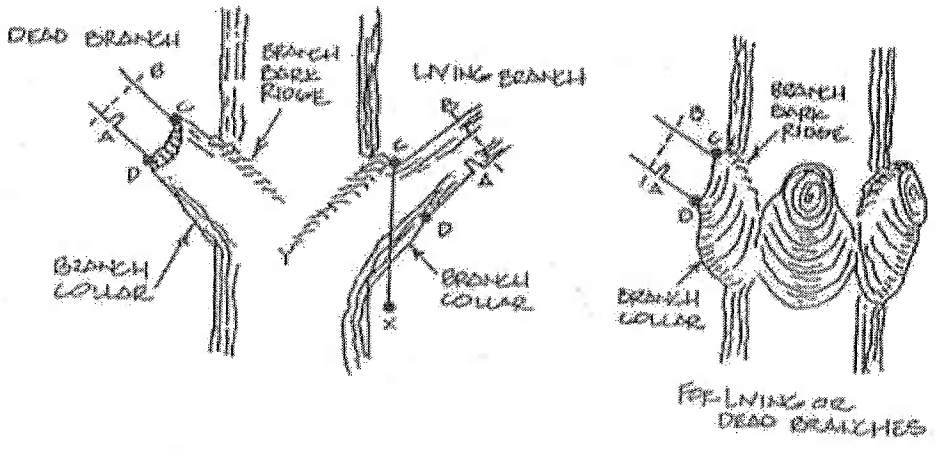


Notes:
1. Retention Areas will be set as part of the review process
2. Boundaries of Retention Areas should be staked flagged prior to trenching
3. Exact location of trench should be identified
4. Trench should be immediately backfilled with soil removed or other high organic soil
5. Roots should be cleanly cut using vibratory knife or other acceptable equipment

Source: City of Gaithersburg, Maryland: City Tree Manual

Figure J-2

Crown Reduction

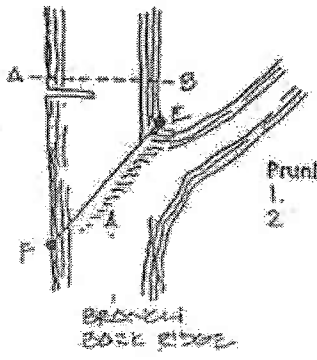


HARDWOODS

CONIFERS

Pruning a Branch

1. Remove branch weight by undercutting at A and remove limb by cutting through at B.
2. Remove stub at CD (line between branch bark ridge and outer edge of branch collar).
3. If D is difficult to find on hardwoods, drop vertical from C (line CX). Angle XCY=XCD.



Pruning a Leader or To Reduce Size

1. Remove top weight by cutting at A&E.
2. Remove stub at EF parallel to the Branch Bark Ridge.

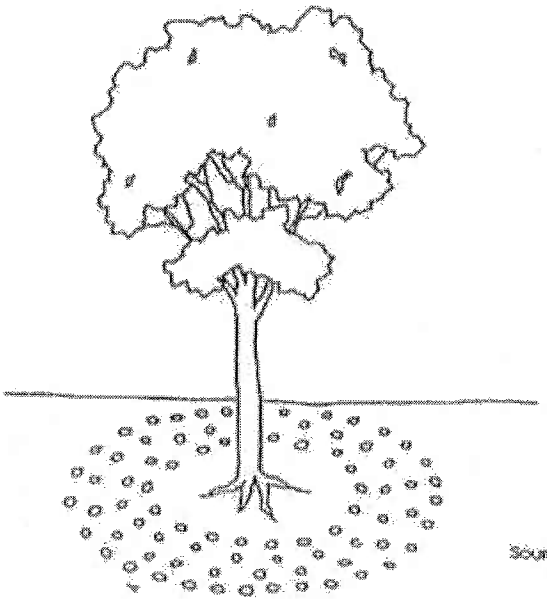
Source: Fairfax County, Virginia
Vegetation Preservation & Planting

Notes:

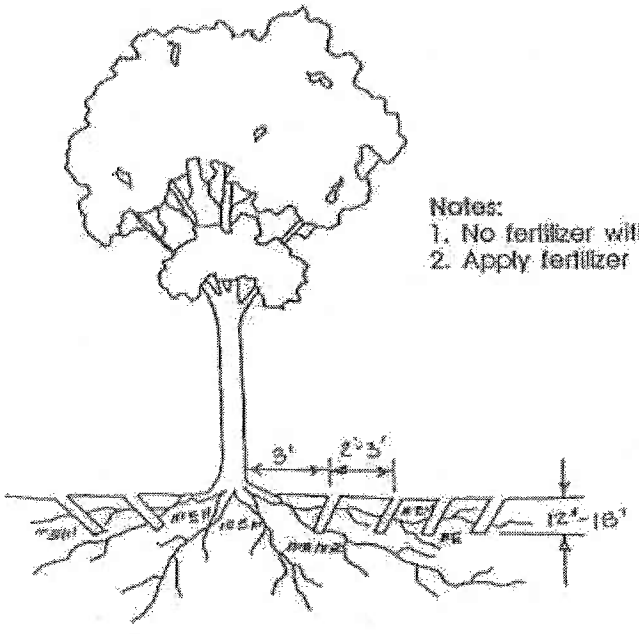
1. Only prune at specified times
2. No more than 30% of crown to be removed at one time.

Figure J-3

Application of Fertilizers by Injection



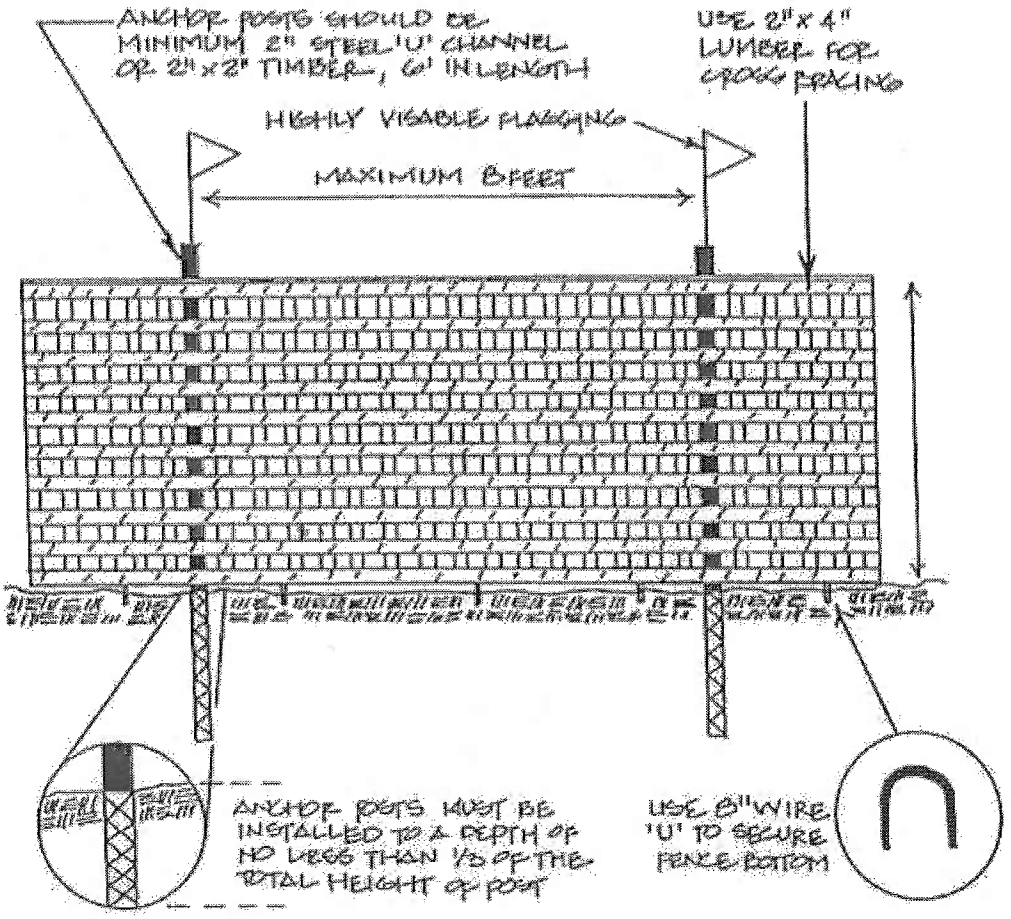
Source: Pirone, 1978



Notes:
1. No fertilizer within 3 feet of trunk
2. Apply fertilizer to entire critical root zone

Figure J-4

Blaze Orange Plastic Mesh



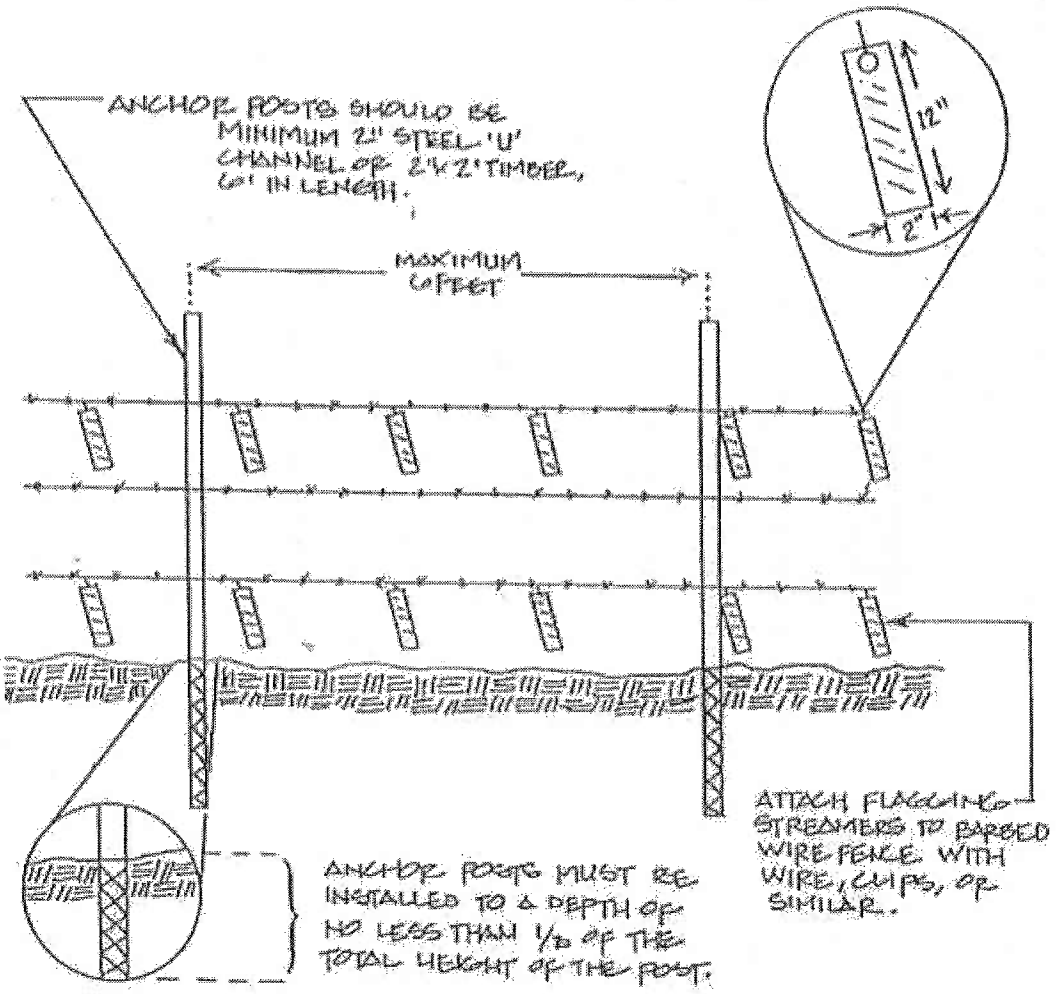
Notes

1. Forest protection device only.
2. Retention Area will be set as part of the review process.
3. Boundaries of Retention Area should be staked and flagged prior to installing device.
4. Root damage should be avoided.
5. Protective signage may also be used.
6. Device should be maintained throughout construction.

Source: Prince George's County, Maryland: Woodland Conservation Manual

Figure J-5

Three Strand Barbed Wire



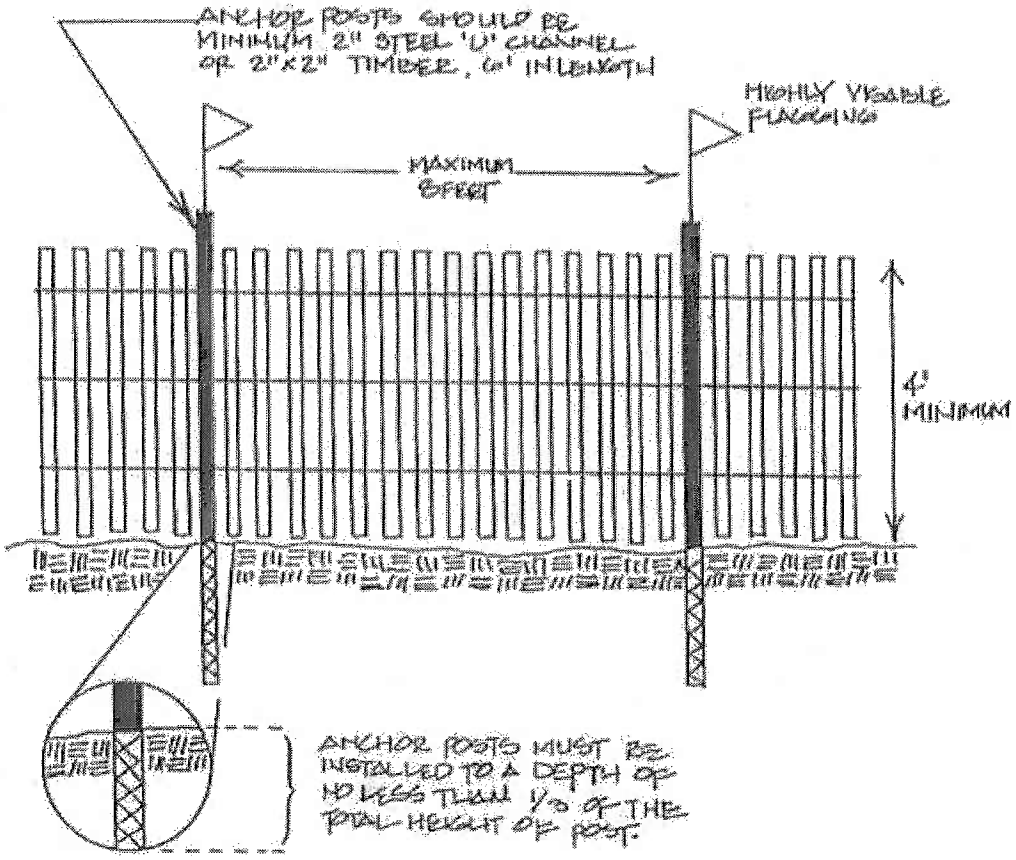
Notes

1. Forest protection device only.
2. Retention Area will be set as part of the review process.
3. Boundaries of Retention Area should be staked and flagged prior to installing device.
4. Avoid root damage when placing anchor posts.
5. Barbed wire should be securely attached to posts.
6. Device should be properly maintained during construction.
7. Protective signage is also recommended.

Source: Prince George's County, Maryland: Woodland Conservation Manual

Figure J-6

Snow Fence



Notes:
1. Forest protection device only
2. Retention area will be set as part of the review process
3. Boundaries of Retention Area should be staked prior to installing protective device
4. Avoid root damage when placing anchor posts
5. Device should be properly maintained during construction
6. Protective signage is also recommended

Source: Prince George's County, Maryland, Woodland Conservation Manual

Figure J-7

Signage

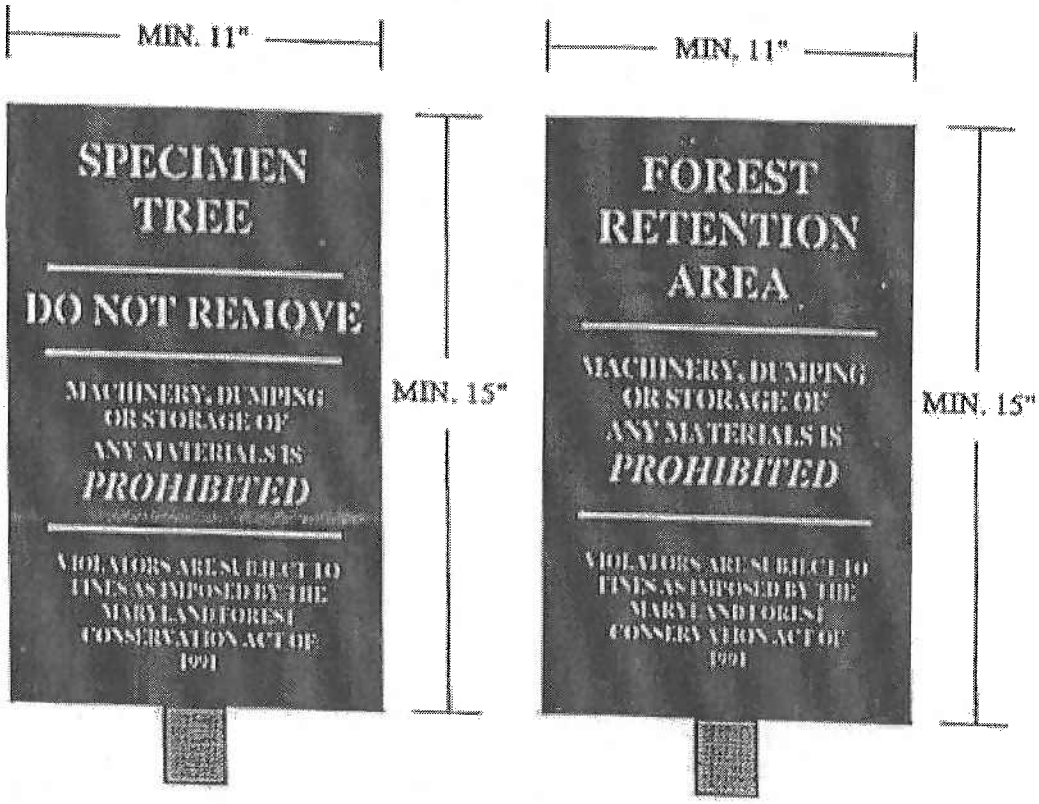
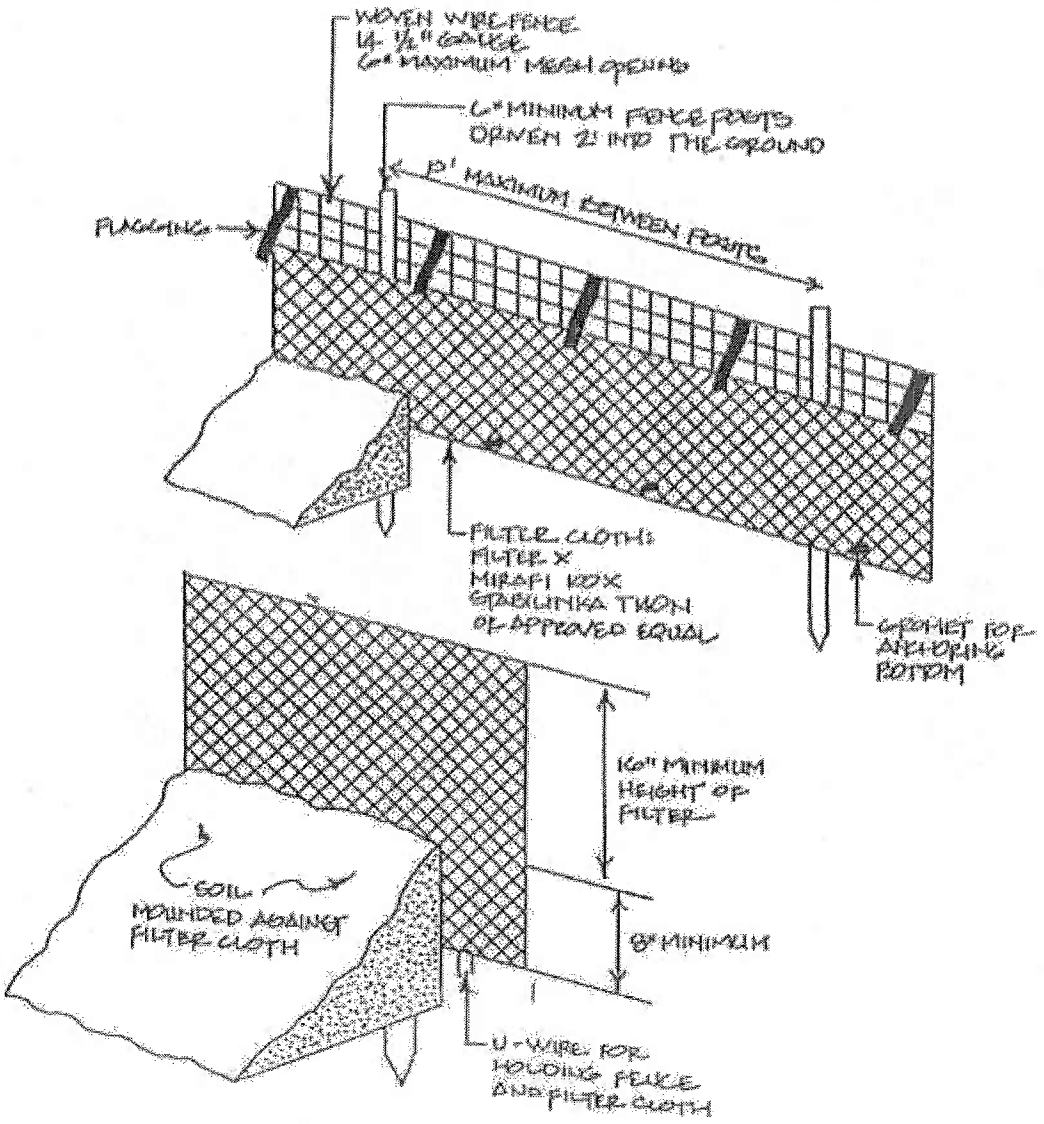


Figure J-8

Filter Cloth on Wire Mesh



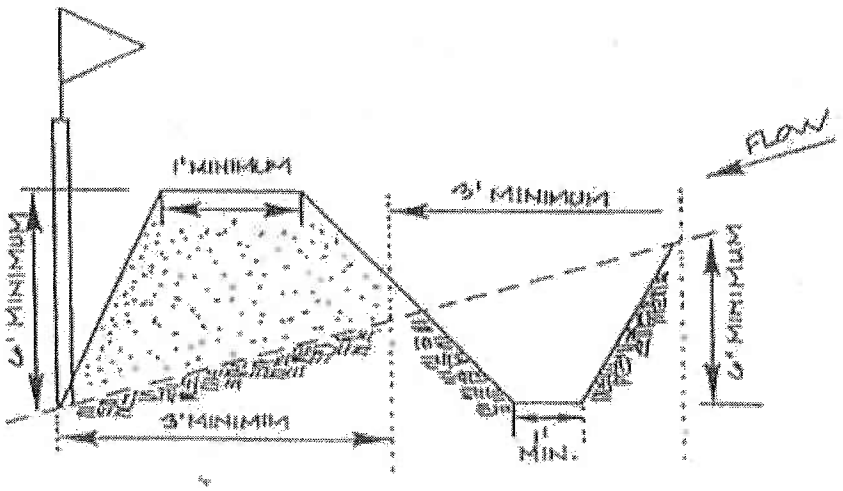
Source: Prince George's County, Maryland: Woodland Conservation Manual

Notes:

1. Combination sediment control and protective device
2. Retention area will be set as part of the review process
3. Boundaries of Retention Area should be staked prior to installing protective device
4. Root damage should be avoided
5. Mound soil only within the limits of disturbance
6. Protective signage is also recommended
7. All standard maintenance for sediment control devices apply to these details

Figure J-10

Earthen Dike and Swale

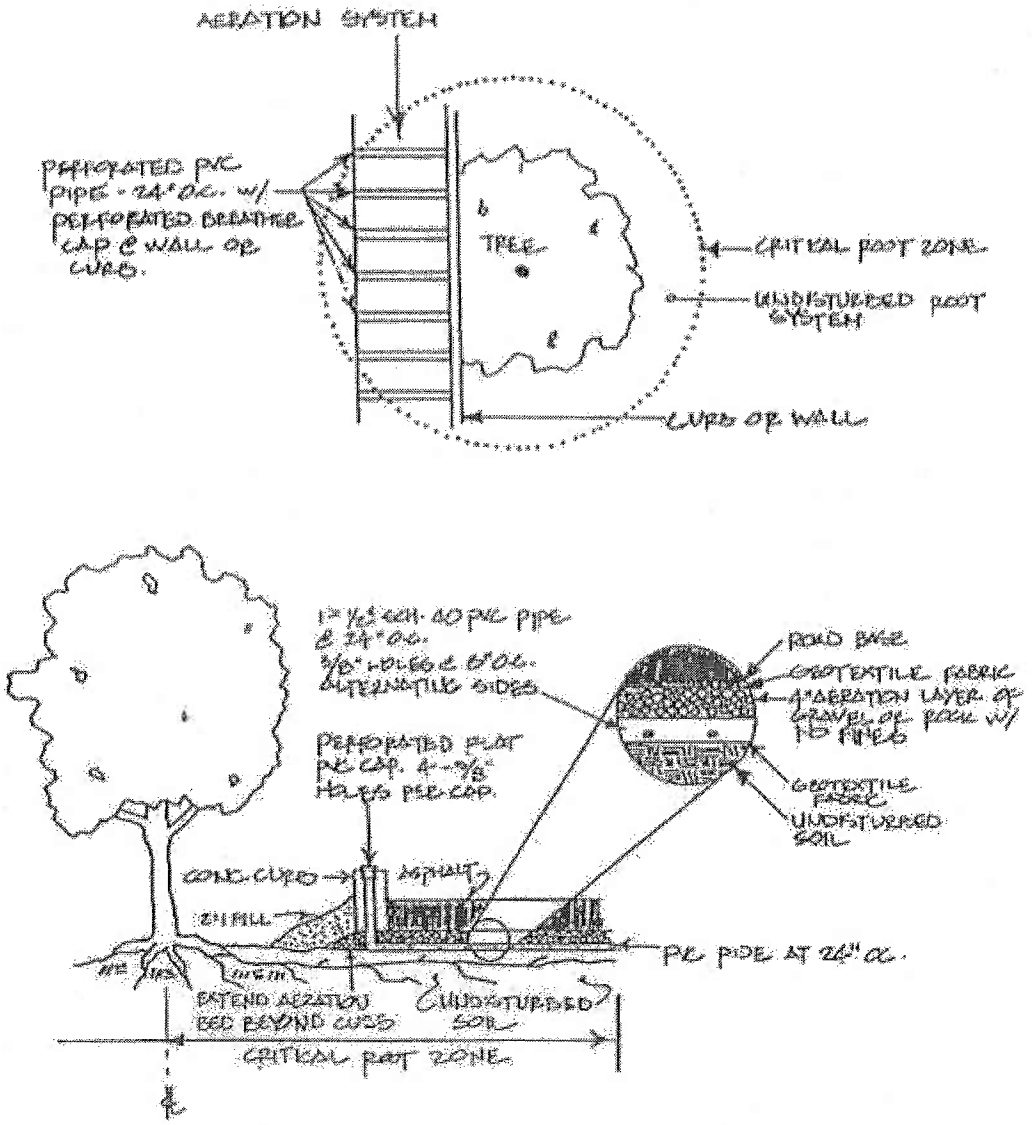


Notes:
1. Combination sediment control and protective device
2. Retention area will be set as part of the review process
3. Boundaries of Retention Area should be staked prior to installing protective device
4. Root damage should be avoided
5. The top or toe of slope should be within the limit of disturbance
6. Equipment is prohibited within critical root zone of retention area; place dike accordingly
7. All standard maintenance for earthen dikes and swales apply to these details
8. All standard reclamation practices for earthen dikes and swales shall apply to these details

Source: Prince George's County, Maryland: Woodland Conservation Manual

Figure J- 11

Aeration System

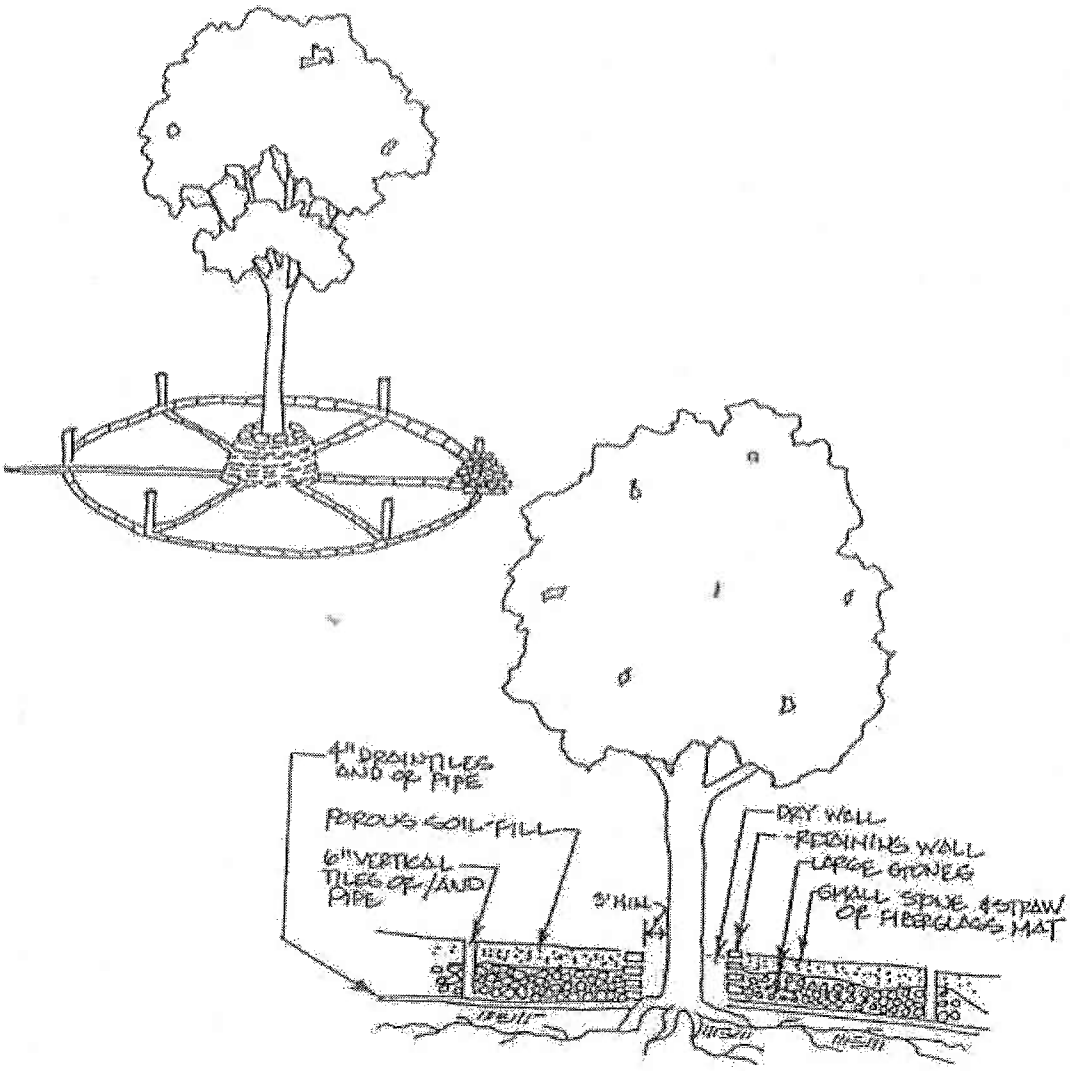


Notes:
1. Bed preparation should not exceed two inches.
2. Vertical pipe should be capped with a perforated cap with 4-3/8 inch holes per cap.
3. Gravel or rock should contain no fines.
4. Can also be used when critical root zone is covered by fill instead of asphalt.

Source: Steve Clark & Associates

Figure J -12

Tree Well

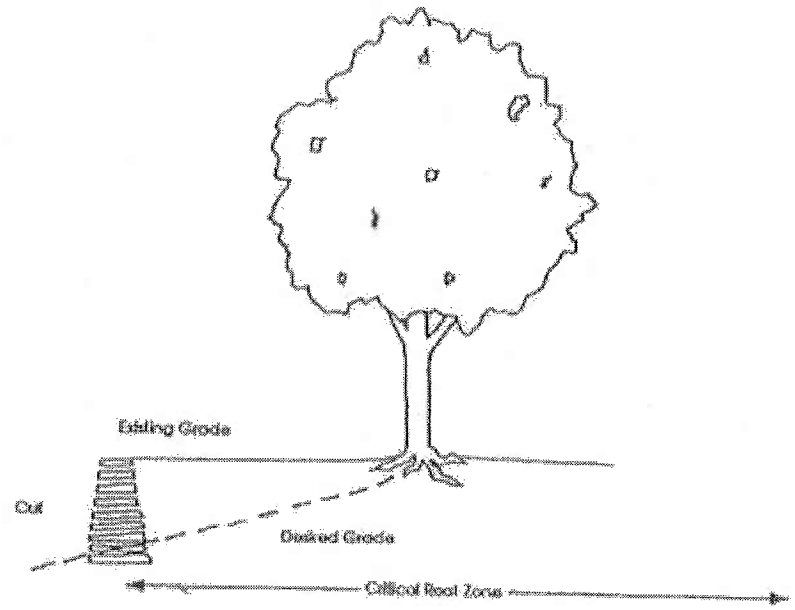


Notes:
1. Well wall should be no closer than 3 feet from tree trunk or more for smaller trees.
2. Drainage pipe layout should extend beyond the critical root zone
3. Vertical pipes shall be capped with a perforated flat cap with 4-3/8 inch holes per cap
4. Radiating spokes should be on 3 foot centers at the well wall

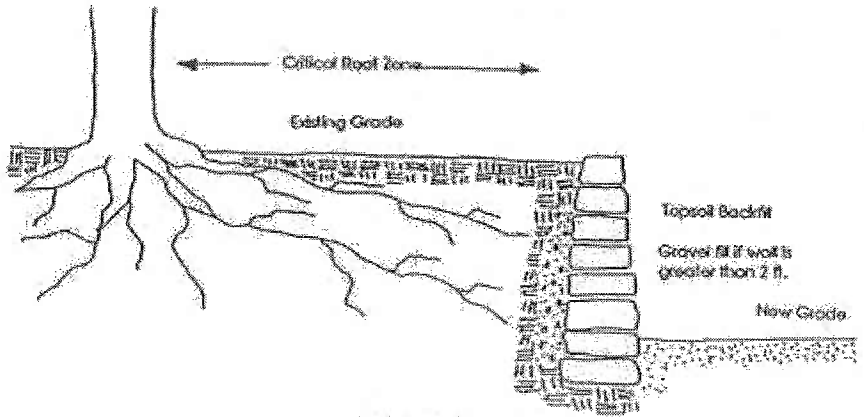
Source: Fairfax County, Virginia: Vegetation Preservation & Planting

Figure J- 13

Retaining Walls



Source: Fulton County, Georgia
Tree Preservation Ordinance

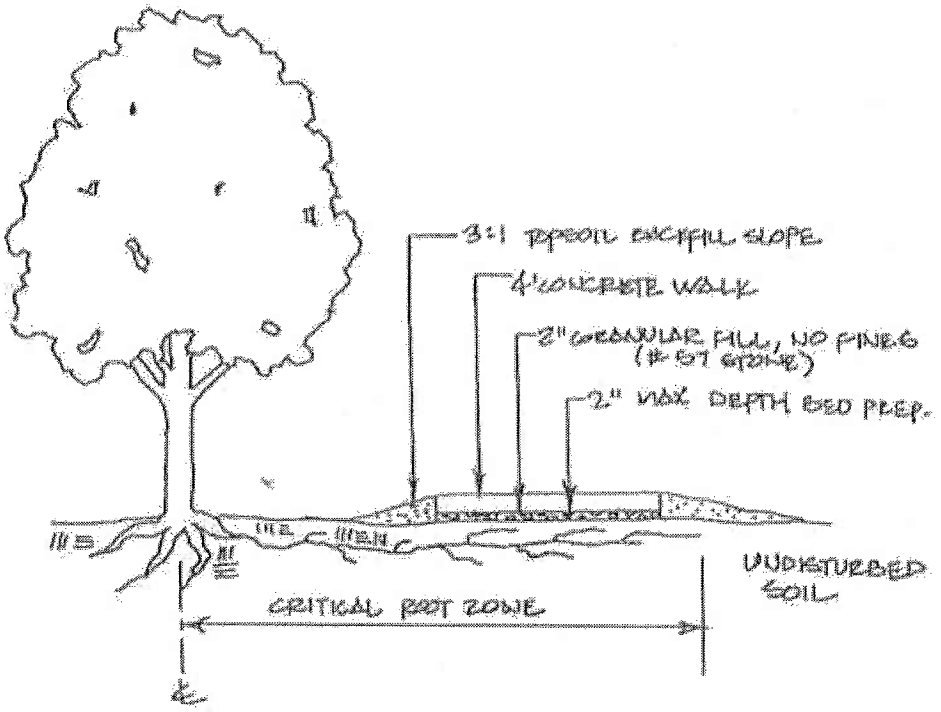


Source: Fairfax County, Virginia - Vegetation Preservation & Planting

Note:
1. Wall should be constructed outside the critical root zone.

Figure J-14

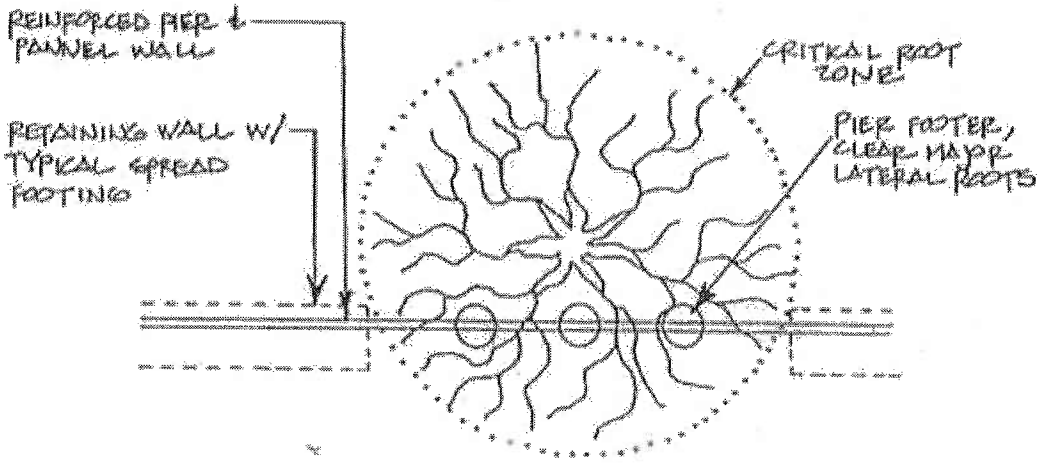
Raised Sidewalk



Notes:
1. Bed preparation should not exceed 2 inches
2. Granular fill should contain no fines
3. Minimize width of sidewalk; should be no wider than 4 feet

Source: City of Gaithersburg, Maryland. City Tree Manual

Figure J-15 **Reinforced Pier and Panel Wall**

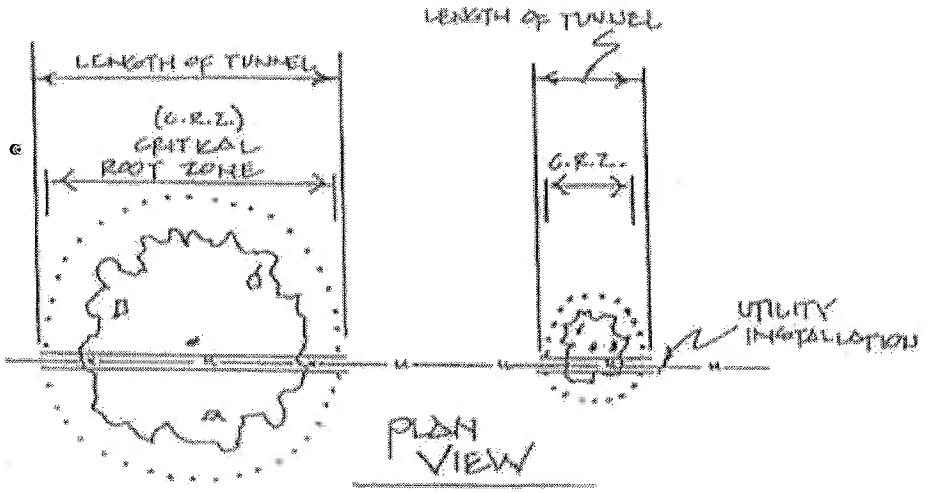


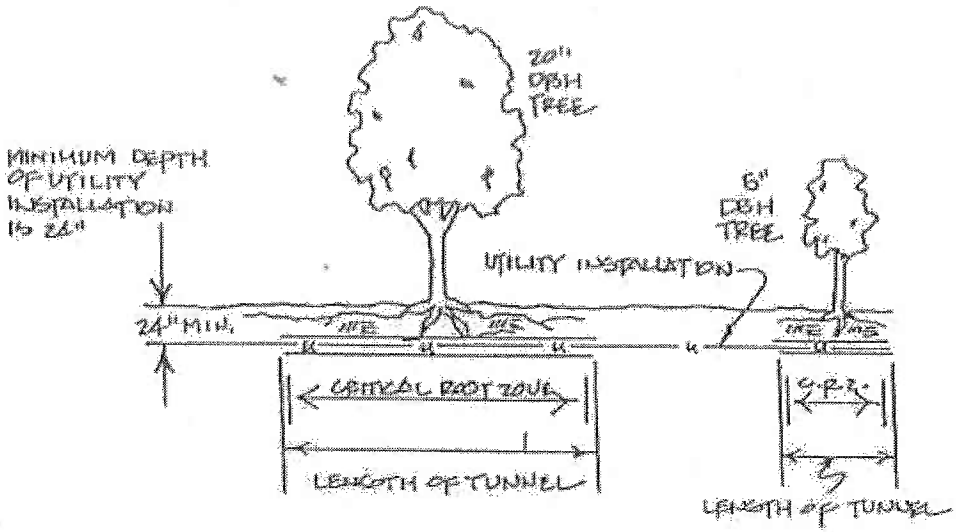
Notes:
1. Area of disturbance should be minimized.
2. Care should be taken to avoid major lateral roots
3. Roots should be cleanly cut using a vibratory knife or other similar equipment

Source: Steve Clark & Associates

Figure J- 16

Tunnelling





Notes:
1. Tunnel under critical root zone
2. Tunnel should be 24 inches deep at a minimum
3. When tunnelling, aim for the trunk of the tree
4. When trenching, tunnel through the critical root zone

Adapted from: Fairfax County, Virginia: Vegetation Preservation & Planting

AIRPORT WIDE STANDARD FOR SOLE SOURCE SYSTEMS AND EQUIPMENT

MARTIN STATE AIRPORT

BWI BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

SECTION 02553 - NATURAL GAS DISTRIBUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including Standard Provisions/Interim Standard Provisions for Construction Contracts - Volume 1, December 1993, and Technical Provisions apply to the Work of this Section.

1.2 SCOPE

A. The work covered by this section includes the furnishing of all materials and equipment and the performing of all labor to complete the Natural Gas Distribution as shown on the Contract Drawings and as herein specified or directed by the Engineer.

B. The Engineer is responsible for contacting the Baltimore Gas and Electric Company (BGE) prior to development of plans to verify availability of natural gas supply for this project. The Engineer shall also provide BGE with estimated gas load calculations and minimum service pressures required.

C. BGE will provide and install new natural gas service main, meter with pressure regulator assembly on site and connection to existing gas main.

D. Contractor shall be responsible for pavement removal and repair, maintenance of traffic and for all coordination between BGE and the Project.

1.3 RELATED SECTIONS

A. The following sections in this document contain requirements that relate to this Section:

1. Section 02310 - "Excavation and Backfill"

1.4 SEQUENCING AND SCHEDULING

A. Coordinate gas main installation on-site and connection to existing gas main with BGE.

B. Coordinate with other utility work.

C. BGE estimates it will take approximately ____ working days to complete the gas main installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Materials for natural gas piping system including pipe, valves, meter, pressure regulators, and specialties will be provided by BGE.

B. Bedding material meeting requirements of AASHTO M6-81 shall be furnished by BGE.

C. Concrete pad for meter station at building will be constructed by the Contractor after verifying dimensions required with BGE.

PART 3 - EXECUTION

3.1 GENERAL

A. The Contractor shall notify BGE three months prior to start of work in area around the proposed building gas service mains. Contact with BGE shall be made through:

Mr. Kevin Kline
Baltimore Gas and Electric Company
(410) 597-6516

B. The Contractor shall coordinate all necessary pavement removal and repairs.

C. The Contractor shall provide a secure area near the construction site for BGE to store materials and equipment.

3.2 INSTALLATION

A. See Division 2 Section 02310 for requirements of excavation, backfill, and pavement repair.

B. The Contractor shall be responsible for pedestrian and traffic control during installation of the new gas main piping by BGE.

C. Drawings indicate general alignment for the gas main. The Contractor is responsible for coordination of the new gas main with other utilities and between different construction phases of the project.

3.3 FIELD QUALITY CONTROL

A. BGE shall verify that entire gas distribution system has been inspected, tested, and purged by BGE according to NFPA 54, Part 4 "Gas Piping Inspection, Testing, and Purging" and local gas utility company requirements.

B. Report test results in writing to the Engineer and the authorities having jurisdiction.

1. Verify that specified piping tests are complete.

C. Refer to Section 01400 - Construction Quality Control Plan.

PART 4 - MEASUREMENT

4.1 METHOD OF MEASUREMENT

A. No direct measurement will be made for Pay Item "BGE Gas Service Cost Allowance" and Pay Item "Contractor Gas Service Support Work Allowance" as payment will be made on actual cost basis. Measurement of gas pipe demolition shall be made on a linear foot basis. Demolition of gas pipe shall include excavation and backfill, and other incidental items shown on the plans.

PART 5 - PAYMENT

5.1 BASIS OF PAYMENT

A. Payment for the Pay Item "BGE Gas Service Cost Allowance" will be made to the Contractor on the basis of actual costs billed (as shown on utility invoices) by BGE plus Contractor's overhead and profit as defined in Article SP-9.04. Partial payments will be made out of the allowance amount as bills are received from the utilities. The Contractor shall furnish proof to the Engineer that utility payments have been made after he receives payment from MAA. The Contractor shall include the figure indicated in the proposal form in his bid for this item. The Contractor will not be entitled to any unspent or non-approved portion of monies from this allowance.

B. Payment for the Pay Item "Contractor Gas Service Support Work Allowance" will be made to the Contractor on the basis of actual costs billed (as shown on invoices submitted by the Contractor and approved by the Engineer) plus Contractor's overhead and profit as defined in Article SP-9.04. Partial payments will be made out of the allowance amount as bills are submitted and approved with each Application for Payment, which shall include all materials and labor for pavement demolition, disposal, and replacement, assisting BGE with pipe installation, coordination, and all incidentals necessary to complete this work. The Contractor shall include the figure indicated in the

proposal form in his bid for this item. The Contractor will not be entitled to any unspent or non-approved portion of monies for this allowance.

C. Payment for the demolition of gas pipe will be made based on the accepted quantities of piping removed at the contract unit price.

D. Payment will be made under:

Item 02553-1	Demolition of Gas Piping--per linear foot
Item 01021-1	BGE Gas Service Cost Allowance
Item 01021-2	Contractor Gas Service Support Work Allowance

END OF SECTION 02553

SECTION 08711 - DOOR HARDWARE

PART 2 - PRODUCTS

2.1 INTERCHANGEABLE DOOR HARDWARE CORES AND KEYING

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Cylinders:

a. Best Lock Corporation (BLC).

B. Standards: Comply with the following:

1. Cylinders: BHMA A156.5.

C. Cylinder Grade: BHMA Grade 1.

D. Cylinders: Manufacturer's standard tumbler type, constructed from brass or bronze, and complying with the following:

1. Number of Pins: Seven.

2. Mortise Type: Threaded cylinders with rings and straight- or clover-type cam.

3. Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.

4. Bored-Lock Type: Cylinders with tailpieces to suit locks.

a. High-Security Grade: BHMA Grade 1A, listed and labeled as complying with pick- and drill-resistant testing requirements of UL 437 (Suffix A).

E. Permanent Cores: Manufacturer's standard; finish face to match lockset; complying with the following:

1. Interchangeable Cores: Core insert, removable by use of a special key, and usable with other manufacturers' cylinders.

2. All cores must be recombinatable by removing pin segments of one individual barrel without disturbing the seals or pins of the other barrels of the same core.

3. The control key shall have no cuts in common with the grand-master key and shall operate with a shear line completely independent from the shear line of the grand-master, master and change keys.

F. Construction Keying: Comply with the following:

1. Construction Cores: Provide construction cores that are replaceable by permanent cores. Provide 10 construction master keys.

a. Replace construction cores with permanent cores, as directed by MAA.

G. Keying System: Unless otherwise indicated, provide a factory-registered keying system complying with the following requirements:

1. Grand Master Key System: Cylinders are operated by a change key, a master key, and a grand master key.

2. Existing System: Master key or grand master key locks to Owner's existing system.

a. Cylinders shall be master keyed.

H. Keys: Provide nickel-silver keys complying with the following:

1. Stamping: Permanently inscribe each key with a visual key control number and include the following notation:

a. Notation: "DO NOT DUPLICATE." or as directed by MAA.

2. Quantity: In addition to one extra blank key for each lock, provide the following:

a. Cylinder Change Keys: Three.

b. Master Keys: Five.

c. Grand Master Keys: Five.

I. Finishes

1. Standard: Comply with BHMA A156.18.

2. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

3. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations

in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

4. BHMA Designations: Comply with base material and finish requirements indicated by the following:

   a. BHMA 619: Satin nickel plated, clear coated, over brass or bronze base metal.

   b. BHMA 626: Satin chromium plated over nickel, over brass or bronze base metal.

2.2 ACCESS KEY BOXES (KNOX BOX)

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

   1. Access Key Boxes:

      a. Series 3200, Knox Company, Irvine, California.

B. Access Key Boxes:

   1. Surface-Mounted Cabinet: ¼-inch thick steel plate cabinet with ½-inch thick steel door equipped with interior gasket and

   2. Door shall be manufactured to accept Best Removable Core.

   3. Finish: Zinc-phosphate primer with black weather resistant TGIC polyester power-coat finish.

END OF SECTION 08711

SECTION 13851 - FIRE ALARM SYSTEM

PART 2 - PRODUCTS

2.1 MANUFACTURERS

Manufacturers: The existing Fire Alarm System is manufactured and certified by Honeywell; therefore, Fire Alarm panel, initiating, monitoring and controlling devices shall be exclusively by Honeywell only. Substituted Booster Panels and notification devices shall be submitted and approved by Honeywell. There will be "No Exceptions Allowed".

2.2 FIRE ALARM CONTROL PANEL (FACP)

A. General: Comply with UL 864, "Control Units for Fire-Protective Signaling Systems."

B. Cabinet: Lockable steel enclosure. Arrange panel so all operations required for testing or for normal care and maintenance of the system are performed from the front of the enclosure. If more than a single unit is required to form a complete control panel, provide exactly matching modular unit enclosures. Accommodate all components and allow ample gutter space for interconnection of panels as well as field wiring. Identify each enclosure by an engraved, red-laminated, phenolic resin nameplate. Lettering on the enclosure nameplate shall not be less than 1-inch high. Identify individual components and modules within the cabinets with permanent labels.

C. Systems: Alarm and supervisory systems are separate and independent in the FACP. The alarm-initiating addressable interface circuit boards in the FACP consist of plug-in cards. Installation requiring interconnection of field wiring for module replacement is not acceptable.

D. Zones: Provide for all alarm and supervisory zones indicated.

E. The fire alarm panel shall tie into the existing Honeywell Graphic Central P.C.s, such that every addressable initiating device will be displayed on its appropriate color graphic floor plan on the Graphic Central P.C. The device symbol, on the color graphic floor plan, shall display a change of state (color of the symbol shall change) wherever the initiating device is in "normal", "alarm", or "trouble", condition. The fire alarm panel shall tie into the existing Honeywell Graphic Central P.C.s. Furnish the required programming to monitor the fire alarm panel providing trouble and alarm relay contacts and display in the appropriate location on the Honeywell P.C.s.

F. Alphanumeric Display and System Controls: Provide the basic interface between human operator at FACP and addressable system components, including annunciation, supervision, and control. A display with a minimum of 32 characters displays alarm,

supervisory, and component status messages and indicates control commands to be entered into the system for control of smoke detector sensitivity and other parameters. Provide keypad for use in entering and executing control commands.

G. Instructions: Printed or typewritten instruction card mounted behind a lexan plastic or glass cover in a stainless steel or aluminum frame. Install the frame in a location observable from the FACP. Include interpretation and appropriate response for displays and signals, and briefly describe the functional operation of the system under normal, alarm, and trouble conditions.

H. Acceptable Products:
Honeywell FS 90 Plus FACP.
Honeywell 14005680 Series F.O. Interface Board.

2.3 UPGRADING EXISTING FIRE ALARM CONTROL PANEL (FACP)

A. Provide hardware, programming and testing for existing fire alarm panels to interface with new fire alarm panels for fire alarm notification zones for the terminal building.

2.4 DATA GATHERING PANELS (DGP)

Honeywell FS 90 Plus FACP.

2.5 GATEWAYS

A. Provide color graphic PC/gateway at CDC, Aircraft Rescue, and Fire Facility for two communication buses to expand Fire Alarm monitoring system's point capacity at existing Honeywell Graphic Central PC at CDC, Aircraft Rescue and Fire Facility.

Acceptable Products:
Honeywell W 7053 B.

2.6 BOOSTER PANELS

A. Booster panel shall meet UL 864 and ADA requirements. Booster panel shall include 8 Amp, 24 DC volt power supply, battery charger, batteries, synchronizing module, dry contacts for monitoring and interface with Honeywell Fire Alarm Control Panel in red color NEMA 1 enclosure.

Acceptable Products:
Wheel Lock PS–12/24-8 Booster Panel.
Wheel Lock DSM-12/24-R Synchronizing Module.

2.7 INITIATING DEVICES

A. General

1. Each device shall be assigned a unique address via easily understood decade (01 to 99) switch. Address selection via binary switches or by jumpers is not acceptable. Devices which take their address from their position in the circuit are unacceptable because if devices are later added, existing addresses, descriptors and commands must be reprogrammed.

2. Devices shall receive communication signals from the same pair of wires. For fault-tolerant circuits, any separate power wiring shall also be made fault-tolerant.

3. Additional devices shall be capable of being added to the circuit from any point in the circuit and without affecting any existing device address or function.

4. Each device shall contain screw terminals with rising plates for positive termination of up to 12 AWG wire.

B. Manual Pull Stations

1. Fabricated of metal or plastic, and finished in red with molded, raised-letter operating instructions of contrasting color.

2. Single-action mechanism initiates an alarm.

3. Double-action mechanism requires two actions, such as a push and a pull, to initiate an alarm.

4. Station Reset: Key or wrench operated; double pole, double throw; switch rated for the voltage and current at which it operates.

5. Indoor Protective Shield: Factory-fabricated clear plastic enclosure, hinged at the top to permit lifting for access to initiate an alarm. Lifting the cover actuates an integral battery-powered audible horn intended to discourage false alarm operation.

6. Weatherproof Protective Shield: Factory-fabricated clear plastic enclosure, hinged at the top to permit lifting for access to initiate an alarm.

7. Integral Addressable Module: Arranged to communicate manual-station status (normal, alarm, or trouble) to the FACP.

   Acceptable Product:
   Honeywell S 464G1007.

C. Sensors

1. All sensors shall mount on a common base to facilitate the changing of sensor type if building conditions change. The base shall be incompatible with conventional detectors to preclude the mounting on a non-intelligent device.

2. Each sensor shall contain a LED which blinks each time it is scanned by the FACP. If the FACP determines that the sensor is in alarm, the FACP shall command the sensor LED to remain on to indicate alarm.

3. Each sensor shall contain a magnetically-actuated test switch such that it can be tested for alarm from the sensor location.

4. Each sensor shall be capable of being tested for alarm via command from the FACP.

5. Each sensor shall respond to FACP scan for information with its type identification to preclude inadvertent substitution of another sensor type. The FACP shall operate with the installed type but shall initiate a mismatch (trouble) condition until the proper type is installed or the programmed sensor type changed.

6. Each sensor shall respond to FACP scan for information with an analog representation of measured fire-related phenomena (smoke density, particles of combustion, temperature). Systems which only monitor the presence of a conventional detector in an addressable base shall not be acceptable.

7. Photoelectric Smoke Sensors shall contain an optical sensing chamber with nominal sensitivity of 2.3% per foot obscuration.
   Acceptable Product:
   Honeywell TC 806 B.

8. Duct Ionization Smoke Sensors. Shall operate over an air velocity range from 300 to 4,000 fpm. Each shall be equipped with an air inlet sampling tube which completely traverses to duct width.
   Acceptable Product:
   Honeywell TC 807 A.
   Honeywell 14506873, smoke sensor duct housings.

9. Thermal Sensors shall provide temperature measurement when scanned by the FACP for information.
   Acceptable Product:
   TC 808 B Thermal Sensors

10. Flow Switch: Provide monitoring module for each flow switch. Flow switch shall be provided as part of Fire Protection System.

11. Tamper Switch: Provide monitoring module for each tamper switch. Tamper switch shall be provided as part of Fire Protection System.

D. Monitor Modules:

1. The Monitor Module shall provide an addressable input for N.O. or N.C. contact devices such as manual pull stations, duct smoke detectors, water flow switches, sprinkler supervisory devices, door contacts, intrusion detectors, etc.

2. The Monitor Module shall provide a supervised initiating circuit. An open-circuit fault shall be annunciated at the FACP. Subsequent alarms shall be reported. (Style D Operation)

3. The module shall contain an LED which blinks upon being scanned by the FACP. Upon determination of an alarm condition, the LED shall be latched on.

4. The module shall mount in a standard electrical box.
Acceptable Product:
Honeywell TC 809 A.

E. Control Modules:

1. The Control Module shall provide an addressable output for a separately powered alarm indicating circuit or for a control relay.

2. The Control Module shall provide a supervised indicating circuit where indicated on the plans. An open-circuit fault shall be annunciated at the FACP. Subsequent alarm signaling shall occur in spite of the fault condition.

3. The Control Module shall provide a control relay. The relay contacts shall be SPDT (Form "C") rated at 2 amps at 28 V dc.

4. The module shall contain an LED which blinks upon being scanned by the FACP. Upon activation of the module, the LED shall be latched on.

5. The module shall mount in a standard electrical box.
Acceptable Product:
Honeywell TC 810 A.

2.8 FIRE ALARM NOTIFICATION DEVICES

A. Alarm Horn/Strobe Units

1. Alarm horns shall be UL 1971 listed and suitable for indoor, or outdoor, application with the appropriate electrical box. All horns shall be 24 VDC

polarized. The minimum sound level shall be 75-130 dB at 10 feet. Horns shall be semi-flush mounted. Single and dual projectors are to be supplied.

2. The visual signal shall flash on alarm occurrence. The bezel shall extend 1-1/2 inches minimum from the finished wall, and be approximately 3-1/2 x 5 inches engraved "FIRE".

3. All Multi candela strobes shall be field selectable to 15, 30, 75 or 110 candelas. Multi candela Strobe shall be Wheel Lock NS4-24-MCW-FR.

4. All strobes in unisex and public restrooms shall be ADA compliant and shall be 15/75 candela. ADA strobe shall be Wheel Lock NS4-241575W-FR.

B. Visual Alarm Unit

1. Visual Alarm unit shall be UL 1971 listed. Electronic light source shall be sealed in silicone and protected by a Lexan lens. The word "FIRE" shall appear on the lens. The light shall flash at a rate of 1 to 3 flashed per second, maximum. Lamp shall be powered by a supervised 24 VDC polarized source

2. Multi candela strobes shall be field selectable to 15, 30, 75 or 110 candelas. Multi candela Strobe shall be Wheel Lock RSS-24-MCW-FR.

3. Strobes in unisex and public restrooms shall be ADA compliant and shall be 15/75 candela. ADA strobe shall be Wheel Lock RSS-24-241575W-FR.

4. High Intensity Strobes shall be 185 candelas. Strobe shall be Wheel Lock RSS-24-24185W-FR.

2.9 REMOTE INDICATING LIGHTS AND IDENTIFICATION PLATES

A. Description: LED indicating light near each smoke detector that may not be readily visible, and each sprinkler water-flow switch and valve-tamper switch. Light is connected to flash when the associated device is in an alarm or trouble mode. Lamp is flush mounted in a single gang wall plate. A red, laminated, phenolic-resin identification plate at the indicating light identifies, in engraved white letters, device initiating the signal and room where the smoke detector or valve is located. For water-flow switches, the identification plate also designates protected spaces downstream from the water-flow switch.

2.10 MAGNETIC DOOR HOLDERS

A. Description: Units are equipped for wall or floor mounting as indicated and are complete with matching door plate.

1. Electromagnet: Requires no more than 3 W to develop 25-lbf (111-N) holding force.

2. Wall-Mounted Units: Flush mounted, unless otherwise indicated.

3. Rating: 120-V ac.

B. Material and Finish:

1. Match door hardware.

2.11 EMERGENCY POWER SUPPLY

A. General: Components include nickel-cadmium battery, charger, and an automatic transfer switch.

1. Battery Nominal Life Expectancy: 20 years, minimum.

B. Battery Capacity: 24-Hours stand-by and 15-minutes in alarm back-up. Comply with NFPA 72.

C Battery Charger: Solid-state, fully automatic, variable-charging-rate type. Provide capacity for 150 percent of the connected system load while maintaining batteries at full charge. If batteries are fully discharged, the charger recharges them completely within four hours. Charger output is supervised as part of system power supply supervision.

D. Integral Automatic Transfer Switch: Transfers the load to the battery without loss of signals or status indications when normal power fails.

2.12 ADDRESSABLE INTERFACE DEVICE

A. Description: Microelectronic monitor module listed for use in providing a multiplex system address for listed fire and sprinkler alarm-initiating devices with normally open contacts.

B. Integral Relay: Capable of providing a direct signal to the elevator controller to initiate elevator recall or to a circuit-breaker shunt trip for power shutdown.

2.13 GUARDS FOR PHYSICAL PROTECTION

A. Description: Welded wire mesh of size and shape for the manual station, smoke detector, gong, or other device requiring protection.

1. Factory fabricated and furnished by the manufacturer of the device.

2. Finish: Paint of color to match the protected device.

2.14 WIRE

A. Notification Circuits: Shall be in compliance with NFPA 70, Class A, Style Z, Type FPLR-CI, minimum 12 AWG solid copper conductors, shielded twisted pair rated at 600-volts, 90-degrees Celsius with color coded insulation.

B. Initiating Line Circuits: Shall be in compliance with NFPA 70, Class A, Style D, Type FPLR-CI, minimum 14 AWG solid copper conductors, shielded twisted pair rated at 600-volts, 90-degrees Celsius with color coded insulation.

C. Signaling Line Circuits: Shall be in compliance with NFPA 70, Class A, Style 5 Alpha, Type FPLR-CI, minimum 14 AWG solid copper conductors, shielded twisted pair rated at 600-volts, 90-degrees Celsius with color coded insulation.

END OF SECTION 13851

SECTION 16430 - POWER MONITORS FOR LOW VOLTAGE SWITCHGEAR

PART 2 - PRODUCTS

2.1 COMPONENTS

A Multifunction Digital-Metering Monitor: All double-ended substations shall be equipped with a multifunction digital-metering monitor located at each secondary main circuit breaker. Metering monitor shall be sole-sourced exclusively from Square-D. There will be "No Exceptions Allowed". Metering monitor shall have as a minimum all capabilities of Square-D CM3350 circuit monitor. Metering monitor display and control unit shall be flush or semi-flush mounted in instrument component door. Metering monitor shall be fully compatible with Johnson Controls N2 protocol for monitoring and displaying basic electrical data.

END SECTION 16430

SECTION 16442 - PANELBOARDS

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: All Panelboards shall be sole-sourced exclusively from Square-D. There will be "No Exceptions Allowed".

2.2 MANUFACTURED UNITS

A. Enclosure Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover.

B. Phase and Ground Bus Material: Hard-drawn copper, 98 percent conductivity.

C. Panel Short-Circuit Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals.

D. Branch Overcurrent Protective Devices:

1. All circuit breakers shall be bolt-on type, whenever possible, replaceable without disturbing adjacent units.

2. All 120/240 VAC rated circuit breakers shall have VISI-TRIP trip indicator.

E. <Insert other features as required for specific project>.

END OF SECTION 16442

SECTION 16714 –FLEXIBLE RESPONSE SYSTEM

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. The existing Flexible Response System is manufactured by Fire Lite Alarms, Inc., therefore modules shall be exclusively by Fire Lite Alarms, Inc. only. All other products required for system integration shall be submitted and approved by MAA with input from TENN security.

2.2 CONTROL PANEL

A. Provide monitoring modules and addressable control relay modules as described below for existing Fire Lite control panel MS-9200 for expansion.

2.3 MONITORING MODULE

Provide addressable monitoring module suitable for monitoring a normally open, dry contact device. Module shall be able to mount inside a single gang device box. Module shall have direct dial address entry (01-99).

Acceptable Product:
Fire-Lite Alarms, Incorporated, MMF301, Monitoring Module.

2.4 ADDRESSABLE CONTROL RELAY MODULE

Provide addressable control relay module with two independently addressed and controlled normally open relays. Model shall have direct dial address entry (01-99).

Acceptable Product:
Fire-Lite Alarms, Incorporated, CRF C304 Control Module

2.5 SECURITY STROBES

Strobe lights shall provide high Intensity flashes for fast premise identification, excellent visibility for the widest-angle coverage, 12V operating voltage and suitable for surface mounting. Red strobe light shall be Ademco Series SL1R or approved equal. Amber strobe light shall be approved equal.

Acceptable Product:
Amesco Series SL1A, Amber Strobe Light
Amesco Series SL1B, Blue Strobe Light

2.6 PIEZO HORN

Horn shall provide minimum 100 dB output at 175 mA or as recommended by manufacturer.

Acceptable Product:
Moose MPI-47 or approved equal Piezo Horn.

2.7 POWER SUPPLY

Power supply shall be a complete assembly of 16VA transformer (120V primary to 12V secondary), battery charger, 12V, 2.6AH sealed lead acid battery in NEMA 1 enclosure. It shall provide precision voltage regulation, transient protection and blowout protection for efficient operation of strobe lights, horns, panic button, footbar, etc. It shall activate devices during normal as well as emergency operation.
Acceptable Product:
Moose Product Inc. Series CH-12 or approved equal power supply.

2.8 FOOT BAR

Foot bar shall be 18 inches wide cast aluminum and operated by upward toe movement for security alarm with key re-settable indicator flag. It shall be provided with double pole double throw switch to activate audio and visual alarms.
Acceptable Product:
Ademco No. 266 or approved equal foot bar.

2.9 PANIC BUTTON

Panic button operation takes place when two large levers on either side of the switch are depressed simultaneously in order to activate alarm, and alarm signal cannot be activated if one lever is accidentally depressed. Panic button shall have key re-settable indicator flag and double pole double throw contacts to activate audio and visual alarms.
Acceptable Product:
Ademco Catalog No. 268 or approved equal panic button.

2.10 SILENCE KEY SWITCH

Silence key switch shall be provided with lock-mounted switch and key for silence operation. It shall be provided with double pole double throw contacts to activate audio and visual alarms.

Acceptable Product:
Ademco Catalog No. 269 or approved equal.

2.11 CONDUCTOR

Provide twisted shielded copper cables as recommended by manufacturer.

2.12 AUTOMATED EXTERNAL DEFIBRILLATORS

A. Defibrillator shall be 10.5 inched wide x 11.6 inches high x 4.0 inches deep, lightweight portable, with low maintenance requirements and long shelf life non-rechargeable lithium batteries. Biphasic Technology shall be used to deliver defibrillation truncated exponential with voltage and duration for patient impedance at 200 to 360 joules energy levels as recommended by the American Heart Association and International Guidelines Display of low battery alert service, shock count, CPR time and real time on two lines, 20 characters LCD on each line.

Acceptable Product:
Medtronic Physio-Control, Life Pack Series 500 Defibrillator.

B. Automated external defibrillator cabinets. Defibrillator cabinet shall be 12 inches wide x 16 inches high x 6 inches deep, with glass front door, magnetic contact, lead wires for monitoring module connection and disable alarm key in white epoxy finish. Provide BWI Fire Marshall approved sign above cabinet.

Acceptable Product:
Medtronic Physio control Series 3012604, Cabinet

END OF SECTION 16714

SECTION 16782 - CLOSED-CIRCUIT TELEVISION (CCTV) SYSTEM

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. The existing Closed Circuit Television System is manufactured by Philips Communication; therefore, Matrix Switches, digital recorders, camera, and power supplied shall be exclusively by Philips Communication only. All other products required for system integration shall be submitted and approved by MAA with input from ADT. There will be "No Exceptions Allowed."

2.2 GENERAL

A. Provide CCTV systems, of types, sizes, capacities and electrical characteristics indicated below, consisting of CCTV cameras, LCD monitors, video matrix switcher, keyboard controllers, signal equipment, camera enclosures, power supplies, and other components as required for complete installation. Except as otherwise indicated, provide manufacturer's standard CCTV system components as indicated by published product information, designed and constructed as recommended by manufacturer.

2.3 SATELLITE MATRIX SWITCHER

A. The Matrix System shall integrate the specified CCD cameras and peripheral products into a comprehensive extension of the existing MAA CCTV system. A built-in cable compensation circuit on every input channel shall provide high quality picture and control. The system's extensive program capability shall include versatile camera sequences, alarm mode, time/date event scheduling, password protection, operator's access level, priority and system partitioning, providing outstanding flexibility.

B. A keyboard controller shall be used for setup, camera control and video routing. The keyboard controller unit's 2-line character LCD display and function keys shall provide direct menu access to cameras.

C. The system shall have 80 inputs and 4 outputs as base configuration; by adding 16-channel video input modules, and/or 4-channel video output modules the system can be expanded to accommodate up to 256 cameras, 64 monitors and 32 keyboard controllers.

D. The system shall have the ability to integrate external devices such as computers, printers and alarm input devices. The built-in RS-232C port shall permit up and downloading of the system data for back-up and restore purposes with a PC. The system can be controlled and programmed through the RS-232C port, if a printer is connected,

the system set-up data can be printed and verified. The built-in diagnostic program shall help to identify a malfunction speedily for system maintenance and repair. The power source shall be 120VAC, 60Hz. The system shall be UL listed.

E. The system shall have a data connection via a fiber optic multiplexer specified elsewhere within this specification for communications with the existing matrix switcher. The Contractor shall be responsible for all required new and existing system programming for a functionally complete and operational system.
Acceptable Products:
Philips Model LTC 8800 System Matrix Switcher.

The Matrix shall be manufactured by Philips Model LTC 8800 System, no substitutions. The following parts, in quantities as required, shall be included in Matrix Switcher:
Philips LTC 8801/60 CCTV switching bay, CPU and power supply.
Philips LTC 8821/00 Video input module, 16-video inputs per card.
Philips LTC 8834/00 Video output module, 4-video outputs per card.
Philips KBD Universal Universal Digital Keyboard Controller.

2.4 DIGITAL VIDEO RECORDER

A. General: The digital video recorder (DVR) shall have the following general specifications:

1. Video Inputs - 16

2. Software - Windows 2000

B. The DVR shall provide full screen or selectable multi-screen displays of 2x2 (quad), 3x3, and 4x4 formats.

C. The recorder shall be capable of sequencing the 16 camera inputs as four quad displays.

D. The date/time, recorder name, and camera name shall be stored with each image recorded.

E. The recorder shall provide 16 video inputs with independently configurable frame rate settings (ips).

F. The recorder shall provide 16 video inputs with independently configurable frame rate settings (ips). Each recorder input for this project shall be configured for 3.75 ips. Recorded digital video shall be stored for a period of 30 days for all inputs.

G. The digital recorder shall be capable of recording at the following images per second (ips) rates:

1. Up to 120 ips (1 to 4 cameras) or up to 80 ips (5 to 16 cameras) with one compression card installed.

2. Up to 240 ips (1 to 8 cameras) or up to 160 ips (9 to 16 cameras) with two compression cards installed.

H. The recorder shall use temporal compression based on proprietary MJPEG and H.263 technology.

I. Image integrity shall be maintained using proprietary codec, time/date stamp, watermark authentication.

J. The recorder shall be capable of providing simultaneous recording and playback.

K. The recorder shall provide five independently configurable motion detection zones per camera.

L. The recorder shall provide a function to bookmark a specific time and date of a video file for easy retrieval at a later date.

M. The recorder shall provide pre and post alarm recording.

N. The recorder shall provide both local and remote pan/tilt/zoom control.

O. The system shall provide the following minimum TV Lines of Resolution (TVL) as related to the digital memory resolution:

1. 450TVL at 640H x 480V; 280TVL at 320H x 240V; 120TVL at 160H x 120V

P. The recorder shall include the following:

1. CDRW unit.

2. SCSI-2 interface connection to allow video archiving to a disk array.

3. 3.5 Floppy drive.

4. Inputs for sixteen (16) programmable, N/O, N/C dry alarm contacts.

5. Sixteen (16) programmable output relays.

6. 480 Gigabyte hard drive for storage of digital video.

Q. The recorder shall provide the capability to load a bitmap image of a facility, then drag and drop camera and alarm icons to create an overview of the installation thereby allowing an operator to click on the camera icons to view video from the selected camera.

R. The recorder shall be capable of recording single channel audio.

S. The recorder shall include remote viewer Graphical User Interface (GUI) software to allow simultaneous access via Ethernet to live and recorded video. This software shall also provide system configuration and pan/tilt control supporting up to sixteen (16) recorders. The Contractor shall configure this software and program the GUI for connection to an Ethernet system provided by others. Contractor work shall include physical connection of the recorders to the Ethernet switch and configuration of the software on a computer workstation provided by others.

T. The recorder shall have remote administrator configuration capability.

U. The recorder shall provide a POS database interface that allows search parameters for time, date, camera, merchandise, and cash amount of sale.

V. Electrical Specifications:

1. Video Input: 1Vp-p, composite video, 75 ohms.

2. Video Output: 1Vp-p,composite video 75 ohms.

3. Power supply: Switch selectable between 110 VAC, 60Hz and 220 VAC, 50Hz. 4. Audio: 1-channel (line in or mic. in, line out).

4. Connectors:

a. Video input: 16 BNC, non-looping

b. Video output: RCA (BNC converter supplied.

c. SCSI-2 HD-50 interface to disk array

d. RJ-45 10/100 Mb base-T Ethernet connection.

e. Audio: 1/8-inch mini phone jack.
Acceptable Product:
Philips Model DR16248 Digital Video Recorder.

2.5 QUAD VIDEO PROCESSOR

A. The quad video processor shall permit viewing of 4 cameras on a single LCD display.

B. The unit shall offer full time quad display and full screen display of video images.

C. The unit shall have 720 x 484 pixel resolution and 525 lines resolution.

D. The rear panel shall feature 4 loop through Auto Terminated BNC video inputs, 4 alarm

input connections, one BNC monitor output, one BNC record output, and a RS-232 remote callup 15-pin D input.

E. The unit shall be rack-mountable. The power source shall be 120VAC, 60Hz, and shall be UL listed.
Acceptable Product:
Philips Model LTC 22377/60, Quad Video Processor.

2.6 CLOSED-CIRCUIT TELEVISION CAMERAS

A. General: Provide CCTV color cameras, associated accessories and wiring for MAA surveillance. Cameras shall be connected to the existing MAA matrix switcher via fiber optic multiplexers installed under this project.

B. Fixed Color Cameras: Provide 1/3 inch format cameras using solid state, interline transfer, charge coupled device (CCD) image sensors. Cameras shall produce standard EIA video signals with composite output level of 1.0 v p-p and 75 ohms impedance. Output connectors shall be BNC types. All cameras shall feature no geometric distortion, immunity to electrical and magnetic fields. All cameras shall be provided as standard resolution for color as specified herein and indicated on plans.

1. Standard resolution for color cameras shall have the following features.

   a. The minimum scene illumination to obtain "usable video " shall be 2 lux at F 1.4 (0.2 foot-candle) based on scene illumination, 75 % reflectance factor, automatic gain control (AGC).

   b. Signal to noise ratio shall be 50 dB, minimum with AGC off.

   c. The camera shall incorporate back light compensation (BLC), aperture correction and auto tracing white balance (ATW).

   d. The camera shall conform with UL 544 and 1409 and radiation standards of FCC class B. Input power shall be 24 volt AC, 60 Hz.

   e. The camera shall accept C and CS mount lenses and shall be capable of functioning over a temperature range of -20° – 32° F. External dimensions of camera shall not exceed 2.65 inches wide x 2.56 inches x 4.81 inches length and weight shall not exceed 2 pounds. The housing shall be weatherproof metal case with top heater, blower and bottom mounting provision.
   Acceptable Product:
   Philips Model LTC 0450/21, Cameras.

C. Integrated high-speed dome color pan/tilt/zoom camera: Cameras shall be provided complete with all back boxes, mounting adapters, and hardware required to install camera in location shown on the Contract Drawings.

1. Integrated dome pan/tilt/zoom camera shall be suitable for in-ceiling mount, pendant mount, or wall mount as required for the camera location and meet the following specifications:

   a. 99 Presets

   b. 0.5° preset accuracy

   c. Proportional Pan and Tilt

   d. Privacy Masking

   e. Guard Tour

   f. Image sensor:

      1) Sensor shall incorporate integral infrared cutoff filter.

      2) Image sensor shall be a color 1/4-inch interline transfer CCD.

      3) Sensor shall be free of blemishes as defined by EIA-330, and shall not have dead pixels.

      4) Sensor shall have at least 768 horizontal pixels and 494 vertical pixels.

2. Resolution: Camera shall have at least 470 lines of horizontal resolution. Resolution shall not vary over the life of the camera.

3. Signal-to-noise ratio: At least 50 dB unweighted with no gain.

4. Sensitivity:

   a. Slow shutter off: 0.025 fc/0.25 lux.

   b. Slow shutter on: 0.0016 fc/0.016 lux.

5. Automatic Circuits: The camera shall have:

   a. Automatic white clip.

   b. Automatic white balance.

   c. Automatic gain control.

d. Electronic light control (electronic shutter speed).

e. Auto-iris drive.

6. Lens:

a. Lens shall be equipped with an auto-iris mechanism.

b. Lens shall be an 18 times optical (4.1mm - 73.8mm) and 12 times digital zoom with an aperture range of f/1.4 to f/3.0.

7. Dome pan/tilt drive:

a. Shall be supplied as part of the integrated assembly.

b. Dome shall have continuous 360° pan capability.

c. Pan speed rate shall be variable from 0.1-120° per second (manual operation).

d. Shall have variable-rate, proportional pan and tilt speed that shall decrease the pan and tilt speed in proportion to the zoom focal length.

e. Presets position speed rate shall be 360° per second, +/- 0.50° accuracy.

f. Dome bubble shall be smoked gray color or clear as approved by the Engineer.

g. Dome drive shall have auto flip functionality and have quick disconnect for mechanical and electrical connections.

h. Domes for outdoor use shall be rated as follows:

1) NEMA 4X.

2) Humidity: 0% to 90% relative, non-condensing.

3) Operating Temperature Range: -40°F to +122°F

8. Mount shall be furnished complete with all interface cards, receiver/drivers, translator cards, cables and appurtenances so they are fully functional and compatible with the existing switcher and pan/tilt control system.

9. Contractor shall consult with the Engineer on color of pendants and exposed hardware and submit samples to the Engineer for approval.

Acceptable Product:

Philips G3 Autodome Bu ENV Euvito Dome Series.

D. Vari-focal lenses: Provide 1/3-inch format auto iris vari-focal lens with the following operational features.

1. Focal length: 2.8 -6 mm, 3.5 - 8 mm, and 5 - 50 mm. As required for each specific camera location.

2. Iris Range - F1.2 - close

3. Focus Range: 1 foot to infinity

4. Weight: .18 lbs

5. Lens mount: CS

6. Angle of view: Wide 88.7° x 69.2°
Tele 44.2° x 34.0°

7. Iris Type: Automatic
Acceptable Product:
Philips Models LTC-3364/20, LTC-3364/31, and LTC-3374/20 lenses, no substitutions.

E. Indoor Housing for Fixed Camera: Provide indoor housing for fixed or suspended ceilings with following features.

1. Maximum camera/ lens size: 8" L x 4" W x 4" H.

2. Dome: .13-inch thick polycarbonate.

3. Mounting: suspended ceiling mount.
Acceptable Product:
Philips Model LTC 9370/00, Camera.

F. Camera Power Supply: Provide 120/24 VAC, 60 HZ camera power supply with the following characteristics:

1. Camera outputs: 4, 8, and 16.

2. Voltage input: 120 VAC, 60 Hz.

3. Voltage outputs: 24 VAC.

4. Current Output: Maximum current available for each terminal pair is 1.85 AC.

5. Controls and indicators Power LED and on/off switch inside cabinet.

6. Connectors: Screw terminals.

7. Construction/finish: Beige metal case.

8. Dimensions: approximately 11.25 " W x 3.5 " D x 11.25.
Acceptable Product:
Philips Model LTC 540X/60 Series, Power Supply where X equals the number of outputs as required per number of cameras fed."

2.7 9-INCH COLOR MONITOR

A. The 9-inch color monitor shall be mounted in a 19-inch vertical cabinet located within the MDF Room A206.
Acceptable Product:
Philips Model LTC 2810/90, 9-inch color monitor.

2.8 42-INCH LDC MONITOR

A. General:

1. Video displays shall be provisioned with UL, CE or ETL labeling indicating compliance with recognized standards.

2. Suitable manufacturers of LCD video screens include: Eternal Graphics, NEC, Philips, or approved equal.

B. Display Characteristics:

1. Minimum Active Area: 41.4" for 42-inch units.

2. Aspect ratio: 16:9.6

3. Resolution: WVGA (1280 x 768)

4. Horizontal Viewing Angle: 170°

5. Vertical Viewing Angle: 170°

6. Brightness: 450 Cd/m^2

7. Color Range: 16.7 Million colors

8. Contrast Ratio: 600:1

C. Physical Parameters & Special Features:

1. Unit Dimensions (WxHxD): 36.5"x23.2"x3.95"

2. Backlight Half-Life: 50,000 Hours

3. Power Consumption: 110-120VAC/50-60Hz, 240 Watt

4. Unit Weight: 53 lbs.

5. Ambient Temperature/Humidity: warranted operational range + 32°F to +95° F and 20 to 80% relative humidity (non-condensing)

D. Signal & Control Features for Video Displays

1. RS-232 Video Display Remote Control

2. Infra-Red Remote Control

3. Video Signal Input:

a) Data: VGA (640x480), WXGA (1280x768), DVI-I

b) Video: Composite Video (NTSC, PAL, SECAM), S-Video (NTSC, PAL)

2.9 DIGITAL FIBER OPTIC VIDEO MULTIPLEXER AND DATA TRANSCEIVER

A. Provide digital fiber optic video/data multiplexers as required. Multiplexer shall allow transmission of 4 channels of high resolution, real-time color video, as well as bi-directional data simultaneously on one optical fiber. The unit shall employ 8-bit digital encoding for transmission of these signals. The multiplexer shall consist of a video transmitter/data transceiver, and a video receiver/data transceiver. The multiplexer shall allow bi-directional transmission of Manchester Encoding, Bi-Phase, RS-232, RS-422 or RS-485 (2 or 4 wire) data protocols. No in-field electrical or optical adjustments or in-line attenuators shall be required. All units shall be available in both rack mount and surface mount versions. The units shall have solid-state limiters on all power lines, which shall provide for automatic reset. All rack mount units shall have an internal DC power supply. A short circuit in one unit shall not affect operation of other units powered from the common power supply. The rack mount units shall be hot swappable with no risk of damage to other units or rack during replacement. The unit shall be UL listed. Operating temperature shall be –40°C to +74°C for all units.

Acceptable Products:

IFS model VT7420DRDT-R3. The video transmitter/data transceiver rack mount rack mount.

IFS model VR7420DRDT-R3. The video receiver/data transceiver rack mount.

B. 19" Rack Mount Panel – Provide IFS R3 card cages, no substitutions with the following characteristics:

1. Input Voltage: 115 VAC (line cord)

2. Power supply (to plug-ins): 20 VAC @ 2.8A

3. # Slots/Spacing: 14 slots available, with internal power supply.

4. Size (In.) (W x H x D): 19.0 x 5.2 x 7

5. Fusing: 1A slow blow (Rack Power supply) (Plug-in modules individually fused)

2.10 ETHERNET SWITCH

A. The Contractor shall provide Ethernet switches to support the transmission of digital video between the remote DVRs and the existing DVR workstation as specified herein and detailed on the contract drawings. This includes provision of the proper quantities of media ports. The Ethernet switches shall be intelligent, layer 2 and SNMP manageable. Provide all intra-rack cabling, connectors and transceivers required for operating the system.

B. Ethernet switches shall be compatible with the existing MAA/BWI CISCO network: Rack mount 24 port 100BaseTX switch, with redundant Power supply unit and fiber optic GBIC uplinks.

C. Coordinate with MAA IT/Network representative for, IP address, network management and redundancy scheme.

Acceptable Product:
Cisco 2950G-EI Ethernet Switch.

2.11 19-INCH EQUIPMENT CABINET

A. Provide 19-inch equipment cabinets as specified in Section 16741 - Premise Wiring and Distribution Systems.

2.12 SIGNAL TRANSMISSION COMPONENTS

A. CCTV camera cable: Cellular-polyethylene dielectric, bare copper double braided shield with 95 percent minimum shielding factor, No. 18 AWG stranded copper conductor and PVC jacket, RG-6U.

B. CCTV coaxial cable Connectors: Type BNC, 75 ohms.

C. CCTV coaxial cable splitter: Type BNC, 75 ohms.

D. CCTV camera covert operations outlets: Recessed, Type BNC, 75 ohms.

Fiber Optic Patch Cords: Provide all required fiber optic patch cords. Patch cords shall be as specified in Section 16741.

END OF SECTION 16782

ITEM L-109 MODIFICATIONS AND ADDITIONS TO AIRFIELD LIGHTING CONTROL SYSTEM

EQUIPMENT AND MATERIALS

109-2.1 COMPUTERIZED AIRFIELD LIGHTING CONTROL SYSTEM (CALCS) MODIFICATIONS, ADJUSTMENTS, AND CALIBRATION. Modify the existing computerized airfield lighting control system (CALCS) so that the display reflects new Lighting Circuits. Add new components to control and monitor new regulators and adjust the existing (CALCS) equipment as required including additional wiring and conduits. Provide all necessary wire and conduit to accommodate new components necessary to provide a working system. The Contractor shall sub-contract Siemens Airfield Solutions (SAS) to modify the existing computer system software and screen graphics to reflect the changes required by this contract. All screen graphic and software changes shall be submitted to the Engineer for approval prior to installation. Work under this contract shall not void any existing warranties on the existing system. After all lights are installed and all other electrical modifications have been made, recalibrate all lighting circuits which have had load changes. This will require field work to verify that lighting fixtures are properly operating (or recording outages). It is the Contractor's responsibility to restore the computerized lighting control system at the Air Traffic Control Tower, Electrical Vault or Portable Personal Computers, and any other existing airfield monitoring locations to full calibration and operation reflecting all changes at the end of the project.

Materials for changes to the CALCS shall be in all ways matched to and compatible with the existing system component parts.

All new components shall be compatible with the existing SAS CALCS system installed in 2000. Contact SAS at 860-408-9546 for system details.

a. TESTING AND COMMISSIONING

1. The Contractor in cooperation with SAS shall prepare and submit a proposed testing and commissioning procedure for the CALCS. Prepare these documents listing the testing and commissioning procedures and expected test results. As a minimum, tests shall include:

(a) Point-to-point wiring continuity tests.

(b) Insulation and grounding tests.

(c) Fiber-optic network communications tests. Include in Pay Item Section 16134.

(d) Verification of all remote control functions for each controllable element.

(e) Touch-screen monitor operations, screen display sections, command select acknowledgement, and action confirmed representations, alarm indications.

(f) AEMS computer tests.

b. WARRANTY. Provide a written guarantee that the CALCS equipment and components supplied and installed are guaranteed against defects and malfunction for a period of 12 months from date of completion of commissioning.

109-2.2 INDIVIDUAL LAMP CONTROL AND MONITORING SYSTEM

a. Addressable Device

The lighting series circuits shall be used as the transmission backbone or infrastructure of a communication command and information network. Addressable devices shall provide the interfacing between the controlled and monitored elements (lamps, signs, etc.) and the rest of the system. To allow communication to a controllable element in the field, via the lighting series circuit, the only required airfield hardware installation is to plug an addressable device into the secondary circuit of the relevant FAA L-830 isolation transformer. The addressable device shall be enclosed in a permanently sealed watertight epoxy case and suitable for installation in L-867 or L-868 size B light base. No additional wires shall be required between the field elements and the electrical vault. No bypasses or filters shall be required in the field.

The addressable device shall be designed to control and monitor individual airfield elevated or inpavement lighting fixtures and to receive signals from sensors and detectors. The addressable device shall be able to function properly on circuits powered by various CCR styles and different manufacturers. The device shall be capable of functioning properly on constant current series circuits having various wave shapes, load variations and high noise levels.

The addressable device shall be a microprocessor-based unit and consist of:

1. Master. The Master shall be able to communicate with remote units via series circuit and shall have an interface with the existing CALCS. The Master shall have lightning protection equal to that on the output of the CCR. Input power for Master shall be 120 VAC, 60 HZ.

2. Remote. The remote shall provide the following data:

(a) ON/OFF switching and flashing of elements (lights, signs, stop-bar, segments of lights, runway guard light, etc.).

(b) Collection of signals from airplane position sensors and their transmission via the lighting series circuit.

(c) Detection of burnt out lamps.

(d) Short-circuiting of isolation transformer in case of lamp failure.

(e) Watchdog timer to provide a fail-safe mode.

109-3 COMPUTERIZED AIRFIELD LIGHTING CONTROL EQUIPMENT - GENERAL

a. Control and Monitoring Equipment

1. The control and monitoring equipment shall be of a distributed nature and shall not be a PLC based. The IU (Interface Unit) units shall be installed locally at each Constant Current Regulator (CCR), which requires control and/or monitoring within the airfield lighting electrical vault(s).

2. Each new CCR shall be connected to an IU.

3. The IU shall be a microprocessor based module that includes all of the communication, control commands, input/output interface and failsafe functionality.

4. The IU shall be connected to both existing networks associated with the Redundant Communications Network (RCN) via quick disconnects.

5. The IU can communicate back to the Vault computer via either of the networks.

6. Removal of any IU unit(s) from the vault network shall not affect the operations of the CALCS system.

7. The IU shall be a universal device that can be used on any type of CCR from any manufacturer.

8. Each IU shall be identical and have interchangeable components.

9. The IU unit shall be optically isolated from the airfield series circuit via a quick disconnect.

b. Existing Redundant Vault Control and Monitoring Network

1. A Redundant Communication Network (RCN) using two (2) existing independent communication networks in the electrical vault(s).

2. The existing RCN has two (2) cables each consisting of two (2), 24AWG, shielded twisted pairs with a common (drain wire) meeting EIA RS-422 applications (Belden™ No. 9842 or equivalent).

3. The network shall be used to control and monitor all the CCR(s).

4. Each CCR shall be interfaced to an IU.

5. Any malfunction in one network shall not affect the operation of the system.

6. Any malfunction in one of the IU communication ports, transfers communication to the remaining port without affecting system functions.

c. Overview of Operation

1. Each IU unit shall have a unique factory set address and a field programmable communication address.

2. The IU receives commands via the existing RCN, executes those commands, and transfers back the status of the element to the existing vault computer.

3. The IU shall perform the following functions:

(a) Brightness setting control of the CCR(s) or ON/OFF control as required by the controlled element.

(b) CCR output voltage and current monitoring.

(c) CCR status monitoring (i.e., remote/local, loss of input power).

(d) Monitor all requirements per FAA L-827 monitoring requirements (See Monitoring section).

(e) Perform all failsafe functions.

(f) Communication via both networks to the vault computer.

(g) Self-diagnostic function to monitor for proper operation.

(h) Locally store all data and parameters specific to the controlled CCR.

d. Subcomponents: Each IU unit shall consist of the following six components:

1. Input/Output Module

(a) Interface for all control and monitoring connections.

(b) Distribution bus for interfacing internal boards.

(c) Easy access, quick disconnect terminal blocks.

2. Processor Module

(a) Interface for redundant communication network.

(b) Easy access, quick disconnect terminal block connections for RCN.

(c) Receives and transmits data to the vault computer.

(d) Interface for insulation resistance monitoring.

(e) Quick disconnect connection for interface to the Insulation Resistance Monitoring Module.

3. Monitoring Module

(a) Interface for current and voltage monitoring.

(b) Quick disconnect connections for interface to the Voltage and Current Sensor Module.

(c) Receives current and voltage samples from the Voltage and Current Sensor Module.

(d) Can interface with up to one (1) circuit.

4. Display Module

(a) The following LED's shall be installed as a minimum on the IU's and provide the following information:

(1) Running status: LED indicator display of IU status.

(2) Brightness Step: LED display indicating the commanded step of the CCR.

(3) Remote/Local: LED display indicating the status of the remote local switch of the CCR.

(4) Primary Power: LED display indicating the status of the input power to the CCR.

(a) Over Current Shutdown: LED display indicating over current shutdown of the CCR.

(b) Open Circuit Shutdown: LED display indicating open circuit shutdown of the CCR.

(c) Channel A: LED display indicating the status of existing channel A of the existing redundant communication network.

(d) Channel B: LED display indicating the status of existing channel B of the existing redundant communication network.

(5) Current and Voltage Module (CVM)

(a) Collects current and voltage samples.

(b) Transmits current and voltage samples to the Monitoring Board.

(c) Interfaces to the output of the CCR.

(d) Shall be isolated from the series circuit via a quick disconnect interface.

(e) Quick disconnect connections for interface to the Monitoring Board.

(6) Insulation Resistance Monitoring Module (IRMM)

(a) Collects insulation resistance samples.

(b) Transmits insulation resistance samples to the Processor Board.

(c) Interfaces to the output of the CCR.

(d) Shall be isolated from the series circuit via a quick disconnect interface.

(e) Quick disconnect connection for interface to the Processor Board.

e. Control and Feedback Interface

1. The IU unit shall have the following interface points available:

(a) Control: Five mechanical latching output points (expandable to 16). These control points shall also be self-monitored and provide back-indication to the Vault computer verifying proper execution of control command.

(b) Feedback: Two digital-isolated input points (expandable to 6).

(c) Current/Voltage Monitoring: One digital interface (expandable to 3).

(d) Insulation Resistance Monitoring: Two digital interface.

f. Monitoring

(1) The IU unit shall provide full FAA L-827 monitoring per FAA AC 150/5345-10 (current edition).

(2) The IU shall include the monitoring board and provide the following information for each CCR:

(a) Loss of input power to the CCR.

(b) CCR shutdown by open-circuit/over-current protective devices.

(c) Drop of more than 10 percent in the CCR VA load.

(d) Failure of the CCR to deliver the selected output current.

(e) The number of burnt-out lamps in each series circuit.

(f) Remote/local status of the CCR.

(g) Actual CCR output current.

(h) Actual CCR output voltage.

(i) Actual CCR output load (wattage).

(3) The Monitor and Control Equipment (MCE) will also monitor the control relays that are interfaced to the control equipment.

(a) Each relay output is fed to a discrete digital input on the IU device.

(b) Each digital input is monitored for proper execution by the IU device.

(c) This type of contact monitoring provides positive back indication that the correct control commands have been executed by the IU device.

5. The system shall include software for calibrating the following measurements:

(a) The number of burnt-out lamps in the series circuit.

(b) Actual CCR output current.

(c) Actual CCR output voltage.

(d) Actual CCR output load (wattage).

g. Programming

1. Each IU unit shall have a unique factory set address and specific parameters, which are field-programmable. Downloading of the IU's parameters shall be done from the existing electrical vault computer.

2. The control system shall continuously scan all the IU units and detect any malfunctioning units as well as inconsistency between the commanded brightness step and the actual brightness step.

3. Each IU unit shall transmit internal diagnostic information to the control system and provide detailed information regarding its operating status. Any malfunction can easily be isolated to the exact location through the use of troubleshooting and diagnostic screens available at the vault computer.

4. A computer when connected to the IU port, shall be able to perform the following functions:

(a) Monitor the commands being received at the MCE unit.

(b) Perform ON/OFF and brightness step switching of the CCR.

(c) Monitor the communications status of the Redundant Communication network.

(d) Read all the status information of the CCR (i.e., Remote/Local).

(e) Read the current, voltage and wattage of the CCR.

(f) Monitor all the information received at that location.

(g) Perform/transmit any control operation that the MCE is capable of.

(h) Configure and test the MCE at that location.

h. Interface Device Reliability: The MCE device shall have an actual minimum calculated Mean Time Between Failure (MTFB) of 150,000 hours.

i. Communication

1. Each IU unit shall support a data communication rate of up to 115.2 kbaud.

2. The communication protocol shall include adequate security to prevent unauthorized access to the network.

j. Failsafe

1. Each IU unit shall provide a self-contained failsafe feature that shall perform the following functions:

(a) Ensure default operation of the airport lighting, even if the entire airport lighting control system is not functioning.

(b) Display the commands sent by the existing computer to the CCR's and/or to the other controllable items.

(c) Self-monitor the IU outputs and verifies proper commands are executed.

(d) Adaptable to each CCR regardless of internal or external control voltage.

(e) Permits maintenance of portions of the control system, without changing the operational status of the lighting system.

2. The failsafe mode of each IU unit shall be defined per the requirements of the airport. The failsafe modes are as follows:

(a) Active Failsafe Mode: This mode shall be executed as follows:

(1) If the CCR was switched ON before the failure, it shall remain ON at the same brightness level.

(2) If the CCR was switched OFF before the failure, it shall switch ON to a pre-determined brightness level.

(b) Passive Failsafe Mode: This mode shall be executed as follows:

(1) If the CCR was switched ON before the failure, it shall remain ON at the same brightness level.

(2) If the CCR was switched OFF before the failure, it shall remain OFF.

3. Technical Specifications

(a) The failsafe system shall operate independently of the computer, providing failsafe interfacing to the CCR and/or other controllable elements.

(b) The failsafe system shall be based on electromechanical latching relays with the following characteristics:

(1) Maximum Switching Voltage: 240 VAC, 125 VDC.

(2) Nominal Switching Capacity: 8A/250 VAC, 5A/30 VDC.

(3) Rated Current (Resistive): 5A.

(4) Operational Life: Mechanical 5 x 10^7, Electrical 10^5.

(5) Protection: IP67 (protection against ingress of dust and water in harmful quantities).

(6) Approval: UL and CSA.

4. Mode of Operation

(a) The commands executed by the IU to switch the CCR and/or controllable element shall be momentary commands.

(b) The control commands shall be mechanically latched upon execution.

(c) Failure of the IU and/or loss of communication to the network shall not change the status of the airport lighting.

(d) The active failsafe mode shall be triggered by the internal watchdog of the IU unit upon detection of a failure within the IU unit or with the control system. The watchdog shall activate the failsafe and switch any controllable items that are OFF to their predetermined state.

(e) IU Unit shall be manufactured by ADBA Siemens Company.

109-2.4 INSULATION RESISTANCE MONITORING SYSTEM

a. General

1. The insulation resistance monitoring system (IRMS) shall be an integral component of the IU unit.

2. The IRMS shall be capable of automatically or manually monitoring and reporting the insulation resistance value of the series circuit cabling (one IRMS per circuit).

3. The IRMS shall be capable of measuring the cable leakage current and display the actual insulation resistance.

4. The IRMS shall be capable of measuring from 20k Ohms up to 1000M Ohms.

5. The IRMS DC test voltage shall have an automatic range of 500 and 1000 volts with current limiting to 5 milliamperes.

6. The IRMS system shall be capable of taking resistance readings on circuits that are energized or de-energized. This will allow the system to be used as a troubleshooting tool for assisting in locating circuit faults.

7. The IRMS system shall provide database record keeping that allows for graphical trend analysis of the insulation resistance readings.

b. Overview of Operation

1. The IRMS shall operate while the circuit is energized or de-energized and allow for automatic or manual readings during either condition. This shall allow for a more flexible troubleshooting tool for maintenance personnel versus systems that only operate while the circuit is energized.

2. The IRMS shall have a self-calibration feature that performs checks on the hardware to verify proper operation prior to taking measurements.

3. The IRMS shall be flexible, user programmable and allow for all of the following variables to be programmed by the user at any computer location:

(a) Start Time 1: This represents the first time of the day in which the IRMS is to take the first automatic reading of the series circuit.

(b) Start Time 2: This represents the second time of the day in which the IRMS is to take the first automatic reading of the series circuit

(c) Period: This specifies how often the circuit is measured. The period selection shall be made from an options list that includes the following choices: 1 hour, 8 hours, daily, weekly (once a week), biweekly (every 2 weeks), Monthly (once a month) or any variation defined by the operator

(d) Charge Time: This is the amount of time, in seconds, that the IRMS shall charge the circuit before taking a reading. The charge time shall be a number from 15 to 900 seconds. Charge time adjustments allow for greater flexibility in the IRMS system and provide readings that are more accurate for those circuits that are older and/or are longer runs.

(e) Warning Limit: This is a limit value, in Ohms, at which point a resistance warning shall be generated. If a resistance reading is below this value, the warning shall be sent to the event database. When the value goes above this level, the warning shall be marked as cleared in the event database. This number can be any value between 20k Ohm and 1G Ohm.

(f) Alarm Limit: This is a limit value, in Ohms, at which point a resistance alarm shall be generated. If a resistance reading is below this value, the alarm shall be sent to the event database. When the value goes above this level, the alarm shall be marked as cleared in the event database. This number can be any value between 20k Ohm and 1G Ohm.

4. All user programmable variables shall be able to be changed at any specified computer within the CALCS system.

5. The IRMS data for all of the series circuits shall be viewable from any specified computer within the CALCS system.

6. All the IRMS data shall be viewable in real-time or historical at any specified computer location. The IRMS information shall be available at all times and shall not require any special transferring of data between the IRMS system and the control system since the IRMS shall be an integral component of the CALCS.

END OF ITEM L-109

OPERATION AND MAINTENANCE DATA

MARTIN STATE AIRPORT

BWI BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

SECTION 017823 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Maryland Aviation Administration Standard Provisions for Construction Contracts, SP-8.11, Operating and Maintenance Data.

B. Technical Specifications, specific training or operation and maintenance manual requirements.

1.2 SUMMARY

A. This Section includes requirements for preparing manuals, including the following:

1. Training manuals, for all required training.

2. Operation and maintenance manuals, for the entire contract.

3. Interim operation and maintenance manuals, for each phase of construction and partial turnover.

PART 2 – PRODUCTS

2.1 MANUALS, GENERAL

A. Construction

1. Manuals shall be submitted in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, with locking rings. Binders shall be sized to hold 8-1/2-by-11 inch paper, with spines no more than 3 inches wide. Covers and spines shall be white and shall have clear plastic sleeves to hold printed labels. The insides of covers shall have pockets to hold loose items.

2. Index dividers shall be of heavy paper with reinforced holes and printable tabs.

3. Loose-leaf binder pockets and sheet protectors shall be of clear plastic with punched holes.

4. Sheet lifters shall be inserted between the front and back binder covers and the first and last sheets.

B. Organization

1. Arrange contents numerically by technical specification section, or alphabetically by system. If two or more binders are needed to accommodate all manual pages, organize each binder into related groupings. If possible, place information on individual specification sections or systems into a single binder.

2. Identify each binder on front and spine with the printed title "TRAINING MANUAL," "OPERATION AND MAINTENANCE MANUAL," or "INTERIM OPERATION AND MAINTENANCE MANUAL". Labels shall also include the contract number and name, volume number, and an abbreviated list of contents.

3. Use index dividers with printed tabs to divide sections. Provide a table of contents showing each tab and its contents. If multiple binders are used, in each binder provide a table of contents for all binders.

4. After each divider provide a title page that states the number and name of the specification section or system, along with the name, address, and contact information for the subcontractor or supplier who installed or provided the equipment.

5. If possible print oversize pages or drawings on 11-by-17 inch paper, folded in half and punched. Otherwise use binder pockets to hold folded oversize sheets.

6. Use binder pockets to hold items that cannot be punched, such as samples, compact discs or DVDs.

C. Electronic Version

1. Provide CDs or DVDs containing an electronic version of the entire set of operation and maintenance manuals in pdf format, including all oversize sheets.

2. Use pdf files prepared by manufacturer or supplier whenever available. Otherwise scan all pages into pdf files with a minimum resolution of 200 dpi. Use full color scans for color coded pages and grayscale scans for all other pages.

3. Insert bookmarks for each volume, table of contents, divider, specification section, and system.

D. Quantities

1. Provide one training manual for each person who is to receive training.

2. Provide four full sets of bound operation and maintenance manuals. When so directed by the Engineer, provide one additional operation and maintenance manual for individual sections such as fire protection or information technology.

3. Provide three copies of the electronic version of the operation and maintenance manuals.

2.2 TRAINING MANUALS

A. Provide training manuals for all training required by the technical specifications.

B. Training manuals shall contain all information and references to be covered in the training sessions, and a syllabus or summary of the training provided. Include manufacturer's or supplier's published training guides if applicable.

2.3 OPERATION AND MAINTENANCE MANUALS

A. Provide all operation and maintenance information required by the technical specifications. Use material published by or otherwise available from manufacturers or suppliers.

B. Documents shall include, as required or as appropriate:

1. Installation manuals.

2. Operating procedures.

3. Product data and cut sheets.

4. Oversize sheets.

5. Parts listings.

6. Wiring diagrams.

7. Process diagrams.

8. Control sequences.

9. Approved shop drawings and submittals.

10. Test results.

11. Inspection reports and sign-off sheets.

12. Certifications.

13. Warranties.

C. For phased construction with partial turnovers, provide an interim operation and maintenance manual for each phase of the work being turned over, covering only the work being turned over. Interim manuals are in addition to the full set of operation and maintenance manuals to be provided for the entire contract.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

A. Training Manuals: Where manuals contain manufacturer's standard printed data, include sheets pertinent to the product or component installed. Where one sheet shows more than one product, mark sheet to identify each product or component actually incorporated into the work. If data includes more than one item in a tabular format, identify each item using appropriate references to the contract documents.

Provide supplementary text as available from manufacturer, supplier, or installer.

B. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance information describing operation and maintenance of each piece of equipment or system installed. Where one sheet shows more than one product, mark sheet to identify each product or component actually incorporated into the work. If data includes more than one item in a tabular format, identify each item using appropriate references to the contract documents.

Provide supplementary text as available from manufacturer, supplier, or installer.

Insert additional information as provided and directed by the Engineer.

C. Submittal due date: Submit training manuals and interim operation and maintenance manuals to the Engineer for review and comment prior to the scheduled training or partial turnover. Make corrections and submit corrected copies before the training or turnover.

Submit full sets of operation and maintenance manuals for the entire contract within two weeks after substantial completion. Make corrections and resubmit corrected manuals within the designated contract punch list period.

PART 4 – MEASUREMENT

4.1 METHOD OF MEASUREMENT

A. No separate measurement will be made for work under this Section.

PART 5 – PAYMENT

5.1 BASIS OF PAYMENT

A. No separate payment will be made for work under this Section. The cost of the work described in this Section shall be considered incidental to the item for which it applies.

END OF SECTION 017823

COMMUNICATIONS SYSTEMS AND INFRASTRUCTURE SPECIFICATIONS

MARTIN STATE AIRPORT

BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

270000-TC – COMMON WORK FOR TELECOMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including Maryland Department of Transportation/Maryland Aviation Administration Standard Provisions for Construction Contracts Volume 1, Maryland State Highway Administration, Anne Arundel County and Interim Standard Addenda; and other Division 01 Specification sections, apply to this Section.

B. Related Sections:

271343-TC	Communications Services Cabling
270526-TC	Grounding and Bonding
270528-TC	Hangers and Support
271116-TC	Cabinets, Racks, Frames and Enclosures
271119-TC	Termination Blocks and Patch Panels
271313-TC	Cable Splicing and Termination
271323-TC	Optical Fiber Splicing and Terminations
271519-TC	Horizontal Cabling
271543-TC	Faceplates and Connectors for Systems
270553-TC	Identification
275116-TC	PA and Emergency Tenant Paging

1.2 SUMMARY

A. Section Includes:

1. Communications equipment coordination, submittal, and warranty requirements.

2. Common communications equipment installation requirements.

1.3 DEFINITIONS

A. DCI: Designer, contractor or installer.

B. OT: Maryland Aviation Administration Office of Technology

1.4 REFERENCES

A. The publications listed below form a part of this specification. The publications are referred to in the text by basic designation only.

B. Specific reference in specifications to codes, rules, regulations, standards, manufacturer's instructions, or requirements of regulatory agencies shall mean the latest printed edition of each in effect at the date of contract unless the document is shown dated.

C. Conflicts:

1. Between referenced requirements: Comply with the one establishing the more stringent requirements.

2. Between referenced requirements and contract documents: Comply with the one establishing the more stringent requirements.

3. OT Engineer will make final determination between conflicts

D. References:

1. Underwriters Laboratories Inc. (UL) Cable Certification and Follow Up Program

2. National Electrical Manufacturers Association (NEMA)

3. National Electrical Code (NFPA-70)

4. National Electrical Safety Code (NESC)

5. Building Industry Consulting Service International (BICSI) Telecommunications Distribution Methods Manual (TDMM)

6. Local, county, state and federal regulations and codes in effect as of date of purchase

7. Equipment of foreign manufacture must meet U.S. codes and standards. It shall be indicated in the proposal the components that may be of foreign manufacture, if any, and the country of origin.

1.5 SUBMITTALS

A. The DCI shall perform no portion of the work requiring submittal and review of record drawings, shop drawings, product data, or samples until the respective submittal has been approved by the OT. Such work shall be in accordance with approved submittals.

B. Qualifications: The DCI shall submit qualification data sheets for firms and persons as specified in the “Quality Assurance” article of this specification to demonstrate their capabilities and experience.

C. Proposed product data sheets: The DCI shall submit catalog cut-sheets that include manufacturer, trade name, and complete model number for each product specified. Model number shall be handwritten and/or highlighted to indicate exact selection. Identify applicable specification section reference for each product.

D. Samples: The DCI shall provide one sample of each type of cable for testing and approval by the OT upon request.

E. Testing Plan: The DCI shall provide a test plan for testing prior to beginning testing. The following minimal items shall be submitted for review:

1. All testing methods

2. Product data for test equipment

3. Certifications and qualifications of all persons conducting the testing

4. Calibration certificates indicating that equipment calibration meets National Institute of Standards and Technology (NIST) standards and has been calibrated at least once in the previous calendar year

5. Examples of test reports, including all graphs, tables, and charts necessary for display of testing results

F. Testing Reports: The DCI shall submit cable test reports as follows:

1. Submit certification test reports of DCI-performed tests

2. The tests shall clearly demonstrate that the media and its components fully comply with the requirements specified herein.

3. Electronic and hardcopy versions of test reports shall be submitted together and clearly identified with cable identification.

4. Submit data electronically on CD-ROM in Microsoft Excel format, listing products furnished, including:

5. Manufacturer's name

6. Manufacturer's part numbers

G. Record Drawings: Furnish CAD drawings of completed work including cable ID numbers following the OT's labeling standards. Submit in hardcopy (two full size and two half size) and electronic formats.

H. Standard products:

1. Equipment and materials shall be standard products of a manufacturer regularly engaged in the manufacture of structured cabling products and shall be the manufacturer's latest standard design.

2. Items of the same classification shall be identical. This requirement includes equipment, modules, assemblies, parts, and components.

3. All components of each kind shall be covered by a single warranty program with a single point of contact. Cable and connecting hardware shall be manufactured by the same company or be part of the same system, i.e. warranted by the manufacturer(s) as one system.

1.6 WARRANTY

A. The DCI shall provide a joint written warranty of the manufacturer(s) and the installer(s), on a single document. The document shall warrant complete installation of the equipment, system to be free from defects in materials and workmanship for a period of no less than 20 years for copper and 25 years for fiber, starting with the date of Final System Acceptance.

B. DCI shall warrant that all approved components meet or exceed the specifications provided in the product data submittal and exceed standards referenced for the warranty period. The warranty shall apply to all components.

C. The DCI shall warrant that the proposed merchandise will conform to its description and any applicable specifications, and shall be of good quality for the known purpose for which it is intended.

D. The product warranty shall cover the replacement or repair of defective products and labor for the replacement or repair of such defective products.

1.7 MAINTENANCE AND SUPPORT

A. System Assurance: The System Assurance shall cover the failure of the system to support the application which it was designed to support, as well as additional application(s) introduced in the future for the warranty period.

B. System Certification: Upon successful completion of the installation and subsequent inspection, the DCI shall be provided with a numbered certificate, from the manufacturing company, registering the installation.

C. Support Availability: The DCI shall commit to make available local support for the product and system during the Warranty period.

1.8 PROJECT CONDITIONS

A. Verify that field measurements are as shown on Project Documents; no media, fiber or copper, shall be installed in lengths surpassing Standards based length requirements.

B. Cable routing shown on Drawings is approximate unless dimensioned. Route cable as required to meet Project Conditions.

C. Where cable routing is not shown, and destination only is indicated, determine exact routing and lengths required. Record actual routing on as-builts including, but not limited to all conduit larger that ¾ inch, all exterior conduit/cabling, and all Work Area communications outlet information.

1.9 DELIVERY AND STORAGE

A. Equipment shall be delivered in original packages with labels intact and identification clearly marked.

B. Equipment shall not be damaged in any way and shall comply with manufacturer's operating specifications.

C. Equipment and components shall be protected from the weather, humidity, temperature variations, dirt, dust, or other contaminants. Equipment damaged prior to system acceptance shall be replaced at no cost to the OT.

1.10 COORDINATION

A. Determine required separation between other work.

B. Coordinate to avoid interference with other work disciplines.

C. Coordinate installation with other trades and furniture installers.

D. Coordinate with all DCIs providing equipment outside the scope of this contract.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify liquid-carrying pipes are not installed in or above voice and data system communications rooms. Do not proceed with installation in affected areas until removed.

3.2 INSTALLATION

A. Install work following drawings, manufacturer's instructions and approved submittal data.

B. All installation shall be done in conformance with standards, BICSI methods, industry standards and manufacturers' installation guidelines. The DCI shall ensure that the maximum pulling tensions of the specified distribution cables are not exceeded and cable bends maintain the proper radius during the placement of the facilities. Failure to follow the appropriate guidelines shall require the DCI to provide in a timely fashion the additional material and labor necessary to properly rectify the situation. This shall also apply to any and all damages sustained to the cables by the DCI during the implementation.

C. Test Equipment

1. Test equipment used under this contract shall be from manufacturers that have a minimum of 5 years experience in producing field test equipment. Manufacturers shall be ISO 9001 certified.

2. The test instrument shall be within the calibration period recommended by the manufacturer.

3. Test instruments shall have the latest software and firmware installed.

4. All test tools of a given type shall be from the same manufacturer, and have compatible electronic results output.

5. Test adapter cables shall be approved by the manufacturer of the test equipment. Adapters from other sources are not acceptable.

6. All test equipment purchased for use under these tasks shall become the property of the MAA upon systems acceptance. The MAA reserves the right to provide test equipment for the use of the DCI

D. No system shall be put into service until it is fully tested and accepted by the OT.

E. Install work following drawings, manufacturer's instructions and approved submittal data.

F. Equipment Clearances

1. Clearance distances are measured from the outermost surface of devices installed in rack or mounted on wall, rather than from the rack or backboard.

2. Provide a minimum of three feet of space in front and rear of cabinets and racks.

3. Provide a minimum of one-foot side clearance in corners.

4. Provide a minimum of one-foot clearance above cable tray/ladder rack.

5. Provide a minimum of one-foot clearance above top-most item (cable tray, ladder rack or fiber trough) to any ceiling or overhead condition.

3.3 CLEANING

A. Remove all unnecessary tools and equipment, unused materials, packing materials, and debris from each area where Work has been completed unless designated for storage on a daily basis unless directed by OT.

3.4 ACCEPTANCE

A. Once all work has been completed, test documentation has been submitted and approved, and the OT is satisfied that all work has been completed in accordance with contract documents, the OT will notify DCI in writing of formal acceptance of the system.

B. Acceptance shall be subject to completion of all work, successful post-installation testing which yields 100 percent PASS rating, and submittal and approval of full documentation as described above.

C. OT reserves the right to conduct, using DCI equipment and labor, a random re-test of up to five percent of the cable plant to confirm documented results. Random re-testing, if performed, shall be at the expense of the DCI, using standard labor rates. Any failing cabling shall be re-tested and restored to a passing condition at no cost to the OT. In the event more than two percent of the cable plant fails during re-test, the entire cable plant shall be re-tested and restored to a passing condition at no additional cost to the OT.

C. OT may agree to allow certain cabling runs to exceed standardized performance criteria (e.g. length). In this event, such runs shall be explicitly identified and excluded from requirements to pass standardized tests.

END OF SECTION 270000-TC

270526-TC - GROUNDING AND BONDING FOR TELECOMMUNICATIONS SYSTEMS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including Maryland Department of Transportation/Maryland Aviation Administration Standard Provisions for Construction Contracts Volume 1, Maryland State Highway Administration, Anne Arundel County and Interim Standard Addenda; and other Division 01 Specification sections, apply to this Section.

1.2 SUMMARY

A. Section includes:

1. General requirements for providing all labor, materials, tools and equipment required for the complete installation of work called for in the Construction Documents.

2. Descriptions of the the products and execution requirements relating to furnishing and installing Grounding/Earthing and Bonding for Communications Systems.

3. Minimum requirements for the following:

   a. Grounding/Earthing System

   b. Telecommunications Grounding Busbar (TGB)

   c. Telecommunications Main Grounding Busbar (TMGB)

   d. Telecommunications Bonding Backbone (TBB)

   e. Rack Grounding/Earthing and Bonding

4. Product specifications, general design considerations, and installation guidelines are provided in this document. Quantities of grounding/earthing products, typical installation details and cable routing will be provided as an attachment to this document.

1.3 SUBMITTALS

A. Submittal requirements shall be in accordance with Section 270000-Common Work for Telecommunications Systems.

1.4 DEFINITIONS

A. The purpose of the grounding/earthing system is to create a low impedance path to earth ground for electrical surges and transient voltages. Lightning, fault currents, circuit switching (motors turning on and off), and electrostatic discharge are common causes of these surges and transient voltages. An effective grounding/earthing system minimizes the detrimental effects of these electrical surges, which include degraded network performance and reliability and increased safety risks.

B. Bonding – The permanent joining of metallic parts to form an electrically conductive path that will assure electrical continuity and the capacity to conduct safely any current likely to be imposed.

C. Common Bonding Network (CBN) – The principal means for affecting bonding and earthing inside a building.

D. Ground/Earth – A conducting connection, whether intentional or incidental, by which an electric circuit or equipment is connected to earth, or to some conducting body of relatively large extent that serves in place of the earth.

E. Retrofit Rack Grounding/Earthing – The application of grounding/earthing products and technology where equipment is already deployed and functioning.

1.5 REFERENCES

A. The following industry standards are the basis for the grounding/earthing and bonding system described in this document.

TIA/EIA	
TIA-942	Telecommunications Infrastructure Standard for Data Centers
J-STD-607-A	Commercial Building Grounding/Bonding Requirements
TIA/EIA-606	Administration Standard for the Telecommunications Infrastructure of Commercial Buildings
IEEE	
Std 1100	IEEE Recommend Practice for Powering and Grounding Electronic Equipment (IEEE Emerald Book)
NFPA	
NFPA-70	National Electric Code (NEC)

B. Conflicts:

1. If the bid documents are in conflict, this specification shall take precedence.

2. The most recent versions of all documents apply to this project. If there is a conflict between applicable documents, the order above shall dictate the order of precedence in resolving the issue unless an enforceable local or national code is in effect.

1.6 QUALITY ASSURANCE

A. The communications grounding system shall be designed and/or approved by a qualified PE, licensed in the state that the work is to be performed. The communications grounding system shall adhere to the recommendations of the ANSI/TIA-942 and J-STD-607-A standards, and shall be installed in accordance with best industry practice.

B. A licensed electrical contractor shall perform installation and termination of the main bonding conductor to the building service entrance ground.

C. The successful vendor shall meet or exceed all requirements for the cable system described in this document.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. STRUCTUREDGROUND™ Grounding System (STRUCTUREDEARTH™ Earthing System) or approved equal kits, components, and hardware shall be used to construct the grounding/earthing system.

2.2 EQUIPMENT

A. Use lugs when connecting conductors to the TMGB and TGB.

2.3 GROUNDING/EARTHING SYSTEM

A. The ground/earth system must be designed for high reliability. Therefore, the grounding/earthing system shall meet following criteria:

1. Local electrical codes shall be adhered to.

2. The grounding/earthing system shall comply with ANSI/TIA-942 and J-STD-607-A.

3. All grounding/earthing conductors shall be copper.

4. Lugs, HTAPs, grounding strips, and busbars shall be UL Listed and made of premium quality tin-plated electrolytic copper that provides low electrical resistance while inhibiting corrosion. Antioxidant shall be used when making bonding connections in the field.

5. Wherever possible, two-hole lugs shall be used because they resist loosening when twisted (bumped) or exposed to vibration. All lugs shall be irreversible compression and meet NEBS Level 3 as tested by Telcordia. Lugs with inspection windows shall be used in all non-corrosive environments so that connections may be inspected for full conductor insertion (battery rooms are an exception where windowless lugs may be used).

6. Die index numbers shall be embossed on all compression connections to allow crimp inspection.

7. Cable assemblies shall be UL Listed and CSA Certified. Cables shall be a distinctive green or green/yellow in color, and all jackets shall be UL, VW-1 flame rated.

PART 3 – EXECUTION

3.1 INSTALLATION

A. The grounding/earthing system must be intentional, visually verifiable, adequately sized to handle expected currents safely, and directs these potentially damaging currents away from sensitive network equipment. As such, grounding/earthing must be purposeful in its design and installation. Four issues require special consideration:

1. Although AC powered equipment typically has a power cord that contains a ground/earth wire, the integrity of this path cannot be easily verified. Thus, many equipment manufacturers require grounding/earthing above and beyond that which is specified by local electrical codes, such as the National Electrical Code, etcetera. Always follow the grounding/earthing recommendations of the manufacturer when installing equipment.

2. While the building steel and metallic water piping must be bonded to the grounding/earthing system for safety reasons, neither may be substituted for the telecommunications bonding backbone (TBB).

3. Electrical continuity throughout each rack or cabinet is required to minimize safety risks. Hardware typically supplied with bolt-together racks is not designed for grounding/earthing purposes. Additionally, most racks are painted. Paint is an insulator. Unless rack members are deliberately bonded, continuity between members is incidental, and in many cases, unlikely.

4. Any metallic component that is part of the data center, including equipment, racks, ladder racks, enclosures, cable trays, etc. must be bonded to the grounding/earthing system with a 1 ohm resistance between 2 points.

B. Grounding/Earthing and Bonding

1. The Telecommunications Grounding Busbar (TGB) in each telecommunications space will be grounded/earthed to the Telecommunications Main Grounding Busbar (TMGB) located at the service entrance. The gauge of the connecting ground/earth cable, known as the Telecommunications Bonding Backbone (TBB) will follow J-STD-607-A guidelines, as is shown in the table below.

Sizing of the TBB	
TBB Length in Linear meters (feet)	TBB Size (AWG)
Less than 4 (13)	6
4-6 (14-20)	4
6-8 (21-26)	3
8-10 (27-33)	2
10-13 (34-41)	1
13-16 (42-52)	1/0
16-20 (53-66)	2/0
Greater than 20 (66)	3/0

2. The TMGB will be bonded to building steel and grounded/earthed to the electrical service ground according to BICSI TDM Manual and J-STD-607-A guidelines. Local codes may supersede these requirements. In telecommunications spaces with only one rack, the rack jumper cable can be connected directly to the TGB.

3. Cable Sizes for Other Grounding/Earthing Applications

Cable Sizes for Other Grounding/Earthing Applications	
Purpose	Copper Code Cable Size
Aisle grounds (overhead or under floor) of the common bonding network	#2 AWG or larger (1/0 preferred)
Bonding conductor to each PDU or panel board serving the room.	Size per NEC 250.122 & manufacturer recommendations
Bonding conductor to HVAC	6 AWG

equipment	
Building columns	4 AWG
Cable ladders and trays	6 AWG
Conduit, water pipe, duct	6 AWG

4. Route the TBB to each TGB in as straight a path as possible. The TBB should be installed as a continuous conductor, avoiding splices where possible. Use HTAP kits to provide a tap from the TBB to each TGB. When more than one TBB is used, bond them together using the TGBs on the top floor and every third floor in between with a conductor known as a Grounding Equalizer (GE). Use the J-STD-607-A guidelines for sizing of the TBB when sizing the GE (shown in the table above).

5. Avoid routing grounding/earthing conductors in metal conduits. If the grounding/earthing conductor must be routed through a metal conduit, bond each end of the conduit to the grounding/earthing conductor. Use grounding clamps to bond to the conduit, and a #6 AWG copper conductor to connect the GPL grounding clamp to the HTWC HTAP.

C. Rack Grounding/Earthing

1. Equipment and racks shall be bonded in accordance with the methods prescribed in ANSI/TIA-942, as is shown in the figure below.

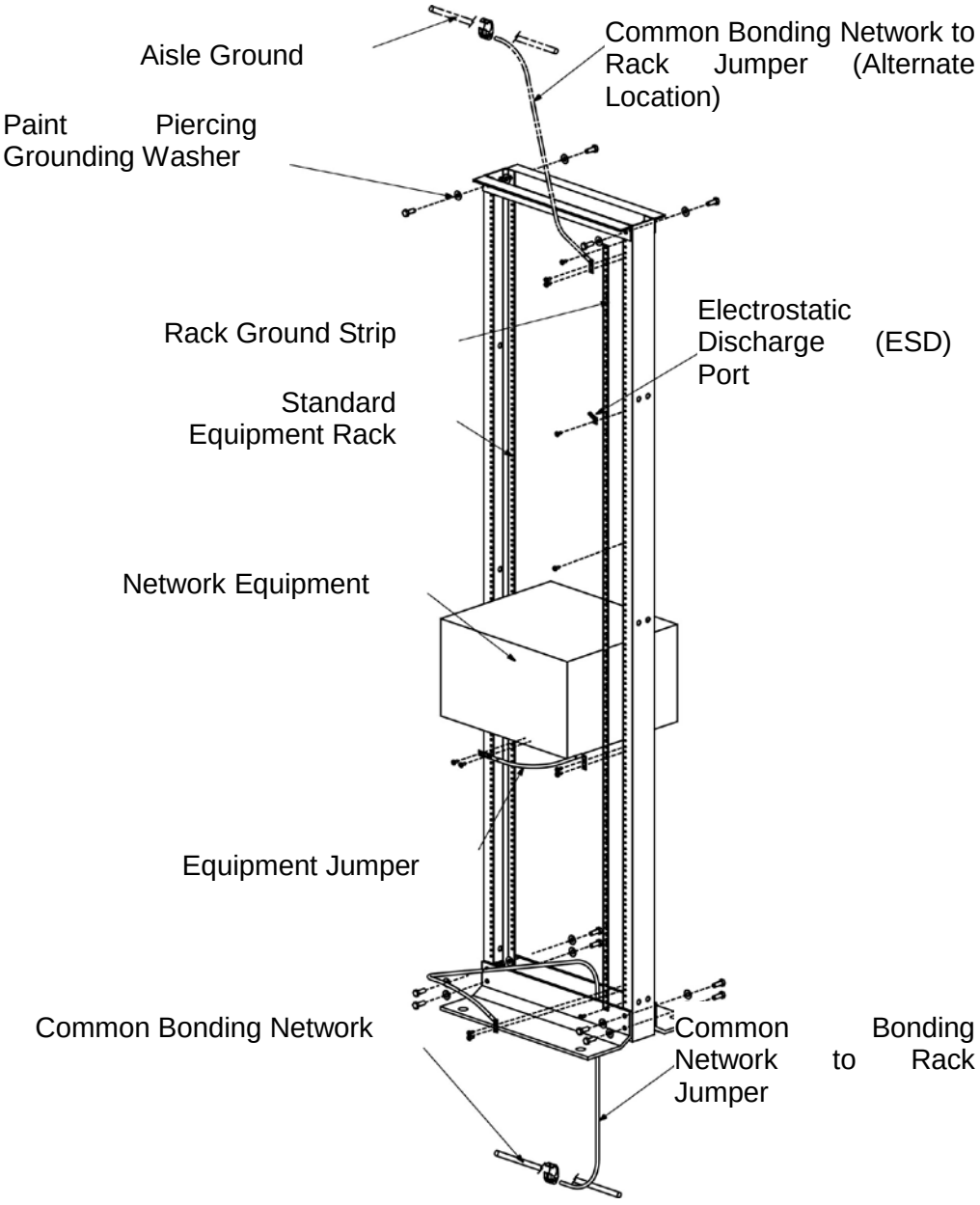


Figure 1 - Properly Grounded/Earthed Rack (Back of Rack Shown)

2. To provide electrical continuity between rack elements, paint piercing grounding washers, shall be used where rack sections bolt together, on both sides, under the head of the bolt and between the nut and rack.

3. When the equipment manufacturer provides a location for mounting a grounding connection, that connection shall be utilized. Use the appropriate jumper for the equipment being installed and the thread-forming screws provided in the kit.

4. Do not bond racks or cabinets serially. Use the copper compression HTAP that comes with the kit to bond the conductor to the common bonding network.

D. Retrofit Rack Grounding/Earthing

1. If the racks already have network equipment installed, it may not be feasible to install the rack ground strip without disrupting data cables. Further, it may be undesirable to disassemble rack hardware to install paint piercing grounding washers

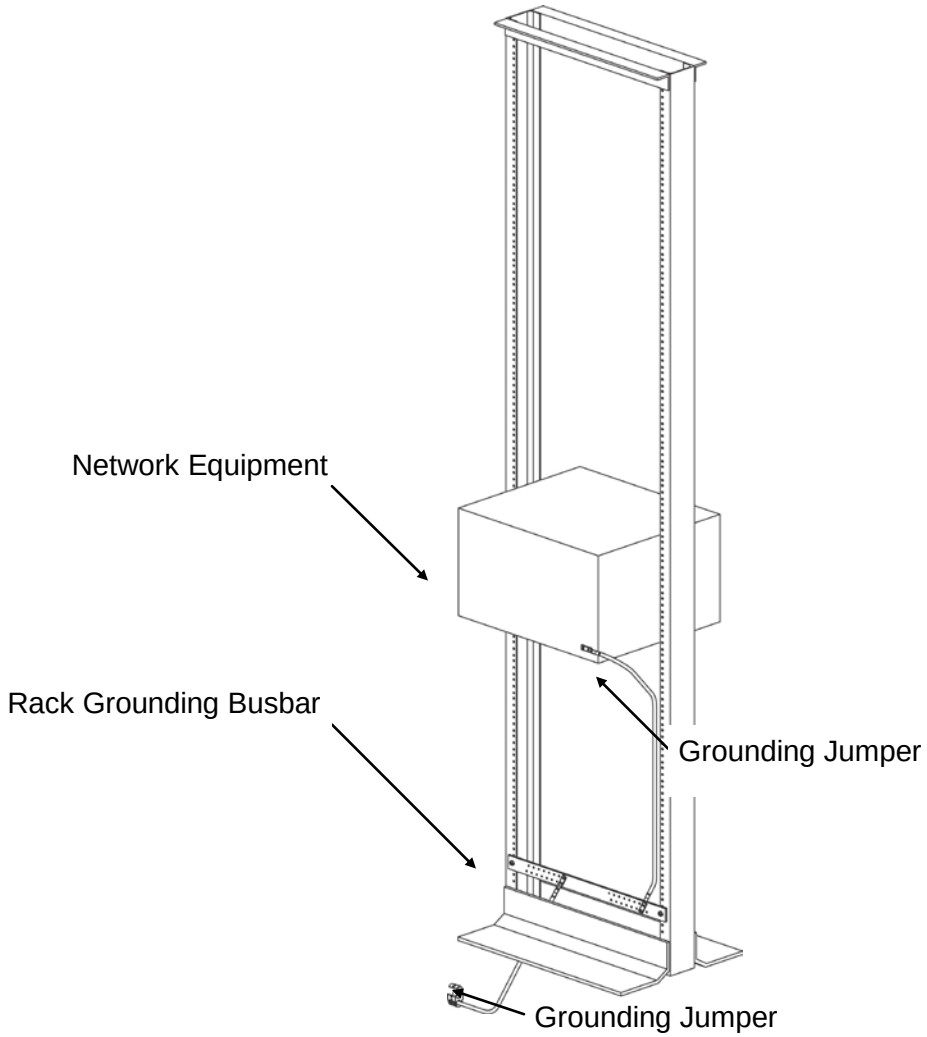


Figure 2 - Retrofit Rack Grounding/Earthing

2. RGW paint piercing grounding washers are not used in this scenario. Thus, the grounding busbar provides continuity through the vertical channels of the rack, but not the top and bottom of the rack. Thus, wherever practical, the solution using the RGS rack grounding strip and the RGW paint piercing washers shall be used instead of the retrofit rack grounding kits.

3. All other grounding/earthing requirements apply to retrofit installations without exception.

END OF SECTION 270526-TC

270528-TC - HANGERS AND SUPPORT FOR TELECOMMUNICATIONS SYSTEMS

PART I – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including Maryland Department of Transportation/Maryland Aviation Administration Standard Provisions for Construction Contracts Volume 1, Maryland State Highway Administration, Anne Arundel County and Interim Standard Addenda; and other Division 01 Specification sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Descriptions of the products and execution requirements relating to furnishing and installing Telecommunications Cabling. Communication cabling support is covered under this document.

2. This section includes minimum requirements for the following:

   a. J-Hooks (Not allowed without an approved variance)

   b. Threaded Rod Cover

   c. Stackable Cable Rack Spacers

   d. Cable Management

3. Product specifications, general design considerations, and installation guidelines are provided in this document. Quantities of telecommunications outlets, typical installation details, cable routing and outlet types will be provided as an attachment to this document.

1.3 SUBMITTALS

A. Submittal requirements shall be in accordance with Section 270000-Common Work for Telecommunications Systems.

1.4 REFERENCES

A. The following industry standards are the basis for the structured cabling system described in this document.

TIA/EIA	
TIA/EIA-568-B	Commercial Building Telecommunications Cabling Standard
TIA/EIA-569-A	Commercial Building Standard for Telecom Pathways and Spaces
TIA/EIA-606	Administration Standard for the Telecommunications Infrastructure of Commercial Buildings
TIA/EIA-607	Commercial Building Grounding/Bonding Requirements
NFPA	
NFPA-70	National Electric Code (NEC)-1999 ISO/IEC ISO/IEC 11801Generic Cabling for Customer Premises

B. Conflicts:

1. The most recent versions of all documents apply to this project. If there is a conflict between applicable documents, the order above shall dictate the order of precedence in resolving the issue unless an enforceable local or national code is in effect.

2. If the bid documents are in conflict, this specification shall take precedence.

1.5 QUALITY ASSURANCE

A. The successful vendor shall meet or exceed all requirements for the cable system described in this document.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. *J-MOD* ™ Cable Support System or approved equal. Open top cable supports shall be utilized as a pathway for communication cabling. The J Hook cable supports shall be manufactured from a non-conductive material suitable for use in air-handling spaces. The cable support must maintain complete horizontal and vertical 1" bend radius control and must manage up to 50 four-pair UTP cables. The system must allow for the ability to add future cable routing capacity. The cable support must provide the ability to retain the cable bundle with *TAK-TY* ® Hook & Loop Cable Ties or approved equal.

Part Number	Description	Material*	Maximum Static Load (Lbs.)
	J Hook for wall mount applications	Nylon	30
	J Hook for use with brackets	Nylon	30
	Chaining Bracket	Galvanized Steel	120
	Ceiling Mount Bracket – 1 level	Galvanized Steel	180
	Ceiling Mount Bracket – 3 level	Galvanized Steel	180
	Drop Wire Bracket – 1 level	Galvanized Steel	20
	Drop Wire Bracket – 3 level	Galvanized Steel	40
	Threaded Rod Bracket – 1 level	Galvanized Steel	180
	Threaded Rod Bracket – 3 level	Galvanized Steel	180
	Screw-on Beam Clamp Bracket – 1 level	Galvanized Steel	180
	Screw-on Beam Clamp Bracket – 3 level	Galvanized Steel	180

** Not for use with chaining brackets

‡ Available in natural and black

* Suitable for use in air handling spaces per UL 2043. Listed in accordance with CAN/ULC S102.2 when mounted as single units or in pairs. Minimum spacing of 4 ft. (1220mm) required between mount points. (Flame Spread Rating = 0, Smoke Developed Classification = 30)

B. J-PRO ™ Cable Support System or approved equal. Open top cable supports shall be utilized as a pathway for communication cabling. The J Hook cable supports shall be manufactured from a non-conductive material suitable for use in air-handling spaces. The pre-riveted J Hook assemblies must maintain complete horizontal and vertical 1" bend radius control and must manage up to 50 four-pair UTP cables. The cable support must provide the ability to retain the cable bundle with *TAK-TY* ® Hook & Loop Cable Ties or approved equal.

Part Number	**Description**	**Material***	**Max. Static Load (Lbs.)**
	J Hook for wall mount applications only. One ¼" (M6) mounting hole for user supplied screw.	Nylon	30
	J Hook with ceiling mount bracket that has one 3/16" (M5), ¼" (M6), and 3/8" (M10) mounting hole.	Nylon J Hook with metal attachments	30
	J Hook with clip for use with #12 wire, threaded rod up to 3/8" in diameter, or 1/8" –3/8" thick flanges.	Nylon J Hook with metal attachments	10
	J Hook with screw-on beam clamp for use with flanges up to ½" thick.	Nylon J Hook with metal attachments	30
	J Hook with screw-on beam clamp for use with flanges up to ½" thick. Rotates 360 degrees.	Nylon J Hook with metal attachments	30
	J Hook with hammer-on beam clamp for use with flanges 1/8" – ¼" thick. Rotates 360 degrees.	Nylon J Hook with metal attachments	30
	J Hook with hammer-on beam clamp for use with	Nylon J Hook with	30

	flanges 5/16” – 1/2” thick. Rotates 360 degrees.	metal attachments	
	J Hook with hammer-on beam clamp for use with flanges 9/16” – 3/4” thick. Rotates 360 degrees.	Nylon J Hook with metal attachments	30
	J Hook with z-purlin clip for use with angled flanges up to ¼” thick.	Nylon J Hook with metal attachments	30
	J Hook with c-purlin clip for use with vertical flanges up to ¼” thick.	Nylon J Hook with metal attachments	30
	J Hook with under floor pedestal support clamp for use with pedestal support up to 1” in diameter.	Nylon J Hook with metal attachments	30

* Suitable for use in air handling spaces per UL 2043. Listed in accordance with CAN/ULC S102.2 when mounted as single units or in pairs. Minimum spacing of 4 ft. (1220mm) required between mount points. (Flame Spread Rating = 0, Smoke Developed Classification = 30)

2.2 EQUIPMENT

A. Provide all labor, materials, tools and equipment required for the complete installation of work called for in the Construction Documents.

B. The Threaded Rod Cover shall be utilized to protect communication cable from abrasion caused by contact with threaded rod. The Threaded Rod Cover shall be manufactured from a gray flame-retardant polyethylene material that is UL94V-0 rated. The material shall be pliable to allow for easy installation.

Part Number	For Threaded Rod Size	Length
	½” to 5/8”	18”

PART 3 – EXECUTION

3.1 INSTALLATION

A. Horizontal Distribution Cable Installation

1. Cable shall be installed in accordance with manufacturer's recommendations and best industry practices.

2. A pull cord (nylon; 1/8" minimum) shall be co-installed with all cable installed in any conduit.

3. Cable raceways shall not be filled greater than the TIA/EIA-569-A maximum fill for the particular raceway type or 40%.

4. Cables shall be installed in continuous lengths from origin to destination (no splices) except for transition points, or consolidation points.

5. Where transition points, or consolidation points are allowed, they shall be located in accessible locations and housed in an enclosure intended and suitable for the purpose.

6. The cable's minimum bend radius and maximum pulling tension shall not be exceeded.

7. If a J-hook or trapeze system is used to support cable bundles all horizontal cables shall be supported at a maximum of 48 to 60 inch (1.2 to 1.5 meter) intervals. At no point shall cable(s) rest on acoustic ceiling grids or panels.

8. Horizontal distribution cables shall be bundled in groups of no more than 50 cables. Cable bundle quantities in excess of 50 cables may cause deformation of the bottom cables within the bundle and degrade cable performance.

9. Cable shall be installed above fire-sprinkler systems and shall not be attached to the system or any ancillary equipment or hardware. The cable system and support hardware shall be installed so that it does not obscure any valves, fire alarm conduit, boxes, or other control devices.

10. Cables shall not be attached to ceiling grid or lighting fixture wires. Where support for horizontal cable is required, the contractor shall install appropriate carriers to support the cabling.

11. Any cable damaged or exceeding recommended installation parameters during installation shall be replaced by the contractor prior to final acceptance at no cost to the Owner.

12. Cables shall be identified by a self-adhesive label in accordance with the System Documentation Section of this specification and ANSI/TIA/EIA-606.

13. The cable label shall be applied to the cable behind the faceplate on a section of cable that can be accessed by removing the cover plate.

14. Unshielded twisted pair cable shall be installed so that there are no bends smaller than four times the cable outside diameter at any point in the run and at the termination field.

15. Pulling tension on 4-pair UTP cables shall not exceed 25-lbf for a four-pair UTP cable.

END OF SECTION 270528-TC

270553-TC - IDENTIFICATION FOR TELECOMMUNICATIONS SYSTEMS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including Maryland Department of Transportation/Maryland Aviation Administration Standard Provisions for Construction Contracts Volume 1, Maryland State Highway Administration, Anne Arundel County and Interim Standard Addenda; and other Division 01 Specification sections, apply to this Section.

1.2 SUMMARY

A. Sections includes:

1. Furnishing labor, equipment, supplies, materials, and testing unless otherwise specified, and in performing the following operations recognized as necessary for the labeling of the telecommunications infrastructure as described on the Drawings and/or required by these specifications.

2. A Class 3 system of administration as per ANSI/TIA/EIA 606-A Standards. As such, all elements must be labeled with unique identifiers as described in the following sections.

3. Minimum requirements for the following:

   a. Labeling Communications Cabling
   b. Labeling Closet Hardware
   c. Labeling Conduit/Hand hole/Inner duct
   d. Labeling Patch Panel Jumpers

B. The Cable Labeling Hierarchy will be the following unless otherwise noted for all Cables, Inner Duct, Conduits, Hand holes, Patch cables and hardware inside plant and outside plant: KB.109.1.1.1.1 whereas, Building, Room, Rack Row number, Rack number, Panel number, Port

1.3 SUBMITTALS

A. Submittal requirements shall be in accordance with Section 270000 – Common Work for Telecommunications Systems.

1.4 QUALITY ASSURANCE

A. The successful vendor shall meet or exceed all requirements for the cable system described in this document.

PART 2 – PRODUCTS

2.1 EQUIPMENT

A. LABELS

1. The size, color and contrast of all labels should be selected to ensure that the identifiers are easily read.

2. All labels are to be mechanically printed, no hand printed labels allowed for any component.

3. Labels should be visible during the installation of and normal maintenanceof the infrastructure.

4. Labels should be resistant to the environmental conditions at the point of installation (such as moisture, heat or ultraviolet light) and should have a design life equal to or greater than that of the labeled component.

5. Provide vinyl substrate with a white printing area and black print. If cable jacket is white, provide cable label with printing area that is any other color than white, preferably orange or yellow – so that the labels are easily distinguishable.

6. Labels shall be flexible vinyl or other substrates to apply easy and flex as cables are bent.

7. Labels shall use aggressive adhesives that stay attached even to the most difficult to adhere to jacketing.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Horizontal Copper Cable Labeling:

1. All horizontal cables shall be labeled with self-laminating marking tape, Brady ID-Pro labeler, Panduit LS7 labeler, or equivalent labeling system. Identification shall be as follows:

a. At the TR end, the cables shall be labeled with the location of where the other end of the cable is terminated including room number, TO number, and jack

position. Place label on a visible part of cable within 12” of termination point for ease of identification after termination.

Example: cable going to room 114, first TO, first jack position would be labeled as: 114-1A1. A cable in the second TO, third jack position would be 114-2A3.

b. At the TO end, the cables shall be labeled 4” from termination with the following: TR – Rack.Patch Panel.Port. This shall be visible by removing outlet cover plate.

Example: TR Room 114, rack row 1, rack 1, patch panel 1, port 03 would be: 114 – 1.1.1.03

c. For voice cabling in older building with separate voice closets and no patch panels, include the TR and as much information as practical such as column, row, block number, and port number or pairs.

d. For CATV coaxial drop cables, at the splitter or tap, the cables shall be labeled with the location where the other end of the cable is terminated including room number, TO number, and jack position. If not collocated with a TO, indicate room number at a minimum. Place label on a visible part of cable within 12” of termination point for ease of identification after termination.

e. For coaxial cables at the TO, they shall be labeled 4” from termination with the room number where the splitter or tap is. This shall be visible by removing outlet cover plate.

B. Telecommunications Outlet (TO) Labeling Scheme:

1. TO’s are labeled alphanumerically in a clockwise rotation around the room. Typically, the first TO located to the left of the main entrance of the room is labeled 1A, followed by 2A, 3A, etc.

C. Horizontal 110 and 66 Block Labeling for voice:

1. For 110 blocks, if the cables are for room terminations, label the appropriate corresponding space for the port with the room number, TO, and jack position.

a. Example: A cable going to room 114, first TO, first jack position would be labeled as: 114-1A1. A cable in the second TO, third jack position would be 114-2A3.

2. For 66 type blocks, if the cables are for room terminations, tag the cable with the room number, TO, and jack position with a loose paper tag that is easily accessible and readable.

    a. Example: A cable in room 114, first TO, first jack position would be labeled as: 114-1A1. A cable in the second TO, third jack position would be 114-2A3.

3. For tie cables between the rack and wallboard a 110 block or 66 block should always be used.

    a. Example: Rack Row 1, Rack 1, patch panel 1, port 03 would be: 1.1.1.03

D. Patch Panel Labeling:

1. For station cabling going to a TO, label each port on the patch panel with the room number, TO, and jack position.

    a. Example: A cable in room 114, first TO, first jack position would be labeled as: 114-1A1. A cable in the second TO, third jack position would be 114-2A3.

    b. Example: A cable going to a floor box TO labeled FB1A in room 114 in the second jack position would be labeled as: 114-FB1A2

E. Vertical/Riser/Intrabuilding Copper Cable Labeling:

1. All riser cables shall be labeled with self-laminating marking tape, Brady ID-Pro labeler, Panduit LS7 labeler, or equivalent labeling system.
2. At the TR, the copper riser cables shall be labeled with from/to, cable number, and count information on both ends.Place label on a visible part of cable close to wiring block for ease of identification after termination.
3. Label cabling every 50’ along the length of the cable in open trays, and on each side of wall penetrations.

F. Interbuilding/Campus/Backbone Copper and Fiber Cable Labeling:

1. All interbuilding cables shall be labeled permanently with from/to information, cable type and size, installation date, and installing contractor at each end, manhole, and pull box the cable passes through.

    a. Example: From Building 500 to 300, a 24 stand fiber single mode cable would be: 500.105.1.1.1 - 300.100.2.1.3 – 24 ST SM

G. Conduit, manhole and hand hole Labeling:

1. All interbuilding and intrabuilding Inner duct and conduit systems shall be labeled permanently with from/to information, Building, manhole/hand hole, bank, and conduit number.

   a. Example: from/to 100.109.1.1-MH5W.3.1

H. Cable Function Color Code

1. As an additional level of identification that allows a particular field type to be quickly located, Color Coded strips, icons, and so on will be installed on all terminated wall plates and block areas. Common equipment refers to PBX equipment, host computer, LAN's and multiplexers. Miscellaneous refers to maintenance alarms, security, paging systems, and other systems and circuits not an integral part of common equipment. Refer to the table below:

Function	Color
Auxiliary and miscellaneous circuits	Yellow
Common equipment	Purple
Customer side of network interface	Green
First level backbone	White
Horizontal cabling to workstations	Blue
Interbuilding backbone	Brown
Key telephone systems	Red
Network side of network interface	Orange
Second level backbone	Gray

Building Reference	Identification
901	Building 901
991	Building 991
TER	BWI Terminal
ARF	ARFF Building
KB	Kauffman Building
MAC	MAC Building
CR<*nnn*>	Cargo Building <number>
MCR	Mid-Field Cargo Building
PHG	Parking-Hourly Garage
PDA	Parking-Daily A Garage
PLA	Parking-Long Term A
PLB	Parking-Long Term B
PEX	Parking-Express Lot
PEP	Parking-Employee
PEA	Parking-Old ESP A
PEB	Parking-Old ESP B

END OF SECTION 270553-TC

271116-TC - CABINETS, RACKS, FRAMES AND ENCLOSURES FOR TELECOMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including Maryland Department of Transportation/Maryland Aviation Administration Standard Provisions for Construction Contracts Volume 1, Maryland State Highway Administration, Anne Arundel County and Interim Standard Addenda; and other Division 01 Specification sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Descriptions of the products and execution requirements relating to furnishing and installing Telecommunications Cabling. Communication Equipment Room Fittings of cabinets, racks, frames and enclosures are covered under this document.

2. This section includes minimum requirements for the following:

   a. Cabinets

   b. Racks and Rack Cable Management

   c. Frames

   d. Enclosures

3. Product specifications, general design considerations, and installation guidelines are provided in this document. Quantities of telecommunications outlets, typical installation details, cable routing and outlet types will be provided as an attachment to this document.

1.3 SUBMITTALS

A. Submittal requirements shall be in accordance with Section 270000-Common Work for Telecommunications Systems.

1.4 REFERENCES

A. The following industry standards are the basis for the structured cabling system described in this document.

TIA/EIA

TIA/EIA-568-B	Commercial Building Telecommunications Cabling Standard
TIA/EIA-569-A	Commercial Building Standard for Telecom Pathways and Spaces
TIA/EIA-606	Administration Standard for the Telecommunications Infrastructure of Commercial Buildings
TIA/EIA-607	Commercial Building Grounding/Bonding Requirements

NFPA

NFPA-70	National Electric Code (NEC)-1999

ISO/IEC

ISO/IEC 11801	Generic Cabling for Customer Premises

B. Conflicts:

1. The most recent versions of all documents apply to this project. If there is a conflict between applicable documents, the order above shall dictate the order of precedence in resolving the issue unless an enforceable local or national code is in effect.

2. If the bid documents are in conflict, this specification shall take precedence. MAA/OT will assist in the design, layout and specification detail needed to clarify any ambiguity between this document and other construction documentation.

1.5 QUALITY ASSURANCE

A. The successful vendor shall meet or exceed all requirements for the cable system described in this document.

PART 2 – PRODUCTS

2.1 EQUIPMENT

A. Provide all labor, materials, tools and equipment required for the complete installation of work called for in the Construction Documents

B. Racks

1. The Cable Management System shall be used to provide a neat and efficient means for routing and protecting fiber and copper cables and patch cords on telecommunication racks and enclosures. The system shall be a complete cable management system comprised of vertical cable managers, horizontal cable manager, and cable management accessories used throughout the cabling system. The system shall protect network investment by maintaining system performance, controlling cable bend radius and providing cable strain relief.

    a. Provide rack as shown on the Drawings and as specified in this section.
    b. The Rack system shall meet all EIA requirements as defined in EIA-310-D.
    c. Provide all mounting components and accessories to securely fix racks to floor and supporting walls. Provide overhead ladder rack fixed to the top of each rack and running from the top of the rack to the telephone backboard where the feeder and distribution cables run, as shown on the drawings. Provide cable bend management fixtures to maintain the proper bend radius as the cables drop into the rack. Do not allow cables to be unsupported as they run from conduit or cable tray to equipment cabinets. Racks to be seismically braced in accordance with local seismic bracing requirements. Racks are to be braced against sway on all three axes. Horizontal cable tray or other cable support that is also rated as a seismic brace may be used to meet some of the seismic bracing requirements.
    d. Each rack shall be UL listed for a load-carrying capacity of 1000 lbs. (454 kg.).
    e. Provide patch management ring runs in each rack. Provide (1) 2U high horizontal patch management between each panel of each rack.
    f. Provide side-mounted vertical cable management with covers on both sides of each rack. The cable management shall be with cover plates and bracket kits as needed to attach to adjacent racks.
    g. Provide strain relief and cable management at the rear of each rack to ensure uniform routing of all feeder and distribution cables.
    h. Each rack to have a minimum of eight power sockets mounted on a strip at the rear of the rack. The power outlets on the connector strip shall be NEMA 5-20R compatible. The plug shall be NEMA 5-20P compatible.
    i. The rack shall be manufactured from extruded aluminum and marked with Rack Unit spacing.
    j. Provide all racks with grounding kits and wires.
    k. Provide Raised Floor Rack Supports from rack manufacturer for all equipment racks mounted on raised “access” floor in the Server Room. Racks installed on raised floors are to be bolted through the raised floor directly into the concrete flooring below.
    l. The rack system solution shall provide integral cable management including vertical channels, pass through holes and slots for additional cable management accessories.

m. Pass through holes shall be located on the front, back and side of the rack for maximum flexibility.
n. Racks are to be threaded for #12-24 threads.

Part Number	Description	Rack Spaces
	19"x 7' 0" Rack	45
	Horizontal patch management at top of rack	1

2. Vertical cable managers shall include components that aid in routing, managing and organizing cable to and from patch panels and/or equipment. Managers shall protect network equipment by controlling cable bend radius and providing cable strain relief. Managers shall be a universal design mounting to EIA 19" or 23" racks and constructed of a base with cable management fingers.

3. The fingers shall include retaining tabs to keep cables in place during cover removal. The covers shall be hinged to open in either direction allowing for quick moves, adds, and changes (MAC).

Part Number	Type	Rack Spaces	Type	Max. Side Extension (in.)
	Front and Rear	45	High Capacity	6.55
	Center mount bracket kit	-	-	-
	Side Mount Kit	-	-	-

4. Horizontal cable managers shall include components that aid in routing, managing and organizing cable to and from patch panels and/or equipment. Panels shall protect network equipment by controlling cable bend radius and providing cable strain relief. Panels shall be a universal design mounting to EIA 19" racks and constructed with cable management fingers. The fingers shall include retaining tabs to keep cables in place during cover removal. The covers shall be easily removed or hinged to allow for quick moves, adds, and changes. The cable managers shall be provided with wire retainers to retain the cables during cover removal and #12-24 English and M6 metric mounting screws.

Part Number	Type	Rack Spaces	Max. Front Extension (in.)
	Front & Rear Duct	2	3.1

C. Enclosures

1. Wall mounted fiber optic enclosures

2. Rack mounted fiber optic

PART 3 – EXECUTION

3.1 INSTALLATION

A. The Communication Equipment Room shall support a minimum of (4) 4-pair Unshielded Twisted Pair (UTP) Copper Cables to each work area outlet unless otherwise noted for specific locations. The cables shall be installed from the Work Area Outlet to the Telecommunications Room (TR) located on the same floor, and routed to the appropriate rack serving that area and terminated as specified in this document.

B. Horizontal Distribution Cable Installation

1. Shall be installed in accordance with manufacturer's recommendations and best industry practices.

2. A pull cord (nylon; 1/8" minimum) shall be co-installed with all cable installed in any conduit.

3. Cable raceways shall not be filled greater than the TIA/EIA-569-A maximum fill for the particular raceway type or 40% whichever greater.

4. Cables shall be installed in continuous lengths from origin to destination (no splices).

5. Where transition points, or consolidation points are allowed, they shall be located in accessible locations and housed in an enclosure intended and suitable for the purpose.

6. The cable's minimum bend radius and maximum pulling tension shall not be exceeded.

7. If a J-hook or trapeze system is used to support cable bundles all horizontal cables shall be supported at a maximum of 48 to 60 inch (1.2 to 1.5 meter) intervals. At no point shall cable(s) rest on acoustic ceiling grids or panels.

8. Horizontal distribution cables shall be bundled in groups of no more than 50 cables. Cable bundle quantities in excess of 50 cables may cause deformation of the bottom cables within the bundle and degrade cable performance.

9. Cable shall be installed above fire-sprinkler systems and shall not be attached to the system or any ancillary equipment or hardware. The cable system and support hardware shall be installed so that it does not obscure any valves, fire alarm conduit, boxes, or other control devices.

10. Cables shall not be attached to ceiling grid or lighting fixture wires. Where support for horizontal cable is required, the contractor shall install appropriate carriers to support the cabling.

11. Any cable damaged or exceeding recommended installation parameters during installation shall be replaced by the contractor prior to final acceptance at no cost to the Owner.

12. Cables shall be identified by a self-adhesive or heat shrink label in accordance with the System Documentation Section of this specification and ANSI/TIA/EIA-606.

13. The cable label shall be applied to the cable behind the faceplate on a section of cable that can be accessed by removing the cover plate.

14. Unshielded twisted pair cable shall be installed so that there are no bends smaller than four times the cable outside diameter at any point in the run and at the termination field.

15. Pulling tension on 4-pair UTP cables shall not exceed 25-lbf for a four-pair UTP cable.

B. Horizontal Cross Connect Installation

1. Cables shall be dressed and terminated in accordance with the recommendations made in the TIA/EIA-568-B standard, manufacturer's recommendations and best industry practices.

2. Pair untwist at the termination shall not exceed 0.5”.

3. Bend radius of the cable in the termination area shall not exceed 4 times the outside diameter of the cable.

4. Cables shall be neatly bundled with no more than 48 cables per, and dressed to their respective panels or blocks. Each panel or block shall be fed by an individual bundle separated and dressed back to the point of cable entrance into the rack or frame.

5. The cable jacket shall be maintained as close as possible to the termination point, no more than 1".

6. Each cable shall be clearly labeled on the cable jacket behind the patch panel at a location that can be viewed without removing the bundle velcro ties. Cables labeled within the bundle, where the label is obscured from view shall not be acceptable.

C. Racks

1. Racks shall be securely attached to the concrete floor using minimum 3/8" hardware or as required by local codes.

2. Racks shall be placed with a 36-inch (minimum) clearance from the walls on all sides of the rack. When mounted in a row, maintain a minimum of 36 inches from the wall behind and in front of the row of racks and from the wall at each end of the row.

3. All racks shall be grounded to the telecommunications ground bus bar in accordance with Section Ground and Bonding for Communications Systems of this document.

4. Rack mount screws not used for installing patch panels and other hardware shall be bagged and left with the rack upon completion of the installation.

5. Wall mounted termination block fields shall be mounted on 4' x 8' x .75" void free fire treated plywood. The plywood shall be mounted vertically 24" above the finished floor.

END OF SECTION 27116-TC

271119-TC - TERMINATION BLOCKS AND PATCH PANELS FOR TELECOMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including Maryland Department of Transportation/Maryland Aviation Administration Standard Provisions for Construction Contracts Volume 1, Maryland State Highway Administration, Anne Arundel County and Interim Standard Addenda; and other Division 01 Specification sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Descriptions of the products and execution requirements relating to furnishing and installing Telecommunications Cabling. Termination blocks and patch panels are covered under this document.

2. This section includes minimum requirements for the following:

   a. Termination blocks

   b. Patch panels

3. Product specifications, general design considerations, and installation guidelines are provided in this document. Quantities of telecommunications outlets, typical installation details, cable routing and outlet types will be provided as an attachment to this document.

1.3 SUBMITTALS

A. Submittal requirements shall be in accordance with Section 270000 – Common Work for Telecommunications Systems.

B. All cables and related terminations, support and grounding hardware shall be furnished, installed, wired, tested, labeled, and documented by the telecommunications contractor as detailed in this document.

C. Upon completion of the installation, the telecommunications contractor shall provide three (3) full documentation sets to the Engineer for approval. Documentation shall include the items detailed in the sub-sections below.

D. Documentation shall be submitted within ten (10) working days of the completion of each testing phase. This is inclusive of all test results and draft as-built drawings. Draft drawings may include annotations done by hand. Machine generated (final) copies of all drawings shall be submitted within 30 working days of the completion of each testing phase. At the request of the Engineer, the telecommunications contractor shall provide copies of the original test results.

E. Testing:

1. Maryland Aviation Administration Office of Technology (MAA/OT) may do a 10% random field re-test be conducted on the cable system to verify documented findings. Tests shall be a repeat of those defined above. If findings contradict the documentation submitted by the telecommunications contractor, additional testing can be requested to the extent determined necessary by the Engineer, including a 100% re-test. This re-test shall be at no additional cost to the Owner.

2. Test Results documentation shall be provided on disk within three weeks after the completion of the project. The disk shall be clearly marked on the outside front cover with the words "Project Test Documentation", the project name, and the date of completion (month and year). The results shall include a record of test frequencies, cable type, conductor pair and cable (or outlet) I.D., measurement direction, reference setup, and crew member name(s). The test equipment name, manufacturer, model number, serial number, software version and last calibration date will also be provided at the end of the document. Unless the manufacturer specifies a more frequent calibration cycle, an annual calibration cycle is anticipated on all test equipment used for this installation. The test document shall detail the test method used and the specific settings of the equipment during the test as well as the software version being used in the field test equipment.

3. The field test equipment shall meet the requirements of ANSI/TIA/EIA-568-B including applicable TSB's and amendments. The appropriate level IV tester shall be used to verify Category 6 cabling systems. The appropriate level III tester shall be used to verify Category 6 cabling systems.

4. Printouts generated for each cable by the wire (or fiber) test instrument shall be submitted as part of the documentation package. Alternately, the telecommunications contractor may furnish this information in electronic form (compact disc). These discs shall contain the electronic equivalent of the test results as defined by the bid specification and be of a format readable from Microsoft Word or Microsoft Excel.

5. When repairs and re-tests are performed, the problem found and corrective action taken shall be noted, and both the failed and passed test data shall be documented.

F. The As-Built drawings are to include cable routes and outlet locations. Their sequential number as defined elsewhere in this document shall identify outlet locations.

Numbering, icons, and drawing conventions used shall be consistent throughout all documentation provided. The Owner will provide floor plans in paper and electronic (DWG, AutoCAD) formats on which as-built construction information can be added. These documents will be modified accordingly by the telecommunications contractor to denote as-built information as defined above and returned to the Owner. Numbering, icons, pathways and other drawing conventions are to be assigned their own individual AutoCAD layer.

G. The Contractors shall annotate the base drawings and return a hard copy (same plot size as originals) and electronic (AutoCAD or as agreed to by MAA/OT) form.

1.4 REFERENCES

A. The following industry standards are the basis for the structured cabling system described in this document.

TIA/EIA

TIA/EIA-568-B	Commercial Building Telecommunications Cabling Standard
TIA/EIA-569-A	Commercial Building Standard for Telecom Pathways and Spaces
TIA/EIA-606	Administration Standard for the Telecommunications Infrastructure of Commercial Buildings
TIA/EIA-607	Commercial Building Grounding/Bonding Requirements

NFPA

NFPA-70	National Electric Code (NEC)-1999

ISO/IEC

ISO/IEC 11801	Generic Cabling for Customer Premises

B. Conflicts:

1. If the bid documents are in conflict, this specification shall take precedence.

2. The most recent versions of all documents apply to this project. If there is a conflict between applicable documents, the order above shall dictate the order of precedence in resolving the issue unless an enforceable local or national code is in effect.

1.5 QUALITY ASSURANCE

A. The successful vendor shall meet or exceed all requirements for the cable system described in this document.

PART 2 – PRODUCTS

2.1 EQUIPMENT

A. Cable Termination Hardware – Category 6

1. Products shall provide labeling options that comply with the TIA/EIA-606-A Standard. All products shall be clearly identified with the use of a thermal transfer printer, hand-printed labels are not acceptable and will be rejected. Products shall include faceplates, surface mount boxes, patch panels, marker ties, printers and accessories. All label heights shall be the same to allow for consistent labeling. Panels shall be available in flat and angled versions.

2. Modular Patch Panels shall be of a metal design with 48 ports. Patch panels shall be available with and without labels.

Part Number	Number of Ports	Ports Per Faceplate	Rack Spaces
	48	2	2

3. Four-pair Category 6 UTP cabling: Patch panels shall be universal for T658A and T568B wiring configurations. Integral cable tie mounts shall be included in the panel for cable management on the back of the panel. Port and panels shall be easy to identify with write-on areas and optional label holder for color-coded labels. Rack mountable patch panels shall mount to standard EIA 19" and 23"racks.

Part Number	Number of Ports	Wiring Configuration	Rack Spaces
	48	Universal	2

PART 3 – EXECUTION

3.1 INSTALLATION

A. The Communication Equipment Room shall support a minimum of (4) 4-pair Unshielded Twisted Pair (UTP) Copper Cables to each work area outlet unless otherwise noted for specific locations. The cables shall be installed from the Work Area Outlet to the Telecommunications Room (TR) located on the same floor, and routed to the appropriate rack serving that area and terminated as specified in this document.

B. Cable Termination Hardware – Category 6

1. Each horizontal or backbone cabling run will be terminated using appropriate connectors or connecting blocks depending upon the cable type. Matching patch cords will be used to perform cross-connect activities or to connect into the networking/voice hardware.

2. Category 6 Unshielded Twisted Pair UTP. Four-pair Category 6 cabling shall be terminated onto modular patch panels, punch down style patch panels or punch down style connecting blocks where specified in the plans.

3. Four-pair Category 6 UTP cabling shall be terminated onto a four-pair Category 6 module. All modules shall be terminated using the T568B wiring scheme. The eight-position module shall exceed the connector requirements of the TIA/EIA Category 6 standard.

4. Four-pair Category 6 cabling shall be terminated onto modular patch panels ('110 style patch panels punch down style connecting bases and connectors) for specific applications as outlined in this specification.

5. Patch Panels - Four-pair Category 6 UTP cabling shall be terminated onto four-pair punch down style connecting hardware mounted to the rear of integral patch panels and routed to Category 6 modules on the front face of the patch panel.

C. Horizontal Cross Connect Installation

1. Cables shall be dressed and terminated in accordance with the recommendations made in the TIA/EIA-568-B standard, manufacturer's recommendations and best industry practices.

2. Pair untwist at the termination shall not exceed 0.5”.

3. Bend radius of the cable in the termination area shall not exceed 4 times the outside diameter of the cable.

4. Cables shall be neatly bundled groups of 48 max and dressed to their respective panels or blocks. Each panel or block shall be fed by an individual bundle separated and dressed back to the point of cable entrance into the rack or frame.

5. The cable jacket shall be maintained as close as possible to the termination point.

6. Each cable shall be clearly labeled on the cable jacket behind the patch panel at a location that can be viewed without removing the bundle support ties. Cables labeled within the bundle, where the label is obscured from view shall not be acceptable.

D. Copper Termination Hardware

1. Cables shall be dressed and terminated in accordance with the recommendations made in the ANSI/TIA/EIA-568-B standard, manufacturer's recommendations and best industry practice.

2. Pair untwist at the termination shall not exceed 0.5”.

3. Bend radius of the cable in the termination area shall not exceed 4 times the outside diameter of the cable.

4. Cables shall be neatly bundled in groups of 48 max and dressed to their respective panels or blocks. Each panel or block shall be fed by an individual bundle separated and dressed back to the point of cable entrance into the rack or frame.

5. The cable jacket shall be maintained to within 25 mm (one inch) of the termination point.

6. Each cable shall be clearly labeled on the cable jacket behind the patch panel at a location that can be viewed without removing the bundle support ties. Cables labeled within the bundle, where the label is obscured from view shall not be acceptable.

3.2 TESTING

A. All cables shall be labeled prior to testing. All cables and termination hardware shall be 100% tested for defects in installation and to verify cabling system performance under installed conditions according to the requirements of ANSI/TIA/EIA-568-A. All pairs of each installed cable shall be verified prior to system acceptance. Any defect in the cabling system installation including but not limited to cable, connectors, feed through couplers, patch panels, and connector blocks shall be repaired or replaced in order to ensure 100% useable conductors in all cables installed.

B. All cables shall be tested in accordance with this document, the ANSI/TIA/EIA standards and best industry practice. If any of these are in conflict, the Contractor shall bring any discrepancies to the attention of the project team for clarification and resolution.

C. Copper Channel Testing:

1. All twisted-pair copper cable links shall be tested for continuity, pair reversals, shorts, opens and performance as indicated below. Additional testing is required to verify Category performance. Horizontal cabling shall be tested using a level IIe or level III test unit for category 6 or category 6 performance compliance, respectively.

2. Continuity - Each pair of each installed cable shall be tested using a test unit that shows opens, shorts, polarity and pair-reversals, crossed pairs and split pairs. Shielded/screened cables shall be tested with a device that verifies shield continuity in addition to the above stated tests. The test shall be recorded as pass/fail as indicated by the test unit in accordance with the manufacturers' recommended procedures, and referenced to the appropriate cable identification number and circuit or pair number. Any faults in the wiring shall be corrected and the cable re-tested prior to final acceptance.

3. Length - Each installed cable link shall be tested for installed length using a TDR type device. The cables shall be tested from patch panel to patch panel, block to block, patch panel to outlet or block to outlet as appropriate. The cable length shall conform to the maximum distances set forth in the ANSI/TIA/EIA-568-B Standard. Cable lengths shall be recorded, referencing the cable identification number and circuit or pair number. For multi-pair cables, the shortest pair length shall be recorded as the length for the cable.

D. Category 6 & 6 Performance

1. Follow the Standards requirements established in ANSI/TIA/EIA-568-B -TSB-155.

2. A level IV or better test unit is required to verify category 6 performances and must be updated to include the requirements of TSB-155. A level IV test unit is required to verify category 6 performances. Refer to section on test equipment for additional requirements.

E. The four basic tests required in TSB-67 are:

1. Wire Map
2. Length
3. Attenuation
4. NEXT (Near end crosstalk)

F. Four additional tests are required per TSB-155:

1. Return Loss
2. ELFEXT Loss
3. Propagation Delay
4. Delay skew

G. Two additional tests are required:

1. PSNEXT (Power sum near-end crosstalk loss)
2. PSELFEXT (Power sum equal level far-end crosstalk loss)

END OF SECTION 271119-TC

271313-TC - CABLE SPLICING AND TERMINATION FOR TELECOMMUNICATIONS SYSTEMS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including Maryland Department of Transportation/Maryland Aviation Administration Standard Provisions for Construction Contracts Volume 1, Maryland State Highway Administration, Anne Arundel County and Interim Standard Addenda; and other Division 01 Specification sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Descriptions of the products and execution requirements relating to furnishing and installing Telecommunications Cabling. Copper backbone cabling (copper cabling splicing and terminations) is covered under this document.

2. Minimum requirements for the Copper Backbone Cabling System.

3. Product specifications, general design considerations, and installation guidelines are provided in this document. Quantities of telecommunications outlets, typical installation details, cable routing and outlet types will be provided as an attachment to this document.

1.3 DEFINITIONS

A. Backbone Cabling System

1. The Backbone Cable Subsystem in a building is the part of the premises distribution system that provides connection between equipment rooms, telecommunication rooms, and telecommunications service entrance facilities. A backbone subsystem provides either intra-building connections between floors in multi-story buildings or inter-building connections in campus-like environments.

1.4 SUBMITTALS

A. Submittal requirements shall be in accordance with Section 270000-Common Work for Telecommunications Systems.

1.5 REFERENCES

A. The following industry standards are the basis for the structured cabling system described in this document.

TIA/EIA

TIA/EIA-568-B	Commercial Building Telecommunications Cabling Standard
TIA/EIA-569-A	Commercial Building Standard for Telecom Pathways and Spaces
TIA/EIA-606	Administration Standard for the Telecommunications Infrastructure of Commercial Buildings
TIA/EIA-607	Commercial Building Grounding/Bonding Requirements

NFPA

NFPA-70	National Electric Code (NEC)-1999

ISO/IEC

ISO/IEC 11801	Generic Cabling for Customer Premises

B. Conflicts:

1. The most recent versions of all documents apply to this project. If there is a conflict between applicable documents, the order above shall dictate the order of precedence in resolving the issue unless an enforceable local or national code is in effect.

2. If the bid documents are in conflict, this specification shall take precedence.

1.6 QUALITY ASSURANCE

A. The successful vendor shall meet or exceed all requirements for the cable system described in this document.

PART 2 -PRODUCTS

2.1 EQUIPMENT

A. Provide all labor, materials, tools and equipment required for the complete installation of work called for in the Construction Documents

B. All cables and related terminations, support and grounding hardware shall be furnished, installed, wired, tested, labeled, and documented by the telecommunications contractor as detailed in this document.

PART 3 – EXECUTION

3.1 INSTALLATION

A. The Communication Equipment Room shall support a minimum of (4) 4-pair Unshielded Twisted Pair (UTP) Copper Cables to each work area outlet unless otherwise noted for specific locations. The cables shall be installed from the Work Area Outlet to the Telecommunications Room (TR) located on the same floor, and routed to the appropriate rack serving that area and terminated as specified in this document.

B. The successful vendor shall meet or exceed all requirements for the cable system described in this document.

C. There shall be no splices to fiber optic cable plants or copper cable plants providing service to the building or within the building.

END OF SECTION 271313-TC

271323-TC- OPTICAL FIBER SPLICING AND TERMINATIONS FOR TELECOMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including Maryland Department of Transportation/Maryland Aviation Administration Standard Provisions for Construction Contracts Volume 1, Maryland State Highway Administration, Anne Arundel County and Interim Standard Addenda; and other Division 01 Specification sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. This document describes the products and execution requirements relating to furnishing and installing Telecommunications Cabling. Optical fiber backbone cabling (optical fiber splicing and terminations) is covered under this document.

2. Minimum requirements for the optical Fiber Backbone Cabling System.

3. Product specifications, general design considerations, and installation guidelines are provided in this document. Quantities of telecommunications outlets, typical installation details, cable routing and outlet types will be provided as an attachment to this document.

1.3 DEFINITIONS

A. Backbone Cabling System

1. The Backbone Cable Subsystem in a building is the part of the premises distribution system that provides connection between equipment rooms, telecommunication rooms, and telecommunications service entrance facilities. A backbone subsystem provides either intra-building connections between floors in multi-story buildings or inter-building connections in campus-like environments.

1.4 REFERENCES

A. The following industry standards are the basis for the structured cabling system described in this document.

TIA/EIA

TIA/EIA-568-B	Commercial Building Telecommunications Cabling Standard
TIA/EIA-569-A	Commercial Building Standard for Telecom Pathways and Spaces
TIA/EIA-606	Administration Standard for the Telecommunications Infrastructure of Commercial Buildings
TIA/EIA-607	Commercial Building Grounding/Bonding Requirements

NFPA

NFPA-70	National Electric Code (NEC)-1999

ISO/IEC

ISO/IEC 11801	Generic Cabling for Customer Premises

B. Conflicts:

1. The most recent versions of all documents apply to this project. If there is a conflict between applicable documents, the order above shall dictate the order of precedence in resolving the issue unless an enforceable local or national code is in effect.

2. If the bid documents are in conflict, this specification shall take precedence.

1.5 SUBMITTALS

A. Submittal requirements shall be in accordance with Section 270000 – Common Work for Telecommunications Systems.

B. Upon completion of the installation, the telecommunications contractor shall provide three (3) full documentation sets to the Engineer for approval. Documentation shall include the items detailed in the sub-sections below.

C. Documentation shall be submitted within ten (10) working days of the completion of each testing phase. This is inclusive of all test results and draft as-built drawings. Draft drawings may include annotations done by hand. Machine generated (final) copies of all drawings shall be submitted within 30 working days of the completion of each testing phase. At the request of the Engineer, the telecommunications contractor shall provide copies of the original test results.

D. Maryland Aviation Administration Office of Technology may test 10% random field re-test be conducted on the cable system, at no additional cost, to verify documented findings. Tests shall be a repeat of those defined above. If findings contradict the

documentation submitted by the telecommunications contractor, additional testing can be requested to the extent determined necessary by the Engineer, including a 100% re-test. This re-test shall be at no additional cost to the Owner.

E. Test Results documentation shall be provided on disk within three weeks after the completion of the project. The disk shall be clearly marked on the outside front cover with the words "Project Test Documentation", the project name, and the date of completion (month and year). The results shall include a record of test frequencies, cable type, conductor pair and cable (or outlet) I.D., measurement direction, reference setup, and crew member name(s). The test equipment name, manufacturer, model number, serial number, software version and last calibration date will also be provided at the end of the document. Unless the manufacturer specifies a more frequent calibration cycle, an annual calibration cycle is anticipated on all test equipment used for this installation. The test document shall detail the test method used and the specific settings of the equipment during the test as well as the software version being used in the field test equipment.

F. The field test equipment shall meet the requirements of ANSI/TIA/EIA-568-B including applicable TSB's and amendments. The appropriate level IV tester shall be used to verify Category 6 cabling systems. The appropriate level III tester shall be used to verify Category 6 cabling systems.

G. Printouts generated for each cable by the wire (or fiber) test instrument shall be submitted as part of the documentation package. Alternately, the telecommunications contractor may furnish this information in electronic form (compact disc). These discs shall contain the electronic equivalent of the test results as defined by the bid specification and be of a format readable from Microsoft Word or Microsoft Excel.

H. When repairs and re-tests are performed, the problem found and corrective action taken shall be noted, and both the failed and passed test data shall be documented.

I. The As-Built drawings are to include cable routes and outlet locations. Their sequential number as defined elsewhere in this document shall identify outlet locations. Numbering, icons, and drawing conventions used shall be consistent throughout all documentation provided. The Owner will provide floor plans in paper and electronic (DWG, AutoCAD rel. 14) formats on which as-built construction information can be added. These documents will be modified accordingly by the telecommunications contractor to denote as-built information as defined above and returned to the Owner. Numbering, icons, pathways and other drawing conventions are to be assigned their own individual AutoCAD layer.

J. The Contractors shall annotate the base drawings and return a hard copy (same plot size as originals) and electronic (AutoCAD rel. 14 or as agreed to by MAA/OT) form.

1.6 QUALITY ASSURANCE

A. The successful vendor shall meet or exceed all requirements for the cable system described in this document.

PART 2 – PRODUCTS

2.1 EQUIPMENT

A. Provide all labor, materials, tools and equipment required for the complete installation of work called for in the Construction Documents.

B. All cables and related terminations, support and grounding hardware shall be furnished, installed, wired, tested, labeled, and documented by the telecommunications contractor as detailed in this document.

C. The type of backbone copper cable shall be 100Ω unshielded twisted pair (UTP), multi-pair cable. The type of backbone fiber cable shall be 50/125 μm multimode fiber cable or 8.3/125 μm singlemode fiber cable. The bending radius and maximum pulling tension of the cable shall be adhered to during handling and installation.

D. Data Cable: All backbone fiber optic cable shall be 50/125μm tight buffered or 8.3/125 μm jacketed fiber optic cable. Fiber cable shall be riser (OFNR) or plenum (OFNP) listed where applicable.

E. Optical Fiber Cables

1. Multimode Cable Elements.

a. Multimode cable to be 62.5 micron core.
b. Fiber shall have a maximum Attenuation of 3.5dB/km @ 850nm and 1.5 dB/km @ 1300nm.
c. Fiber shall have a minimum LED Bandwidth 1500 MHz•km @ 850nm and 500 MHz•km @ 1300nm.
d. Fiber shall have a minimum Effective Modal Bandwidth 2000 (MHz•km) @ 850nm.
e. Fiber shall have a serial Gigabit Ethernet Distance Guarantee 1000m @ 850nm and 600m @ 1300nm.
f. Fiber shall have a serial 10 Gigabit Ethernet Distance 300m @ 850nm.
g. Fiber shall have a minimum tensile load strength of 2700 Newtons.
h. Fiber shall conform to RUS 7 CFR 1755.900 and ANSO/ICEA S-87-640
i. Fiber shall have 3.0mm buffer tube size.

j. Fiber shall have SZ-stranded, loose tube design to isolate fibers from installation and environmental elements.
k. Fiber shall have a jacket made of medium density polyethylene.
l. Fiber cable construction shall be of all-dielectric construction.
m. Fiber shall be plenum rated.

F. Optical fiber Cables

1. Singlemode Cable Elements.

a. Singlemode cable to be 8.3 micron core.
b. Fiber shall have a maximum Attenuation of 0.4 dB/km @ 1310 nm and 0.3 dB/km @ 1510 nm
c. Fiber shall have a serial Gigabit Ethernet Distance Guarantee of 5000 m @ 1310 nm.
d. Fiber shall have a serial 10 Gigabit Ethernet Distance of 10000 m @ 1310 nm and 40000 m @ 1510 nm.
e. Fiber shall have a minimum tensile load strength of 2700 Newtons.
f. Fiber shall conform to RUS 7 CFR 1755.900 and ANSO/ICEA S-87-640
g. Fiber shall have 3.0mm buffer tube size.
h. Fiber shall have SZ-stranded, loose tube design to isolate fibers from installation and environmental elements.
i. Fiber shall have a jacket made of medium density polyethylene.
j. Fiber cable construction shall be of all-dielectric construction.
k. Fiber shall be plenum rated.
l. Cable shall be capable of supporting 1470, 1490, 1510, 1530, 1550, 1570, 1590 and 1610 nm wavelengths.

G. Backbone Cable (the following fiber counts are subject to job specific needs)

1. Provide internal use riser rated optical fiber cable with 144 strands of single mode optical fiber cable and 72 strands of multimode optical fiber cable .The cable shall be riser rated (CMR) for use as an internal cable in a non-plenum / plenum environment.
2. Provide printed length markings on the cable jacket every two feet.
3. All fiber will be installed in a 1.5 inch inner duct within the conduit.

H. External Cable (the following fiber counts are subject to job specific needs)

1. Provide external optical fiber cable with 144 strands of single mode optical fiber and 72 strands of multimode optical fiber cable.
2. The cable shall be recommended by the manufacturer for use as an external cable suitable for installation in an underground duct or conduit system.
3. Provide printed length markings on the cable jacket every two feet.

4. Optical fibers will be contained within loose buffer tubes utilizing water blocking tapes or compounds surrounding these tubes. The cable will be an all-dielectric construction, with a central strength member.

I. Rack Mounted Optical Fiber Patch Panel.

1. Conforming to the following specification:

a. Each panel shall be suitable for installation in EIA 19" mounting frame.
b. Patch panels shall be capable of holding 6 coupler (bulk head) adapters.
c. Each panel shall provide either compression glands or internal clips and entrapment of yarn based impact resistance to provide strain relief.
d. Each panel shall provide fiber handling for fiber strands, including 20" fiber reserve (service loop) inside the patch panel with no bends sharper than 2" bend radius.
e. Each patch panel shall be fitted with bulkhead simplex adapters (with ceramic alignment sleeves for 6 ST or SC Connectors. Provide sufficient quantity of adapters to support all terminated fibers. Bulkhead adapters to be sourced from the same manufacturer as the connectors provided as a part of this project, or they are to be recommended by the manufacturer for use with the connector.
f. Provide adapter plates to house bulkhead adapters and provide blanking adapter plates to cover all unused spaces as necessary.
g. Each patch panel shall allow any individual element to be terminated or otherwise handled without disturbing or damaging other strands.

J. Optical Fiber connectors

1. Multimode Optical Fiber Connectors. Provide multimode Corning optical fiber connectors ST conforming to the following specification.

a. Optical fiber connectors must be part of cable manufacturer's approved extended warranted end to end cabling solution.
b. Maximum insertion loss, of mated pair, less than 0.75 dB at acceptance
c. Optimally keyed, allowing reproducible mating conditions each time a connection is made between connector and coupler.
d. Fitted with color coded strain relief boots to ensure durable and robust connections
e. Durability better than 500 matings, with a maximum increase in insertion loss of not more than 0.2 dB.
f. Fitted with a tight polymer cap, until the connector is fitted to a bulkhead adapter, over the connector to prevent ingress of dirt and dust, until the connector is fitted to a coupler.
g. Having (6) ST connectors per mounting panel (bulk head adapter).

K. Singlemode Optical Fiber Connectors. Provide Corning singlemode optical fiber connectors SC, conforming to the following specification.

1. Optical fiber connectors must be part of cable manufacturer's approved extended warranted end to end cabling solution.
2. Insertion loss of mated pair at 1310 nm to be less than 0.5 dB at acceptance for every duplex connector.
3. Minimum return loss of 36dB at 1310 nm
4. Optimally keyed, allowing reproducible mating conditions each time a connection is made between connector and coupler.
5. Fitted with strain relief boots to ensure durable and robust connections
6. Durability better than 500 matings, with a maximum increase in insertion loss of not more than 0.2 dB.
7. Fitted with a tight polymer cap over the connector to prevent ingress of dirt and dust, until the connector is fitted to a coupler.
8. Having (6) SC connectors per mounting panel (bulk head adapter).

L. Fiber Optic Equipment Trays/Drawers/Enclosures

1. The Fiber Optic Trays shall be used to provide rack mounted fiber optic trays that manage and protect optical fiber terminations and splices. The trays shall be used with 24 or 48 port *MINI-COM* ® modular patch panels or approved equal or fiber adapter patch panels. The trays shall include a removable cover. They shall mount to EIA standard 19" and 23" (with extender bracket) racks or cabinets, include multiple cable entry points and include a fiber optic cable routing accessory kit.

2. Wall mounted fiber optic enclosures shall be constructed of steel material. Enclosures shall provide patch cable protection without the installation of an additional attachment. Enclosures shall maintain discrete locking capability between installer and end user segments.

3. Rack mounted fiber optic enclosures shall be designed to manage and organize fiber optic cable to and from the equipment or cabling plant. Enclosures shall protect fiber optic connections for patching or splicing requirements. Enclosures shall accommodate up to 36 fibers (with Fiber Jack, SC, or SC) per rack space and shall be constructed of steel material. Enclosures shall have removable front and rear covers and top and bottom pass through holes.

Part Number	**Rack Spaces**	**Number of Fibers**
	1	36 with Fiber Jack
	2	72 with Fiber Jack
	3	96 with Fiber Jack
	4	144 with Fiber Jack

PART 3 – EXECUTION

3.1 INSTALLATION

A. The Communication Equipment Room shall support a minimum of (4) 4-pair Unshielded Twisted Pair (UTP) Copper Cables to each work area outlet unless otherwise noted for specific locations. The cables shall be installed from the Work Area Outlet to the Telecommunications Room (TR) located on the same floor, and routed to the appropriate rack serving that area and terminated as specified in this document.

B. All cables shall be run using a star topology (home run) from the Main Cross-Connect (MC) to each Horizontal Cross-Connect (HC) within the telecommunications room. One additional Intermediate Cross-Connect (IC) may be implemented between the MC and HC if so required. The length of each individual run of backbone fiber cable shall not exceed 2000 meters for multimode and 3000 meters for singlemode and the length of each UTP cable run for voice applications is not to exceed 800 meters (90 meters for data) as specified under TIA/EIA-568-B. The length of the media between the IC and HC shall not exceed 300 meters.

C. Optical Fiber Termination Hardware

1. Fiber slack shall be neatly coiled within the fiber splice tray or enclosure. No slack loops shall be allowed external to the fiber panel.

2. Each cable shall be individually attached to the respective fiber enclosure by mechanical means. The cables strength member shall be securely attached the cable strain relief bracket in the enclosure.

3. Each fiber bundle shall be stripped upon entering the splice tray and the individual fibers routed in the splice tray.

4. Each cable shall be clearly labeled at the entrance to the splice enclosure. Cables labeled within the bundle shall not be acceptable.

5. A maximum of 12 strands of fiber shall be spliced in each tray

6. All spare strands shall be installed into spare splice trays.

3.2 TESTING

A. General

1. All cables and termination hardware shall be 100% tested for defects in installation and to verify cabling system performance under installed conditions according to the requirements of ANSI/TIA/EIA-568-B, TSB-67 and TSB-155. All strands of each installed cable shall be verified prior to system acceptance. Any defect in the cabling system installation including but not limited to cable, connectors, feed through couplers, patch panels, and connector blocks shall be repaired or replaced in order to ensure 100% useable conductors in all cables installed.

2. All cables shall be tested in accordance with this document, the ANSI/TIA/EIA standards If any of these are in conflict, the Contractor shall bring any discrepancies to the attention of the project team for clarification and resolution.

B. Optical Fiber Cable & Connectors

1. Test each optical fiber cable element and its associated connectors. Carry out the following test on every element of every optical fiber cable.

2. Visually check optical connectors using microscope (minimal magnification x200) to ensure that no physical damage has occurred during the installation process. There are to be no scratches on the core of the fiber or pits on the core or cladding. If any defect cannot be rectified with polishing, the connector is to be replaced.

3. Carry out OTDR tests on all strands at 1300nm wavelength for multimode cable runs and at 1310 nm for singlemode. These tests shall be carried out from both ends using a near end launch lead and a far end drop lead.

4. The number of samples (averages) for each OTDR test shall be such that the noise amplitude is significantly less than the smallest loss of any component under test. This may vary for different cable runs, for shorter runs and fusion splices etc.; it may be necessary to run many samples.

5. Verify the labeling of the cable and connectors is correct.

6. If any strand has an excessive attenuation coefficient, a sudden step in attenuation coefficient (greater than 0.2 dB) or back scatter, losses due to micro bending or macro bending or has any other fault then the fault on that element shall be rectified.

7. The following table lists the pass/fail criteria for all connectors and fusion splices under test. Any component that does not pass these figures shall be re-worked or replaced.

Fiber Type	Maximum attenuation across mated connector pair (dB) – outward test	Maximum Attenuation across fusion splice – averaged over both directions(dB)
MM	**0.75**	**0.1**
SM	**0.5**	**0.1**

8. The attenuation of each mode connector shall be measured in both directions.

9. Each fusion splice shall be tested in both directions for both multimode and single mode strands. The measurements for each direction shall be averaged for the final attenuation figure for each fusion splice.

10. The return loss must be measured in both directions for single mode connectors. The return loss shall be greater or equal to the value shown in the table above.

11. Any failures shall be recorded and the results obtained after rectification of the fault shall be recorded.

12. Graphical printouts shall be taken of OTDR tests for each element. These printouts shall be printed 11" x 8.5" size sheets. They shall be printed at an appropriate scale, such as 0.5 dB per division for the attenuation axis. Provide diskette copies of the OTDR traces to the Owner on completion of the testing. Provide a copy of the emulation software and the appropriate license to the client.

13. All fiber testing shall be performed on all fibers in the completed end-to-end system. There shall be no splices unless clearly defined in an RFP. Testing shall consist of an end-to-end power meter test performed per TIA/EIA-455-53A. The system loss measurements shall be provided at 850 and/or 1300 nanometers for multimode fibers and 1310 and/or 1550 nanometers for single mode fibers. These tests also include continuity checking of each fiber.
14. For horizontal cabling system using multimode optical fiber, attenuation shall be measured in one direction 850 nanometer (nm) or 1300 nm using an LED light source and power meter.

15. Backbone multimode fiber cabling shall be tested at both 850 nm and 1300 nm (or 1310 and 1550 nm for single mode) in one direction.

16. Test set-up and performance shall be conducted in accordance with ANSI/TIA/EIA-526-14 Standard, Method B.

17. Where links are combined to complete a circuit between devices, the Contractor shall test each link from end to end to ensure the performance of the system. ONLY BASIC LINK TEST IS REQUIRED. The contractor can optionally install patch cords to complete the circuit and then test the entire channel. The test method shall be the same used for the test described above. The values for calculating loss shall be those defined in the ANSI/TIA/EIA Standard.

18. Attenuation testing shall be performed with a stable launch condition using two-meter jumpers to attach the test equipment to the cable plant. The light source shall be left in place after calibration and the power meter moved to the far end to take measurements.

END OF SECTION 271323-TC

271343-TC - COMMUNICATIONS SERVICES CABLING FOR TELECOMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including Maryland Department of Transportation/Maryland Aviation Administration Standard Provisions for Construction Contracts Volume 1, Maryland State Highway Administration, Anne Arundel County and Interim Standard Addenda; and other Division 01 Specification sections, apply to this Section.

1.2 SUMMARY

A. Section includes communications services cabling equipment coordination and installation requirements.

1.3 SUBMITTALS

A. Submittal requirements shall be in accordance with Section 270000-TC-Common Work for Telecommunications Systems.

PART 2 - PRODUCTS

2.1 Telephone System Backbone Cabling

A. Provide General Cable or listed cables. Each cable shall have unshielded twisted pair 24 AWG solid copper conductors and meet or exceed the electrical specifications for Category 3 cables detailed in the ANSI-EIA/TIA 568B.

B. Commercial Building Telecommunications Wiring Standard for premises wiring. The cable shall be riser rated.

2.2 Telephone System External Cabling

A. External Cable. Provide General Cable or listed cable air core telephone cable suitable for direct-burial or conduit applications. The cable shall have 22 AWG solid annealed copper conductors. The sheath shall consist of a 0.008" corrugated aluminum shield, with a 0.006" corrugated steel shield and a black polyethylene jacket. The jacket shall be sequentially printed with a footage marker at regular intervals. A flooding compound shall be applied over the core and to all surfaces of the aluminum and steel shields to resist moisture entry and to inhibit corrosion. Terminate both ends of this cable on Krone Ultim8, 8 pair disconnection modules with hinged label cover blocks bracket fixed to the Telephone Termination Backboard or rack. Match cable CAT rating with cable.

2.3 Telephone System Termination Frames (Contact OT Engineer for Option to be used)

A. Option A
Rack-mounted Termination Patch Panel. Provide a RJ-45 Patch Panel with individual RJ-45 connectors to terminate the telephone backbone cable pairs. All pairs will be terminated on each RJ-45 connector using 568B termination scheme. Each patch panel shall be suitable for rack mounting in a 19" rack. Provide Data-Patch Category 6 Patch Panels which utilize 110 style terminations on the back.

B. Option B
Rack-mounted or wall mounted Termination Provide on a Krone Highband Ultim8, 8 pair disconnection modules with hinged label cover blocks bracket fixed to the Telephone Termination Backboard or rack. Match cable CAT rating with cable.

Connectors to terminate the telephone backbone cable pairs. All pairs will be terminated on each using 568B termination scheme. Each patch module shall be suitable for rack mounting in a 19" rack or on wall using approved methods.

2.4 Feeder Telephone Cabling

A. Provide telephone feeder cables running from the Main Distribution Frame to wall-mounted Intermediate Distribution Frames (IDFs) in each of the Communications Rooms. Refer to drawing for cable quantities and routing information.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Label each block with all building, room and pair counts.

B. Terminate the Main Distribution Frame end of each feeder cable on Krone blocks fitted to Termination Backboard in the MDF. Terminate all pairs of each feeder cable.

C. Terminate the Intermediate Distribution Frame end of each feeder cable on Krone blocks fitted to the wall of each Communications Room. Terminate all pairs of each feeder cable.

E. Telephone System External and Backbone Cabling Testing

1. Test each Telephone System Backbone and External Cable and its associated patch frame connectors. Carry out the following tests on every pair of every telephone system feeder and external cable:

a. Conductor Continuity

b. Conductor Separation

c. Conductor Polarity

END OF SECTION 271343-TC

271519-TC - HORIZONTAL CABLING FOR TELECOMMUNICATIONS SYSTEMS

PART I – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including Maryland Department of Transportation/Maryland Aviation Administration Standard Provisions for Construction Contracts Volume 1, Maryland State Highway Administration, Anne Arundel County and Interim Standard Addenda; and other Division 01 Specification sections, apply to this Section.

1.2 SUMMARY

A. Section includes:

1. Descriptions of the products and execution requirements relating to furnishing and installing Horizontal Cabling. Data Communications Horizontal Cabling is covered under this document.

2. Minimum requirements for the following:

   a. Copper UTP Cable
   b. Fiber Cable

3. Product specifications, general design considerations, and installation guidelines are provided in this document. Quantities of telecommunications outlets, typical installation details, cable routing and outlet types will be provided as an attachment to this document.

1.3 REFERENCES

A. The following industry standards are the basis for the structured cabling system described in this document.

TIA/EIA	
TIA/EIA-568-B	Commercial Building Telecommunications Cabling Standard
TIA/EIA-569-A	Commercial Building Standard for Telecom Pathways and Spaces
TIA/EIA-606	Administration Standard for the Telecommunications Infrastructure of Commercial Buildings
TIA/EIA-607	Commercial Building Grounding/Bonding Requirements

NFPA

NFPA-70	National Electric Code (NEC)-1999

ISO/IEC

ISO/IEC 11801	Generic Cabling for Customer Premises

B. Conflicts:

1. The most recent versions of all documents apply to this project. If there is a conflict between applicable documents, the order above shall dictate the order of precedence in resolving the issue unless an enforceable local or national code is in effect.

2. If the bid documents are in conflict, this specification shall take precedence.

1.4 SUBMITTALS

A. Submittal requirements shall be in accordance with Section 270000-Common Work for Telecommunications Systems.

B. Upon completion of the installation, the telecommunications contractor shall provide three (3) full documentation sets to the Engineer for approval. Documentation shall include the items detailed in the sub-sections below.

C. Documentation shall be submitted within ten (10) working days of the completion of each testing phase. This is inclusive of all test results and draft as-built drawings. Draft drawings may include annotations done by hand. Machine generated (final) copies of all drawings shall be submitted within 30 working days of the completion of each testing phase. At the request of the Engineer, the telecommunications contractor shall provide copies of the original test results.

D. Maryland Aviation Administration Office of Technology may do a 10% random field re-test be conducted on the cable system, at no additional cost, to verify documented findings. Tests shall be a repeat of those defined above. If findings contradict the documentation submitted by the telecommunications contractor, additional testing can be requested to the extent determined necessary by the Engineer, including a 100% re-test. This re-test shall be at no additional cost to the Owner.

E. Test Results documentation shall be provided on disk within three weeks after the completion of the project. The disk shall be clearly marked on the outside front cover with the words “Project Test Documentation”, the project name, and the date of completion (month and year). The results shall include a record of test frequencies, cable type, conductor pair and cable (or outlet) I.D., measurement direction, reference setup, and crew member name(s). The test equipment name, manufacturer, model number, serial number, software version and last calibration date will also be provided

at the end of the document. Unless the manufacturer specifies a more frequent calibration cycle, an annual calibration cycle is anticipated on all test equipment used for this installation. The test document shall detail the test method used and the specific settings of the equipment during the test as well as the software version being used in the field test equipment.

F. The field test equipment shall meet the requirements of ANSI/TIA/EIA-568-B including applicable TSB's and amendments. The appropriate level IV tester shall be used to verify Category 6 cabling systems.

G. Printouts generated for each cable by the wire (or fiber) test instrument shall be submitted as part of the documentation package. Alternately, the telecommunications contractor may furnish this information in electronic form (compact disc). These discs shall contain the electronic equivalent of the test results as defined by the bid specification and be of a format readable from Microsoft Word or Microsoft Excel.

H. When repairs and re-tests are performed, the problem found and corrective action taken shall be noted, and both the failed and passed test data shall be documented.

I. The As-Built drawings are to include cable routes and outlet locations. Their sequential number as defined elsewhere in this document shall identify outlet locations. Numbering, icons, and drawing conventions used shall be consistent throughout all documentation provided. The Owner will provide floor plans in paper and electronic (DWG, AutoCAD) formats on which as-built construction information can be added. These documents will be modified accordingly by the telecommunications contractor to denote as-built information as defined above and returned to the Owner. Numbering, icons, pathways and other drawing conventions are to be assigned their own individual AutoCAD layer.

J. The Contractors shall annotate the base drawings and return a hard copy (same plot size as originals) and electronic (AutoCAD) form. In addition, for all cable runs that pass in or thru a manhole or hand hole, the contractor will provide digital photos of the attached label and entrance in and out of the duct system.

1.5 QUALITY ASSURANCE

A. The successful vendor shall meet or exceed all requirements for the cable system described in this document.

PART 2 – PRODUCTS

2.1 EQUIPMENT

A. Provide all labor, materials, tools and equipment required for the complete installation of work called for in the Construction Documents.

B. All cables and related terminations, support and grounding hardware shall be furnished, installed, wired, tested, labeled, and documented by the telecommunications contractor as detailed in this document.

C. Copper UTP Cable

1. Recommended design shall include:

a. Minimum 2 Four-pair 100 ohm 24 AWG, UTP cable—Category 6 for voice
b. Minimum 2 Four-pair 100 ohm, 24/23 AWG, UTP cable—Category 6 for data
c. Maximum cable length is 90 meters
d. All cable shall meet or exceed the following specifications

2. The Copper Cable shall be used for the horizontal cabling subsystem. These requirements are for cables of unshielded 24 AWG bare copper conductors, insulated with thermoplastic, twisted into pairs and enclosed in a thermoplastic jacket. The finished cable shall meet or exceed the following requirements of ANSI/EIA/TIA-568-B.

3. All cable shall conform to the requirements for communications circuits defined by the National Electrical Code (Article 800) and the Canadian Building Code. Cable listed to NEC Article 800-51(a) will be used for “Plenum” installations and carry labeling of CMP. Cable listed to NEC Article 800-51(b) shall be installed in vertical runs penetrating more than one floor and carry the labeling of CMR.

4. These specifications are for cable that will meet or exceed the requirements of ANSI/TIA/EIA Category 6 Cabling.

5. All cable shall conform to the requirements for communications circuits defined by the National Electrical Code (Article 800) and the Canadian Building Code. Cable listed to NEC Article 800-51(a) will be used for “Plenum” installations and carry labeling of CMP. Cable listed to NEC Article 800-51(b) shall be installed in vertical runs penetrating more than one floor and carry the labeling of CMR.

D. Fiber Cable

1. When using optical fiber cables, any length of horizontal cables, work area cables, patch cords, and equipment cables is acceptable so long as the total of the combined lengths does not exceed 100m (328 ft). When installing per TSB72, the maximum centralized cable length may not exceed 300m (984 ft.).

2. ANSI/TIA/EIA-568-B.3 Horizontal fiber cable distribution systems:
   a. The optical fiber cable shall consist of a minimum of two 62.5/125µm optical fibers enclosed by a protective sheath
   b. The cable will be capable of supporting applications using a bandwidth in excess of 1 GHz over the 85 m specified for horizontal cabling
   c. The optical fiber shall be multimode, graded-index with a nominal 62.5/125µm core/cladding diameter
   d. The mechanical and environmental specification for the optical fiber cable will be in accordance with ANSI/ICEA-S-83-596

62.5/125µm optical fiber

Wavelength (nm)	Maximum Attenuation (dB/km)	Minimum Information Transmission Capacity (MHz•km)
850	3.5	500
1300	1.5	500

PART 3 – EXECUTION

3.1 INSTALLATION

A. The Communication Equipment Room shall support a minimum of (4) 4-pair Unshielded Twisted Pair (UTP) Copper Cables to each work area outlet unless otherwise noted for specific locations. The cables shall be installed from the Work Area Outlet to the Telecommunications Room (TR) located on the same floor, and routed to the appropriate rack serving that area and terminated as specified in this document.

B. Horizontal Distribution Cable Installation

1. Cable shall be installed in accordance with manufacturer's recommendations and best industry practices.

2. A pull cord (nylon; 1/8" minimum) shall be co-installed with all cable installed in any conduit.

3. Cable raceways shall not be filled greater than the TIA/EIA-569-A maximum fill for the particular raceway type or 40%.

4. Cables shall be installed in continuous lengths from origin to destination (no splices) except for transition points, or consolidation points.

5. Where transition points or consolidation points are allowed, they shall be located in accessible locations and housed in an enclosure intended and suitable for the purpose.

6. The cable's minimum bend radius and maximum pulling tension shall not be exceeded.

7. If a J-hook or trapeze system is used to support cable bundles all horizontal cables shall be supported at a maximum of 48 to 60 inch (1.2 to 1.5 meter) intervals. At no point shall cable(s) rest on acoustic ceiling grids or panels.

8. Horizontal distribution cables shall be bundled in groups of no more than 50 cables. Cable bundle quantities in excess of 50 cables may cause deformation of the bottom cables within the bundle and degrade cable performance.

9. Cable shall be installed above fire-sprinkler systems and shall not be attached to the system or any ancillary equipment or hardware. The cable system and support hardware shall be installed so that it does not obscure any valves, fire alarm conduit, boxes, or other control devices.

10. Cables shall not be attached to ceiling grid or lighting fixture wires. Where support for horizontal cable is required, the contractor shall install appropriate carriers to support the cabling.

11. Any cable damaged or exceeding recommended installation parameters during installation shall be replaced by the contractor prior to final acceptance at no cost to the Owner.

12. Cables shall be identified by a self-adhesive label in accordance with the System Documentation Section of this specification and ANSI/TIA/EIA-606. The cable label shall be applied to the cable behind the faceplate on a section of cable that can be accessed by removing the cover plate.

13. Unshielded twisted pair cable shall be installed so that there are no bends smaller than four times the cable outside diameter at any point in the run and at the termination field.

14. Pulling tension on 4-pair UTP cables shall not exceed 25-lbf for a four-pair UTP cable.

C. Horizontal Cross Connect Installation

1. Cables shall be dressed and terminated in accordance with the recommendations made in the TIA/EIA-568-B standard, manufacturer's recommendations and best industry practices.

2. Pair untwist at the termination shall not exceed 0.5 inch).

3. Bend radius of the cable in the termination area shall not exceed 4 times the outside diameter of the cable.

4. Cables shall be neatly bundled not more than 48 cables per and dressed to their respective panels or blocks. Each panel or block shall be fed by an individual bundle separated and dressed back to the point of cable entrance into the rack or frame.

5. The cable jacket shall be maintained as close as possible to the termination point.

6. Each cable shall be clearly labeled on the cable jacket behind the patch panel at a location that can be viewed without removing the bundle support ties. Cables labeled within the bundle, where the label is obscured from view shall not be acceptable.

D. Optical Fiber Termination Hardware

1. Fiber slack shall be neatly coiled within the fiber splice tray or enclosure. No slack loops shall be allowed external to the fiber panel.

2. Each cable shall be individually attached to the respective fiber enclosure by mechanical means. The cables strength member shall be securely attached the cable strain relief bracket in the enclosure.

3. Each fiber bundle not more than 48 cables per shall be stripped upon entering the splice tray and the individual fibers routed in the splice tray.

4. Each cable shall be clearly labeled at the entrance to the splice enclosure. Cables labeled within the bundle shall not be acceptable.

5. A maximum of 12 strands of fiber shall be spliced in each tray

6. All spare strands shall be installed into spare splice trays.

E. Copper Termination Hardware

1. Cables shall be dressed and terminated in accordance with the recommendations made in the ANSI/TIA/EIA-568-B standard, manufacturer's recommendations and best industry practice.

2. Pair untwist at the termination shall not exceed 3.18mm 0.5 inch).

3. Bend radius of the cable in the termination area shall not exceed 4 times the outside diameter of the cable.

4. Cables shall be neatly bundled and dressed to their respective panels or blocks. Each panel or block shall be fed by an individual bundle separated and dressed back to the point of cable entrance into the rack or frame.

5. The cable jacket shall be maintained to within 25 mm (one inch) of the termination point.

6. Each cable shall be clearly labeled on the cable jacket behind the patch panel at a location that can be viewed without removing the bundle support Velcro ties. Cables labeled within the bundle, where the label is obscured from view shall not be acceptable.

3.2 TESTING

A. General

1. All cables and termination hardware shall be 100% tested for defects in installation and to verify cabling system performance under installed conditions according to the requirements of ANSI/TIA/EIA-568-B, TSB-67 and TSB-155. All pairs of each installed cable shall be verified prior to system acceptance. Any defect in the cabling system installation including but not limited to cable, connectors, feed through couplers, patch panels, and connector blocks shall be repaired or replaced in order to ensure 100% useable conductors in all cables installed.

2. All cables shall be tested in accordance with this document, the ANSI/TIA/EIA standards.

B. Copper Link Testing

1. All twisted-pair copper cable links shall be tested for continuity, pair reversals, shorts, opens and performance as indicated below. Additional testing is required to verify Category performance. Horizontal cabling shall be tested using a level IV test unit for category 6 or category 6 performance compliance, respectively.

2. Continuity - Each pair of each installed cable shall be tested using a test unit that shows opens, shorts, polarity and pair-reversals, crossed pairs and split pairs. Shielded/screened cables shall be tested with a device that verifies shield continuity in addition to the above stated tests. The test shall be recorded as pass/fail as indicated by the test unit in accordance with the manufacturers' recommended procedures, and referenced to the appropriate cable identification number and circuit or pair number. Any faults in the wiring shall be corrected and the cable re-tested prior to final acceptance.

3. Length - Each installed cable link shall be tested for installed length using a TDR type device. The cables shall be tested from patch panel to patch panel, block to block, patch panel to outlet or block to outlet as appropriate. The cable length shall conform to the maximum distances set forth in the ANSI/TIA/EIA-568-B Standard. Cable lengths shall be recorded, referencing the cable identification number and circuit or pair number. For multi-pair cables, the shortest pair length shall be recorded as the length for the cable.

4. A level IV or a better test unit is required to verify category 6 performance and must be updated to include the requirements of TSB-155.

5. The four basic tests required in TSB-67 are:

    a. Wire Map
    b. Length
    c. Attenuation
    d. NEXT (Near end crosstalk)

6. Four additional tests are required per TSB-95:

    a. Return Loss
    b. ELFEXT Loss
    c. Propagation Delay
    d. Delay skew

7. Two additional tests are required:
    a. PSNEXT (Power sum near-end crosstalk loss)
    b. PSELFEXT (Power sum equal level far-end crosstalk loss)

C. Fiber Testing

1. All fiber testing shall be performed on all fibers in the completed end-to-end system. There shall be no splices unless clearly defined in an RFP. Testing shall consist of an end-to-end power meter test performed per TIA/EIA-455-53A. The system loss measurements shall be provided at 850 and/or 1300 nanometers for multimode fibers and 1310 and/or 1550 nanometers for single mode fibers. These tests also include continuity checking of each fiber.

2. For horizontal cabling system using multimode optical fiber, attenuation shall be measured in one direction at either 850 nanometer (nm) or 1300 nm using an LED light source and power meter.

3. Backbone multimode fiber cabling shall be tested at both 850 nm and 1300 nm (or 1310 and 1550 nm for singlemode) in both directions.

4. Test set-up and performance shall be conducted in accordance with ANSI/TIA/EIA-526-14 Standard, Method B.

5. Where links are combined to complete a circuit between devices, the Contractor shall test each link from end to end to ensure the performance of the system. ONLY BASIC LINK TEST IS REQUIRED. The contractor can optionally install patch cords to complete the circuit and then test the entire channel. The test method shall be the same used for the test described above. The values for calculating loss shall be those defined in the ANSI/TIA/EIA Standard.

6. Attenuation testing shall be performed with a stable launch condition using two-meter jumpers to attach the test equipment to the cable plant. The light source shall be left in place after calibration and the power meter moved to the far end to take measurements.

END OF SECTION 271519-TC

271543 - FACEPLATES AND CONNECTORS FOR TELECOMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including Maryland Department of Transportation/Maryland Aviation Administration Standard Provisions for Construction Contracts Volume 1, Maryland State Highway Administration, Anne Arundel County and Interim Standard Addenda; and other Division 01 Specification sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Descriptions of the products and execution requirements relating to furnishing and installing faceplates and connectors. Communications faceplates and connectors are covered under this document

2. This section includes minimum requirements for the following:

   a. Faceplates
   b. Copper patch cords and modular connectors
   c. Fiber optic patch cords and modular connectors

3. Product specifications, general design considerations, and installation guidelines are provided in this document. Quantities of telecommunications outlets, typical installation details, cable routing and outlet types will be provided as an attachment to this document.

1.3 SUBMITTALS

A. Submittal requirements shall be in accordance with section 270000-Common Work for Telecommunications Systems.

B. Upon completion of the installation, the telecommunications contractor shall provide documentation sets to the Maryland Aviation Administration Office of Technology (MAA/OT) for approval. Documentation shall include the items detailed in the sub-sections below.

C. Documentation shall be submitted within ten (10) working days of the completion of each testing phase. This is inclusive of all test results and draft as-built drawings. Draft drawings may include annotations done by hand. Machine generated (final) copies of all drawings shall be submitted within 30 working days of the completion of each

testing phase. At the request of the Engineer, the telecommunications contractor shall provide copies of the original test results.

D. MAA/OT may do a 10% random field re-test be conducted on the cable system, at no additional cost, to verify documented findings. Tests shall be a repeat of those defined above. If findings contradict the documentation submitted by the telecommunications contractor, additional testing can be requested to the extent determined necessary by the Engineer, including a 100% re-test. This re-test shall be at no additional cost to the Owner.

E. Testing:

1. Test Results documentation shall be provided on disk within three weeks after the completion of the project. The disk shall be clearly marked on the outside front cover with the words "Project Test Documentation", the project name, and the date of completion (month and year). The results shall include a record of test frequencies, cable type, conductor pair and cable (or outlet) I.D., measurement direction, reference setup, and crew member name(s). The test equipment name, manufacturer, model number, serial number, software version and last calibration date will also be provided at the end of the document. Unless the manufacturer specifies a more frequent calibration cycle, an annual calibration cycle is anticipated on all test equipment used for this installation. The test document shall detail the test method used and the specific settings of the equipment during the test as well as the software version being used in the field test equipment.

2. The field test equipment shall meet the requirements of ANSI/TIA/EIA-568-B including applicable TSB's and amendments. The appropriate level IV tester shall be used to verify Category 6 cabling systems.

3. Printouts generated for each cable by the wire (or fiber) test instrument shall be submitted as part of the documentation package. Alternately, the telecommunications contractor may furnish this information in electronic form (compact disc). These discs shall contain the electronic equivalent of the test results as defined by the bid specification and be of a format readable from Microsoft Word or Microsoft Excel.

4. When repairs and re-tests are performed, the problem found and corrective action taken shall be noted, and both the failed and passed test data shall be documented.

E. The As-Built drawings are to include cable routes and outlet locations. Their sequential number as defined elsewhere in this document shall identify outlet locations. Numbering, icons, and drawing conventions used shall be consistent throughout all documentation provided. The Owner will provide floor plans in paper and electronic (DWG, AutoCAD) formats on which as-built construction information can be added. These documents will be modified accordingly by the telecommunications contractor to denote as-built information as defined above and

returned to the Owner. Numbering, icons, pathways and other drawing conventions are to be assigned their own individual AutoCAD layer.

1.4 REFERENCES

A. The following industry standards are the basis for the structured cabling system described in this document.

TIA/EIA

TIA/EIA-568-B	Commercial Building Telecommunications Cabling Standard
TIA/EIA-569-A	Commercial Building Standard for Telcom Pathways
TIA/EIA-606	Administration Standard for the Telecommunications Infrastructure of Commercial Buildings
TIA/EIA-607	Commercial Building Grounding/Bonding Requirements

NFPA

NFPA-70	National Electric Code (NEC)-1999

ISO/IEC

ISO/IEC 11801	Generic Cabling for Customer Premises

B. Conflicts:

1. The most recent versions of all documents apply to this project. If there is a conflict between applicable documents, the order above shall dictate the order of precedence in resolving the issue unless an enforceable local or national code is in effect.

1.5 QUALITY ASSURANCE

A. The successful vendor shall meet or exceed all requirements for the cable system described in this document.

PART 2 - PRODUCTS

2.1 EQUIPMENT

A. Provide all labor, materials, tools and equipment required for the complete installation of work called for in the Construction Documents

B. All cables and related terminations, support and grounding hardware shall be furnished, installed, wired, tested, labeled, and documented by the telecommunications contractor as detailed in this document.

C. Equivalent Products

1. All outlets shall utilize fully the interchangeable and individual connector modules that mount side by side to facilitate quick and easy moves, adds and changes. All outlets and surface mount boxes shall be available in four colors including Off White (IW),

D Faceplates

1. Faceplates shall be one, two, and four single gang faceplates with combination head screws, screw covers, labels, label covers. The faceplates shall mount to standard U.S. NEMA boxes and adapters with screw-to-screw dimensions of 3.28" (83.3mm).

2. Patch Cords and Modular Connectors - Copper

a. Patch cables are to be provided by contractor, color specified by OT.

3. Patch Cords and Modular Connectors – Fiber Optic

a. Patch cables are to be provided by contractor, color specified by OT.

PART 3 - EXECUTION

3.1 INSTALLATION

A. The Communication Equipment Room shall support a minimum of (4) 4-pair Unshielded Twisted Pair (UTP) Copper Cables to each work area outlet unless otherwise noted for specific locations. The cables shall be installed from the Work Area Outlet to the Telecommunications Room (TR) located on the same floor, and routed to the appropriate rack serving that area and terminated as specified in this document.

B. Faceplate Configurations

1. Faceplates are to be a four position unless a requirement for more than four positions is needed. Color of faceplate is to match color specified by MAA/OT for specific location.
2. Wall phone Faceplate. Provide a wall-mounted flush modular faceplate to house a single work area jack. The faceplate shall fit over a standard NEMA dual gang electrical outlet box fitted with a single gang plaster ring cover and shall be stainless steel. The faceplate shall be capable of having a wall-mounted telephone fitted directly over it.
3. Furniture Faceplate. Provide a flush-mounted modular faceplate to house work area jacks, capable of housing a minimum of two jacks. The faceplate shall fit into a modular furniture raceway.

    a. Provide (4) Category 6. Two (2) blue jacket for Data, and two (2) white for Voice distribution cables running from each outlet back to the specified patch panel in the Communications Room (Distribution Frame) using the cable tray and conduit infrastructure.

    b. Terminate each Category 6 (Cat-6) distribution cable at each end on specified jack using the 568B wiring scheme.

    c. Face plates, jacks, labels and icons should be Ortronics Clarity series Cat 6 or approved equal. Primary voice jack should be Gray (-78) secondary jack should be Black (-00), faceplate should be Fog White. Primary data jack should be Red (-42) secondary jack should be Yellow (-44) faceplate should be Fog White.

C. Horizontal Distribution Cable Installation

1. Cable shall be installed in accordance with manufacturer’s recommendations and best industry practices.

2. A pull cord (nylon; 1/8" minimum) shall be co-installed with all cable installed in any conduit.

3. Cable raceways shall not be filled greater than the TIA/EIA-569-A maximum fill for the particular raceway type or 40% whichever is greater.

4. Cables shall be installed in continuous lengths from origin to destination (no splices) except for transition points, or consolidation points.

5. Where transition points or consolidation points are allowed, they shall be located in accessible locations and housed in an enclosure intended and suitable for the purpose.

6. The cable's minimum bend radius and maximum pulling tension shall not be exceeded.

7. If a J-hook or trapeze system is used to support cable bundles all horizontal cables shall be supported at a maximum of 48 to 60 inch (1.2 to 1.5 meter) intervals. At no point shall cable(s) rest on acoustic ceiling grids or panels.

8. Horizontal distribution cables shall be bundled in groups of no more than 50 cables. Cable bundle quantities in excess of 50 cables may cause deformation of the bottom cables within the bundle and degrade cable performance.

9. Cable shall be installed above fire-sprinkler systems and shall not be attached to the system or any ancillary equipment or hardware. The cable system and support hardware shall be installed so that it does not obscure any valves, fire alarm conduit, boxes, or other control devices.

10. Cables shall not be attached to ceiling grid or lighting fixture wires. Where support for horizontal cable is required, the contractor shall install appropriate carriers to support the cabling.

11. Any cable damaged or exceeding recommended installation parameters during installation shall be replaced by the contractor prior to final acceptance at no cost to the Owner.

12. Cables shall be identified by a self-adhesive label in accordance with the System Documentation Section of this specification and ANSI/TIA/EIA-606. The cable label shall be applied to the cable behind the faceplate on a section of cable that can be accessed by removing the cover plate.

13. Unshielded twisted pair cable shall be installed so that there are no bends smaller than four times the cable outside diameter at any point in the run and at the termination field.

14. Pulling tension on 4-pair UTP cables shall not exceed 25-lbf for a four-pair UTP cable.

D. Horizontal Cross Connect Installation

1. Cables shall be dressed and terminated in accordance with the recommendations made in the TIA/EIA-568-B standard, manufacturer's recommendations and best industry practices.

2. Pair untwist at the termination shall not exceed 3.18 mm (0.5 inch).

3. Bend radius of the cable in the termination area shall not exceed 4 times the outside diameter of the cable.

4. Cables shall be neatly bundled and dressed to their respective panels or blocks. Each panel or block shall be fed by an individual bundle separated and dressed back to the point of cable entrance into the rack or frame.

5. The cable jacket shall be maintained as close as possible to the termination point.

6. Each cable shall be clearly labeled on the cable jacket behind the patch panel at a location that can be viewed without removing the bundle support ties. Cables labeled within the bundle, where the label is obscured from view shall not be acceptable.

E. Optical Fiber Termination Hardware

1. Fiber slack shall be neatly coiled within the fiber splice tray or enclosure. No slack loops shall be allowed external to the fiber panel.

2. Each cable shall be individually attached to the respective fiber enclosure by mechanical means. The cables strength member shall be securely attached the cable strain relief bracket in the enclosure.

3. Each fiber bundle shall be stripped upon entering the splice tray and the individual fibers routed in the splice tray.

4. Each cable shall be clearly labeled at the entrance to the splice enclosure. Cables labeled within the bundle shall not be acceptable.

5. A maximum of 12 strands of fiber shall be spliced in each tray

6. All spare strands shall be installed into spare splice trays.

F. Copper Termination Hardware

1. Cables shall be dressed and terminated in accordance with the recommendations made in the ANSI/TIA/EIA-568-B standard, manufacturer's recommendations and best industry practice.

2. Pair untwist at the termination shall not exceed 3.18mm (0.5 inch).

3. Bend radius of the cable in the termination area shall not exceed 4 times the outside diameter of the cable.

4. Cables shall be neatly bundled and dressed to their respective panels or blocks. Each panel or block shall be fed by an individual bundle separated and dressed back to the point of cable entrance into the rack or frame.

5. The cable jacket shall be maintained to within 25 mm (one inch) of the termination point.

6. Each cable shall be clearly labeled on the cable jacket behind the patch panel at a location that can be viewed without removing the bundle support ties. Cables labeled within the bundle, where the label is obscured from view shall not be acceptable.

G. Identification and Labeling

1. The contractor shall develop and submit for approval a labeling system for the cable installation. The Owner will negotiate an appropriate labeling scheme with the successful contractor. At a minimum, the labeling system shall clearly identify all components of the system: racks, cables, panels and outlets. The labeling system shall designate the cables origin and destination and a unique identifier for the cable within the system. Racks and patch panels shall be labeled to identify the location within the cable system infrastructure. All labeling information shall be recorded on the as-built drawings and all test documents shall reflect the appropriate labeling scheme.

2. All label printing will be machine generated. Self-laminating labels will be used on cable jackets, appropriately sized to the OD of the cable, and placed within view at the termination point on each end. Outlet, patch panel and wiring block labels shall be installed on, or in, the space provided on the device.

3.2 TESTING

A. General

1. All cables and termination hardware shall be 100% tested for defects in installation and to verify cabling system performance under installed conditions according to the requirements of ANSI/TIA/EIA-568-B, TSB-67 and TSB-155. All pairs of each installed cable shall be verified prior to system acceptance. Any defect in the cabling system installation including but not limited to cable, connectors, feed through couplers, patch panels, and connector blocks shall be repaired or replaced in order to ensure 100% useable conductors in all cables installed.

2. All cables shall be tested in accordance with this document, the ANSI/TIA/EIA standards. If any of these are in conflict, the Contractor shall bring any discrepancies to the attention of the project team for clarification and resolution.

B. Copper Channel Testing

1. All twisted-pair copper cable links shall be tested for continuity, pair reversals, shorts, opens and performance as indicated below. Additional testing is required

to verify Category performance. Horizontal cabling shall be tested using a level IV test unit for category 6 or category 6 performance compliance, respectively.

2. Continuity - Each pair of each installed cable shall be tested using a test unit that shows opens, shorts, polarity and pair-reversals, crossed pairs and split pairs. Shielded/screened cables shall be tested with a device that verifies shield continuity in addition to the above stated tests. The test shall be recorded as pass/fail as indicated by the test unit in accordance with the manufacturers' recommended procedures, and referenced to the appropriate cable identification number and circuit or pair number. Any faults in the wiring shall be corrected and the cable re-tested prior to final acceptance.

3. Length - Each installed cable link shall be tested for installed length using a TDR type device. The cables shall be tested from patch panel to patch panel, block to block, patch panel to outlet or block to outlet as appropriate. The cable length shall conform to the maximum distances set forth in the ANSI/TIA/EIA-568-A Standard. Cable lengths shall be recorded, referencing the cable identification number and circuit or pair number. For multi-pair cables, the shortest pair length shall be recorded as the length for the cable.

4. The four basic tests required in TSB-67 are:

    a. Wire Map
    b. Length
    c. Attenuation
    d. NEXT (Near end crosstalk)

5. Four additional tests are required per TSB-155:

    a. Return Loss
    b. ELFEXT Loss
    c. Propagation Delay
    d. Delay skew

6. In Amendment 5, two additional tests are required:

    a. PSNEXT (Power sum near-end crosstalk loss)
    b. PSELFEXT (Power sum equal level far-end crosstalk loss)

C. Fiber Testing

1. All fiber testing shall be performed on all fibers in the completed end-to-end system. There shall be no splices unless clearly defined in an RFP. Testing shall consist of an end-to-end power meter test performed per TIA/EIA-455-53A. The system loss measurements shall be provided at 850 and/or 1300 nanometers for

multimode fibers and 1310 and/or 1550 nanometers for single mode fibers. These tests also include continuity checking of each fiber.

2. For horizontal cabling system using multimode optical fiber, attenuation shall be measured in one direction at either 850 nanometer (nm) or 1300 nm using an LED light source and power meter.

3. Backbone multimode fiber cabling shall be tested at both 850 nm and 1300 nm (or 1310 and 1550 nm for single mode) in one direction.

4. Test set-up and performance shall be conducted in accordance with ANSI/TIA/EIA-526-14 Standard, Method B.

5. Where links are combined to complete a circuit between devices, the Contractor shall test each link from end to end to ensure the performance of the system. ONLY BASIC LINK TEST IS REQUIRED. The contractor can optionally install patch cords to complete the circuit and then test the entire channel. The test method shall be the same used for the test described above. The values for calculating loss shall be those defined in the ANSI/TIA/EIA Standard.

6. Attenuation testing shall be performed with a stable launch condition using two-meter jumpers to attach the test equipment to the cable plant. The light source shall be left in place after calibration and the power meter moved to the far end to take measurements.

END OF SECTION 271543-TC

275116-TC PA AND EMERGENCY TENANT PAGING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including Maryland Department of Transportation/Maryland Aviation Administration Standard Provisions for Construction Contracts Volume 1, December 1993; Interim Standard Provisions Addendum (ISPA) dated February 2004; Errata for ISPA; and other Division 1 Specifications Sections, apply to this Section.

1.2 SUMMARY

A. This section includes general requirements for modifications to the existing Public Address (PA) system and to the Emergency Tenant Paging System.

1.3 SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Reflected ceiling plans showing proposed and existing speaker locations.

C. Shop Drawings:

1. Dimensioned plans and sections or elevation layouts.

2. Wiring Diagrams: Power, signal, and control wiring specific to this Project. Identify terminals and wiring designations and color codes to facilitate installation, operation, and maintenance. Indicate recommended types, wire sizes, and circuiting arrangements for field-installed wiring, and show circuit protection features.

3. Speaker locations, placement of ambient microphones and zone boundaries must be approved by OT Engineer.

4. General design guidance for speaker placement is every 12 feet.

5. The OT Engineer shall assign Paging Access Point (PAP) for terminus of all facilities.

1.4 QUALITY ASSURANCE

A. All equipment and installation methods shall be in accordance with recommendations from Washington Professional Systems (WPS), who is the current sole source PA system provider. The local WPS contact is Dave Leister at 301-370-4746. davel@wpsworld.com. The Contractor is responsible for contacting this organization and including all associated cost in the bid price.

B. A copy of all correspondence, task orders, work orders with WPS shall be also provided to the OT Engineer.

C. OT Engineer shall approve all work prior to work being performed.

D. Additional system design shall be performed by WPS.

1.5 PROJECT CONDITIONS

A. Interruption of Existing Service: Do not interrupt PA system service to facilities occupied by Owner or others unless permitted under the following conditions:

1. Notify the OT Engineer and Fire Marshal no fewer than ~~two weeks~~ 72 hours in advance of proposed interruption of PA system service.

2. Do not proceed with interruption of PA system service without written permission.

B. Emergency Evacuation Paging must remain operational at all times.

If service disruption is required notify the Fire Marshal and the OT Engineer. Approval must be in writing.

1.6 COORDINATION

A. Coordinate all PA system work with the OT Engineer and WPS.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. The existing Public Address System is manufactured by Innovated Electronics Designs, Inc.; therefore, all PA system equipment shall be exclusively by Innovated Electronics Design, Inc., only, unless noted otherwise. There will be “No Exceptions Allowed”.

All other substituted products shall be submitted and approved by the OT Engineer with input from WPS.

2.2 EQUIPMENT

A. All equipment shall be in accordance with recommendations from WPS. Refer to the Drawings for equipment supplier and installation requirements.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Conductors

1. Wire and cabling shall be as recommended by WPS and all wire and cabling shall be installed in an enclosed conduit ~~and~~ or raceway system.

2. Microphone cabling shall be WP 452 or Beldon 8451 cable shall be used for all microphone cabling.

3. Microphone and speaker wire shall not be run in the same conduit.

4. Microphone cabling shall not be spliced.

5. After installation and before termination, all wiring and cabling shall be checked and tested to insure there are no grounds, opens or shorts on any conductors or shields.

6. Visually inspect wire for faulty insulation prior to installation. Protect cable ends at all times with acceptable end caps except during termination.

7. Connection of new work to existing work or equipment must be performed by WPS.

8. During construction if existing work must be removed/disconnected this work shall be performed by WPS.

9. Installation of conductors shall comply with any of the methods listed in NFPA 72 Chapters 6.9.10.4.1, 4.2 and 4.3 for survivability. Coordination with WPS is essential to insure conductor compatibility with system components.

B. Field Quality Control

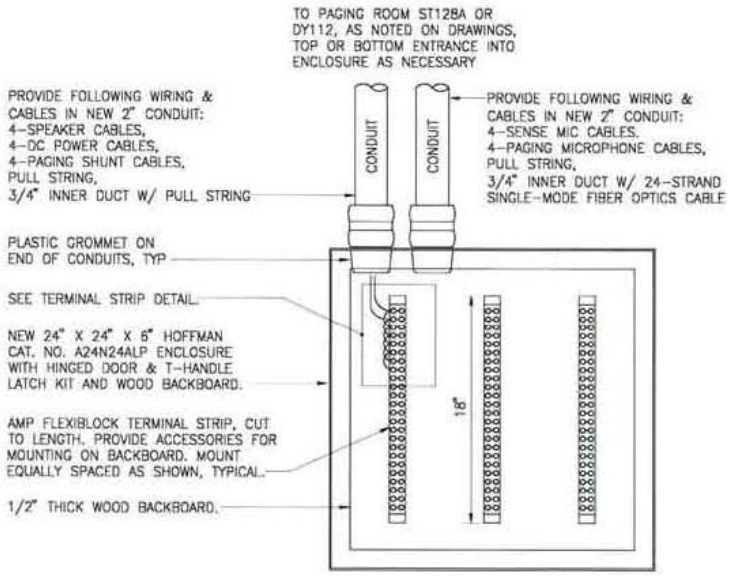
1. Coordinate all final terminations to PA system equipment with WPS.

2. Perform all tests on new conductors prior to contacting WPS.

3. Coordinate all final equipment and system testing and demonstration with WPS, OT Engineer and the Fire Marshal.

4. All connection points to the PA system shall be at existing Paging Access Points (PAP). If insufficient facilities exist, the current facilities shall be expanded to accommodate new work or the creation of a new PAP shall be created at the sole discretion of the OT Engineer.

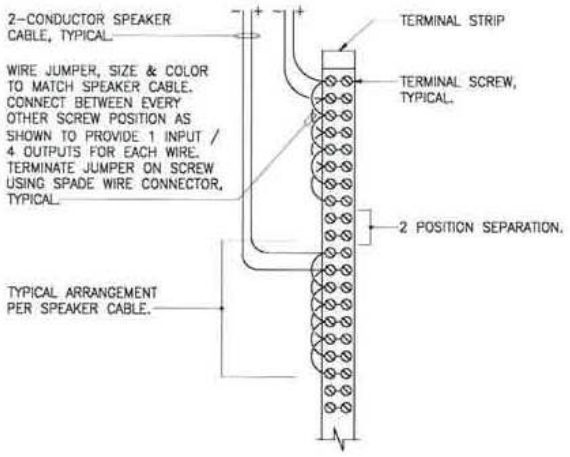
PAP Typical



NEW EMERGENCY PAGING ACCESS POINT (PAP)
(PAGING ENCLOSURE IN COMM RM) DETAIL
NOT TO SCALE

NOTES:

1. PROVIDE CONDUITS AND WIRES/CABLES (AS NOTED IN DETAIL ABOVE) FROM EACH PAP TO PAGING ROOM ST128A OR DY112 (AS NOTED ON DRAWINGS).
2. ROUTE SENSE MIC AND MICROPHONE CABLES TOGETHER, BUT SEPARATE FROM ALL OTHER CABLES, AS NOTED IN DETAIL ABOVE.
3. **SPEAKER AND SENSE MIC HOMERUNS AS SHOWN IN CORRIDORS ARE TO BE ROUTED TO PAP AS NOTED. PROVIDE SPEAKER AND SENSE MIC CABLES AS NOTED ON PLAN SHEETS, IN ADDITIONAL TO THOSE NOTED IN DETAIL ABOVE. PROVIDE ADDITIONAL CONDUITS AS NECESSARY FOR THESE CORRIDOR CIRCUITS, IN ADDITIONAL TO THESE TWO CONDUITS SHOWN IN DETAIL ABOVE.**



TERMINAL STRIP DETAIL
NOT TO SCALE

3.2 START UP SERVICE

A. Engage WPS to perform all equipment startup and system programming. Contractor shall coordinate and be on-site for all startup functions.

3.3 DEMONSTRATION

A. Engage WPS to demonstrate proper operation of all PA system equipment.

END OF SECTION 275116-TC

BUILDING AUTOMATION SYSTEMS SPECIFICATIONS

MARTIN STATE AIRPORT

BWI BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

The following language shall be used when specifying Air Flow Measuring Systems (AFM/AFMS). Provide air flow measuring system on supply and/or return ducts with the following features and specifications. Coordinate with Meters and Gages, section 230519.

1.1 AFM/AFMS

A. Air flow measuring system shall be thermal dispersion type, Ebtron, Gold Series (GP1) or equal.

1. Air flow measuring system operates based on the rate of heat transfer across the heated elements.

2. Sensor probes shall use two "bead-in-glass" thermistors to determine the airflow rate at each sensing point location. Probes shall be connected to a transmitter to calculate individual airflow prior to averaging and output to local DDC panels.

1.2 TECHNICAL SPECIFICATIONS

A. Sensor Accuracy:

1. Airflow Rate: ± 2% of reading, ± 0.25% repeatability.

2. Temperature: ± 0.15° F.

B. Sensor Ranges:

1. Airflow Velocity: 0 to 5,000 FPM.

C. Sensor Distribution:

1. Equal area.

D. Sensor Assembly (Each Sensing Point):

1. Heated Element: One bead-in-glass, hermetically sealed, thermistor probe.

2. Sensor Housing: Glass-filled polypropylene.

3. Sensor Potting Material: Marine grade, waterproof epoxy.

4. Internal Wiring: Kynar® coated copper.

E. Duct Sizes:

1. Standard: 8 inch to 120 inch.

F. Tube Construction:

1. Aluminum: Gold anodized, 6063 aluminum alloy.

2. Stainless Steel: 315 polished stainless steel.

3. Nominal Tube Diameter: 1.1 inch (aluminum), 1.125 inch (316 ss).

4. Mounting Brackets: 304 stainless steel.

5. Mounting Styles: Insertion, internal or standoff.

G. Cable Assembly:

1. Type: UL® plenum rated, PVC jacket.

2. Length: 10 feet (std.), 50 feet max.

3. Termination: 0.875 inch plug (transmitter end), gold plated pins.

H. Compatible Transmitters:

1. GTA 116, GTN116, GTE116, and GRL116.

I. Listings:

1. UL® 873 airflow & temperature indicating devices.

J. Warranty:

1. 36 months from shipment.

The following language shall be used when specifying Flow Meters. Designs shall specify turbine type flow meters on hydronic piping system. Coordinate with Meters and Gages, Section 230519.

1.1 TURBINE FLOWMETERS

A. Description: Insertion type; measures flow directly in gallons per minute (liters per second).

1. Construction: Bronze or stainless-steel body and plastic turbine or impeller. Wetted metal Parts: 316 stainless steel.

2. Pressure Rating: 400 psig minimum [600 psig for High Temperature Hot Water (HTHW)].

3. Temperature Rating: 200 degrees F minimum (400 degrees for HTHW).

4. Display: Visual instantaneous rate of flow, with register to indicate total volume in gallons (liters).

5. Accuracy: Plus or minus 2-1/2 percent.

6. Sensing Method: Impedance sensing.

7. Supply Voltage: 24 ± 4 VDC at 5 OMA.

8. Output: Isolated analog.

9. Manufacturer and Model: Onicon, F1211.

23 09 00 - BUILDING AUTOMATION SYSTEM (BAS)

PART 1 - GENERAL

1.1 BAS SYSTEM SUPPLIER REQUIREMENTS

A. The Contractor, through the use of an Automatic Temperature Control (ATC) System Supplier, shall furnish, install, and place into service the complete heating, ventilating, and air conditioning (HVAC) monitoring and control system, all in accordance with the requirements of the Contract Documents. The HVAC monitoring and control system shall communicate with the existing Baltimore/Washington International Thurgood Marshall Airport (BWI Marshall) Facility Management System (FMS)/Building Automation Systems (BAS).

B. The System Supplier shall assume and execute full responsibility to select, furnish, install and connect, test and calibrate, place into operation all specified components, assemblies, and accessories needed for a complete and functional system of HVAC monitoring and control in full compliance with the requirements of the specification.

C. The system supplier shall be a single firm, or corporation subcontracted by the Contractor to assume full responsibility to perform all engineering, to select, furnish, and place into operation, a complete and functional system of HVAC monitoring and control. Acceptable System Supplier shall be "Factory Branch Office" of the following:

1. **Johnson Controls, Inc., 60 Loveton Circle, Sparks, Maryland – (Eric Badders at: telephone 410-527-2607).**

Other bids by wholesalers, contractors, and franchised dealers are not acceptable.

1.2 BAS SYSTEM DESCRIPTION:

A. The existing Baltimore/Washington International Thurgood Marshall Airport (BWI Marshall) Building Automation System is a Johnson Controls Metasys System.

B. The BAS System shall be Metasys system consisting of BACnet MS/TP direct digital controls as manufactured by Johnson Controls, utilizing electric actuation. A minimum of one (1) Network Automation Engine (NAE) shall be installed as a web-based extension to the existing Metasys ADX server network. A "Facility Explorer", FX controller, or NCM-based system is unacceptable.

C. Communications: The Building Automation Contractor shall be responsible for full communications to the existing BWI Marshall Metasys network. Full communications means, the BWI Marshall facility operators will be able, from the existing Metasys operator workstations, to fully utilize the Metasys network manager software. The

FMS operator will be able to receive alarms, logs, and reports; monitor operating conditions; change control setpoints and operating schedules; and, operate equipment as desired at all existing Metasys operator workstation locations.

1.3 LIGHTING CONTROL SOFTWARE DESCRIPTION

A. Provide lighting control software/programming at Metasys and at each lighting control panel. Prior to start of programming work, request a lighting control schedule from the MAA. This schedule will dictate default on and off control of lights on a per day basis. Do not proceed until the approved schedule is obtained from the MAA. Provide a menu driven selection screen that will allow the following:

1. Monitoring of the corridor and holdroom lighting zone on/off status.

2. Individual control of each lighting zone.

1.4 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and General Specification Sections.

B. Product Data for each type of product specified. Include manufacturer's technical Product Data for each control device furnished, indicating dimensions, capacities, performance characteristics, electrical characteristics, finishes of materials, installation instructions, and startup instructions.

C. Shop Drawings from manufacturer detailing equipment assemblies and indicating dimensions, weights, loadings, required clearances, method of field assembly, components, and location and size of each field connection. Submit damper leakage and flow characteristics, plus size schedule for controlled dampers.

D. Provide the following information for each control system:

1. Schematic flow diagram showing pumps, fans, coils, dampers, valves, air flow measurement devices, and control devices.

2. Each control device labeled with setting or adjustable range of control.

3. Diagrams for all required electrical wiring. Clearly differentiate between factory-installed, and field-installed wiring.

4. Details of control panel faces, including controls, instruments, and labeling.

5. Written description of sequence of operation.

6. Trunk cable schematic showing programmable control unit locations and trunk data conductors.

7. Listing of connected data points, including connected control unit and input device.

8. System graphics indicating monitored systems, data (connected and calculated) point addresses, and operator notations.

9. Software description and sequence of operation.

10. System configuration showing peripheral devices, diagrams, and interconnections.

E. Wiring diagrams detailing wiring for power, signal, and control systems and differentiating clearly between manufacturer-installed and field-installed wiring.

F. Maintenance data for control systems equipment to include in the operation and maintenance manual. Include the following:

1. Maintenance instructions and spare parts lists for each type of control device.

2. Interconnection wiring diagrams with identified and numbered system components and devices.

3. Inspection period, cleaning methods, cleaning materials recommended, and calibration tolerances.

4. Calibration records and list of set points.

G. Field Test Reports: Procedure and certification of pneumatic control piping system.

H. Project Record Documents: Record actual locations of control components, including control units, thermostats, and sensors. Revise Shop Drawings to reflect actual installation and operating sequences.

1.5 QUALITY ASSURANCE

A. Startup Personnel Qualifications: Engage specially trained personnel in direct employ of manufacturer of primary temperature control system.

B. Comply with NFPA 90A.

C. Comply with NFPA 70.

D. Comply with ASHRAE 135 for DDC Components.

1.6 DELIVERY, STIORAGE, AND HANDLING

A. Store equipment and materials inside and protected from weather.

B. Factory-Mounted Components: Where control devices specified in this Section are indicated to be factory mounted on equipment, arrange for shipping control devices to unit manufacturer.

1.7 WARRANTY

A. Standard Material and Labor Warranty:

1. Provide a one-year labor and material Warranty on Controls Contract work provided under this Contract.

2. If within twelve (12) months from the date of acceptance of the Controls Contract work and following receipt of written notice from the Owner, the product is found to be defective in operation, workmanship or materials, then the product shall be promptly replaced, repaired or adjusted at the option of the Controls Contractor at the cost of the Controls Contractor.

3. Maintain an adequate supply of materials available directly to the Project site such that replacement of key parts, including programming, may be promptly carried out. Warranty work shall be done during the Controls Contractor's normal business hours.

4. Maintain an on-site record of all work done, all items removed from site, all items returned to site, all new replacement items installed and all remedial programming and database entry work undertaken including software revisions installed. Maintain a record of all calibrations required as a result of Warranty service.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Johnson Controls, Inc., Loveton Circle, Sparks, Maryland (telephone: 410-527-2607). Contact Person: Erik Badders.

2.2 GENERAL PRODUCT DESCRIPTION

A. The Building Automation System shall be capable of integrating multiple building functions including equipment supervision and control, alarm management, energy management, information management, and historical data collection and archiving.

B. The Building Automation System shall consist of the following:

1. Standalone DDC panels.

2. Local Display Devices.

3. The system shall be modular in nature, and shall permit expansion of both capacity and functionality through the addition of sensors, actuators, standalone DDC panels, and operator devices.

C. System architectural design shall eliminate dependence upon any single device for alarm reporting and Control execution. Each DDC panel shall operate independently by performing its own specified control, alarm management, operator I/O, and historical data collection. The failure of any single component or network connection shall not interrupt the execution of control strategies at other operational devices.

D. Standalone DDC panels shall be able to access any data from, or send control commands and alarm reports directly to any other DDC panel or combination of panels on the network without dependence upon a central processing device, including a Central File Server. Standalone DDC panels shall also be able to send alarm reports to multiple operator workstations, terminals, and printers without dependence upon a central processing device or File Server.

2.3 CONTROLS SYSTEM ARCHITECTURE

A. General:

1. The Controls Systems shall consist of multiple Nodes and associated equipment connected by industry standard digital and communication network arrangements.

2. The Operator Workstations, Servers and principal network computer equipment shall be standard products of recognized major manufacturers available through normal PC and computer vendor channels - not "Clones" assembled by a third-party subcontractor.

3. Provide licenses for all software residing on and used by the Controls Systems and transfer these licenses to the MAA prior to completion.

4. The networks shall, at minimum, comprise, as necessary the following:

a. Operator Workstations: Fixed and portable as required by the Specifications.

b. Network computer processing, data storage and communication equipment including Servers and digital data processors.

c. Routers, bridges, switches, hubs, modems, interfaces, and the like communication equipment.

d. Active processing network Application Nodes including programmable field panels and controllers together with their power supplies, and associated equipment.

e. Addressable elements, sensors, transducers and end devices.

f. Third-party equipment interfaces as required by the Contract Documents.

g. Other components required for a complete and working Control Systems as specified.

5. The Specifications for the individual elements and component subsystems shall be minimum requirements and shall be augmented as necessary by the Contractor to achieve both compliance with all applicable codes, standards, the requirements of the Authority Having Jurisdiction (AHJ) at the site, and to meet all requirements of the Contract Documents.

B. Network:

1. The Controls Systems shall incorporate primary Tier 1 network(s) and also incorporate multiple and integrated secondary Tier 2 and tertiary Tier 3 networks.

2. The networks shall utilize only copper and optical fiber communication media as appropriate and to comply with the applicable codes, ordinances and regulations and the AHJ.

3. Dial-up Communications: Auto-dial/auto-answer communications shall be provided to allow standalone DDC panels to communicate with remote operator devices on an intermittent basis via telephone lines.

2.4 OPERATOR INTERFACES

A. General:

1. The Controls Systems Operator Interfaces shall be user friendly, readily understood and shall make maximum use of colors, graphics, icons, embedded images, animation, text-based information and data visualization techniques to enhance and simplify the use and understanding of all displays by authorized users at the OWS.

2. User access shall be protected by a flexible and Owner redefinable software-based password access protection. Password protection shall be multi-level and partitionable to accommodate the varied access requirements of the different user groups to which individual users may be assigned. Provide the means to define unique access privileges for each individual authorized user. Provide the means to on-line manage password access control under the control of a project specific

Master Password. Provide an audit trail of all user activity on the Controls Systems including all actions and changes.

3. The Operator Interface shall incorporate comprehensive support for functions including, but not necessarily limited to, the following:

   a. User access for selective information retrieval and control command execution.

   b. Monitoring and reporting.

   c. Alarm and non-normal condition annunciation.

   d. Selective operator override and other control actions.

   e. Information archiving, manipulation, formatting, display and reporting.

   f. Controls Systems internal performance supervision and diagnostics.

   g. On-line access to user HELP menus.

   h. On-line access to current as-built records and documentation. At minimum, one (1) copy of all record documentation shall be stored on a designated OWS or Server and be accessible to the MAA personnel.

   i. Means for the controlled re-programming, re-configuration of systems operation and for the manipulation of database information in compliance with the prevailing codes, approvals and regulations for the component applications and elements.

   j. Means to archive all Controls Systems Contract Project specific configuration databases, software programs and other pertinent operational data such that any component of the software and project specific operational databases may be reloaded on-site from archived data.

4. Provide on-line reports and displays making maximized use of simple English language descriptions and readily understood acronyms, abbreviations, icons and the like to assist user understanding and interpretation. All text naming conventions shall be consistent in their use and application throughout the Controls Systems. Submit proposed naming arrangements for approval prior to data entry.

B. All devices, including Servers and Application Nodes, required to support and drive the Operator Interfaces shall support multiple independent user terminals through a theoretical unlimited number of Browsers. Support shall be configured for a minimum of 25 users for all Applications and features provided.

2.5 CONTROLS SYSTEMS APPLICATIONS – GENERAL

A. General:

1. The Controls Systems Application Nodes (AN) shall include all monitoring, control and data handling Nodes including programmable field panels and controllers.

2. AN shall be programmable and governed by the requirements of their applicable codes, approvals and regulations for their Application.

3. The AN shall be designed, packaged, installed, programmed and commissioned in consideration of their specific service and prevailing operating conditions.

4. A failure at an AN shall not cause failures or non-normal operation at any other system AN other than the possible loss of active real-time information from the failed AN.

5. Ancillary AN equipment, including interfaces and power supplies, shall not be operated at more than 80% of their rated service capacity.

6. AN shall comply with FCC Part 15 subpart J Class A emission requirements.

7. AN shall maintain all programming in non-volatile or battery backed memory and shall automatically resume normal monitoring and control following the restoration of stable electrical power after a power outage.

2.6 NETWORK AUTOMATION ENGINE (NAE)

A. Description:

1. The NAE is an automation engine that manages facilities using information and Internet technology.

2. The NAE uses the communication technologies of the building automation industry, including BACnet® protocol; LONWORKS® network and the N2 Bus to monitor; and supervise Heating, Ventilating, and Air Conditioning (HVAC) equipment; and lighting, security, fire, and access control. The NAE55 supports a comprehensive set of supervisory features and functions for large facilities and technically advanced buildings and complexes. The NAE35 and NAE45 extend the power of the NAE to smaller buildings and enable the wider distribution of supervisory functions in larger facilities. The NAE85 is a high-capacity NAE. This device allows the integration of large BACnet Internet Protocol (IP) systems and can take the place of multiple NAEs.

3. A single NAE or a network of multiple NAE devices within a building provide monitoring and control, alarm and event management, data exchange, trending, energy management, scheduling, and data storage.

4. The NAE has an embedded user interface and supports concurrently connected Web browsers with password access control and the security protection technology of the Information Technology (IT) industry.

5. Features::

   a. Communication using commonly accepted IT standards at the automation and enterprise level.

   b. Web-based user interface.

   c. Site Director function.

   d. Support for Web services at the automation network level.

   e. User interface and online system configuration software embedded in NAE.

   f. Supervision of field controller networks including N2 Bus, LONWORKS network, BACnet MS/TP, and BACnet IP devices.

   g. Multiple connection options for data access.

2.7 APPLICATION AND DATA SERVER (ADS)

A. Description:

1. The Application and Data Server (ADS) is a component of the Metasys system that manages the collection and presentation of large amounts trend data, event messages, operator transactions, and system configuration data. As Site Director, the ADS provides secure communication to a network of Network Automation Engines (NAEs), Network Control Engines (NCEs), and Network Integration Engines (NIEs).

2. The User Interface (UI) of the ADS provides flexible system navigation, user graphics, comprehensive alarm management, trend analysis, and summary reporting capabilities. Via a Web browser, occupant comfort and energy usage can be efficiently managed and quickly responded to during critical events., Multiple users can gain access to information from the Building Automation System! (HAS) that uses Internet protocols and Information Technology (IT) standards, and is compatible with enterprise level communication networks.

3. Features:

a. Support of IT Standards and Internet Technologies.

b. Standard Web Browser User Interface.

c. Secure User Access.

d. Flexible System Navigation and Dynamic User Graphics.

e. Alarm and Event Management.

f. Site Director Function.

g. Long-Term Trend Data Storage.

h. Optional Storage of Historical Data on a Separate Computer.

i. Optional Metasys Advanced Reporting System.

2.8 NETWORK INTEGRATION ENGINE (NIE)

A. Description:

1. The Metasys® Network Integration Engine (NIE) integrates existing Metasys N1-based Building Automation Systems (BASs) into the new generation of technology that includes the Internet, Information Technology (IT), and enterprise level global communication. Metasys system extended architecture NI Integration is based on the NIE, a Web-enabled network controller that speaks IT and Internet language to the expanding world of Web browsers and remote operations centers. At the same time, it uses Internet Protocol (IP) Ethernet network technology to communicate with Metasys N1 networks that are installed in many facilities including BWl Marshall Airport.

2. The NIE transfers point data from one or more Network Control Module (NCM) devices in a Metasys NI network, providing alarm and event management, trending, energy management, scheduling, and data sharing capabilities in a manner consistent with the new technology of Metasys system extended.

3. Features:

a. Communication with NI Networks using commonly accepted IT standards at the automation and enterprise levels.

b. Web-based user interface.

c. User interface and online system configuration software embedded in NIE.

d. Site Director function in one NIE or one NAE or in an Application and Data Server (ADS) for large installations.

e. Scalable system integration solution for integrating and migrating Metasys N1 networks.

f. Mapping capability of N1 data 'types including analog, binary, multistate and control system objects, and access to scheduling feature.

g. Trending, totalization, and alarming functions automatically regenerated in the METASYS system extended architecture.

2.9 SYSTEM SOFTWARE FEATURES

A. General

1. All necessary software to form a complete operating system as described in this specification shall be provided.

2. The software programs specified in this section shall be provided as an integral part of the DDC panel and shall not be dependent upon any higher level computer for execution.

B. Graphics Display: Color graphic floor plan displays and system schematic for each piece of mechanical equipment shown on plans shall be provided. Provide a color graphic floor plan for all floors to show the on/off status of lighting zones.

C. Alarm Management: Alarm management shall be provided to monitor, buffer, and direct alarm reports to operator devices and memory files. Each DDC panel shall perform distributed, independent alarm analysis and filtering to minimize operator interruptions due to non-critical alarms, minimize network traffic, and prevent alarms from being lost. At no time shall the DDC panel's ability to report alarms be affected by either operator activity at a PC Workstation or local I/O device, or communications with other panels on the network.

1. Point Change Report Description: All alarm or point change reports shall include the point's description in English language, and the time and date of occurrence.

2. Prioritization: The user shall be able to define the specific system reaction for each point. Alarms shall be prioritized to minimize nuisance reporting and to speed operator response to critical alarms. A minimum of three priority levels shall be provided. Each DDC panel shall automatically inhibit the reporting of selected alarms during system shutdown and start-up. Users shall have the ability to manually inhibit alarm reporting for each point. The user shall also be able to define under which conditions point changes need to be acknowledged by an operator, and/or sent to follow-up files for retrieval and analysis at a later date.

3. Report Routing: Alarm reports, messages, and files will be directed to a user-defined list of operator devices or PC disk files used for archiving alarm information. Alarms shall also be automatically directed to a default device in the event a primary device is found to be off-line.

4. Alarm Messages: In addition to the point's descriptor and the time and date, the user shall be ¸able to print, display or store a 65-character alarm message to more fully describe the alarm condition or direct operator response. Each standalone DDC panel shall be capable of storing a library of at least 250 Alarm Messages. Each message may be assignable to any number of points in the panel.

5. Auto-Dial Alarm Management: In Dial-up' applications, only critical alarms shall initiate a call to a remote operator device. In all other cases, call activity shall be minimized by time-stamping and saving reports until an operator scheduled time, a manual request, or until the buffer space is full. The alarm buffer must store a minimum of 50 alarms.

6. Transaction Logging: Operator commands and system events shall be automatically logged to disk in Personal Computer industry standard database format. Operator commands initiated from Direct-connected workstations, dial-up workstations, and local DDC panel Network Terminal devices shall all be logged to this transaction file. This data shall be available at the Operator Workstation. Facility shall be provided to allow the user to search the transaction file using standard database query techniques, including searching by dates, operator name, data point name, etc. In addition, this transaction file shall be accessible with standard third party database and spreadsheet packages.

D. Historical Data and Trend Analysis: A variety of Historical data collection utilities shall be provided to automatically sample, store, and display system data in all of the following ways:

1. Continuous Point Histories: Standalone DDC panels shall store Point History Files for all analog and binary inputs and outputs. The Point History routine shall continuously and automatically sample the value of all analog inputs at half hour intervals. Samples for all points shall be stored for the past 24 hours to allow the user to immediately analyze equipment performance and all problem-related events for the past day. Point History Files for binary input or output points and analog output points shall include a continuous record of the last ten status changes or commands for each point.

2. Control Loop Performance Trends: Standalone DDC panels shall also provide high resolution sampling capability in one-second increments for verification of control loop performance.

3. Extended Sample Period Trends: Measured and calculated analog and binary data shall also be assignable to user-definable trends for the purpose of collecting operator-specified performance data over extended periods of time. Sample

intervals of 1 minute to 2 hours shall be provided. Each standalone DDC panel shall have a dedicated buffer for trend data, and shall be capable of storing a minimum of 5000 data samples.

4. Data Storage and Archiving: Trend data shall be stored at the Standalone DDC panels, and uploaded to hard disk storage when archival is desired. Uploads shall occur based upon either user-defined interval, manual command, or when the trend buffers become full. All trend data shall be available in disk file format compatible with Third Party personal computer applications.

E. Runtime Totalization: Standalone DDC panels shall automatically accumulate and store runtime hours for binary input and output points.

1. The Totalization routine shall have a sampling resolution of one minute or less.

2. The user shall have the ability to define a warning limit for Runtime Totalization. Unique, user-specified messages shall be generated when the limit is reached.

F. Analog/Pulse Totalization: Standalone DDC panels shall automatically sample, calculate and store consumption totals on a daily, weekly, on monthly basis for user-selected analog and binary pulse input-type points.

1. Totalization shall provide calculation and storage of accumulations of up to 99,999.9 units (e.g., KWH, gallons, KBTU, tons. etc.).

2. The Totalization routine shall have a sampling resolution of one minute or less.

3. The user shall have the ability to define a warning limit. Unique, user-specified messages shall be generated when the limit is reached.

G. Event Totalization: Standalone DDC panels shall have the ability to count events such as the number of times a pump or fan system is cycled on and off. Event totalization shall be performed on a daily, weekly, or monthly basis.

1. The Event Totalization feature shall be able to store the records associated with a minimum of 9,999,999 events before reset.

2. The user shall have the ability to define a warning limit. Unique, user-specified messages shall be generated when the limit is reached.

2.10 CONTROL SYSTEMS FIELD DEVICES

A. Input Devices: Provide controls systems devices as required for each specific project. The following is a list of major devices. Provide additional devices and instrumentation as required.

1. Air Low Differential Pressure Switch.

2. Air Low Differential Pressure Sensor.

3. Air High Differential Pressure Switch.

4. Water Differential Pressure Switch.

5. Temperature Sensors.

6. Humidity Sensors.

7. Air Flow Switch.

8. Water Flow Switch.

9. Current Switch.

10. Current Transducer.

11. Static Pressure Transmitter/Transducer.

12. Differential Pressure Transmitters/Transducer.

13. Water Pressure Transducers.

14. Water Differential-Pressure Transducers.

15. Differential-Pressure Switch (Air or Water).

16. Room Sensor Covers.

17. Room Sensor Accessories.

B. Output Devices:

1. Electric/Pneumatic Transducers.

2. Controls Relays.

C. Controlled Devices:

1. Ball Valve.

2. Butterfly Valve.

3. Globe Valve.

4. Control Damper.

5. Electric Damper Actuators.

6. Electric Valve Actuators.

7. Pneumatic Valve Actuators.

8. Pneumatic Damper Actuators.

9. Combination Fire/Smoke Dampers w/Actuator.

10. Smoke Dampers.

11. Status Sensors:

    a. Status Inputs for Fans.

    b. Status Inputs for Pumps.

    c. Status Inputs for Electric Motors.

    d. Voltage Transmitter (100- to 600-V ac).

    e. Power Monitor.

    f. Electronic Valve/Damper Position Indicator: Visual scale indicating percent of travel and 2- to 10-V dc, feedback signal.

12. Gas Detection Equipment:

    a. Carbon Monoxide Detectors.

    b. Carbon Dioxide Sensor and Transmitter.

    c. Occupancy Sensor.

13. Other Control Devices:

    a. Electric Thermostats.

    b. Humidistats.

    c. Pressure Controller.

END OF SECTION 23 09 00

The following language shall be used when specifying Variable (Adjustable) Frequency Drives (VFD's). Coordinate with Variable-Frequency Motor Controllers, section 262923.

1.1 VFD'S

A. Variable frequency motor drive shall be of a pulse width modulated (PWM) inverter for use on a standard NEMA Design B induction motor. The drive shall be designed specifically for variable torque applications.

B. Integral bypass motor starter package shall be included where required.

PART 2 - PRODUCTS

2.1 VARIABLE FREQUENCY DRIVES

A. The Variable Frequency Drives (VFD's) shall be solid state, with 6/12 Pulse Width Modulated (PWM) Drive utilizing insulated gate bipolar transistors (IGBT's). Provide minimum 12 pulse VFD's for 50 HP motors and larger. Six pulse VFD's for motors smaller than 50 HP shall conform to IEEE519 and BWI standards. The VFD package shall be completely assembled and tested by the manufacturer. The enclosure shall be NEMA 1, 12 or 4; as appropriate for the installation environment. The drive efficiency shall be 97 percent or better at full speed and full load and the fundamental power factor shall be 0.98 at all speeds and loads. Total current harmonic distortion shall be 15% or less at 50% load or higher, measured at the power input terminals of the VFD, also, THD of voltage wave form shall be 3% or less at the power input.

B. All VFD's shall have the following standard features:

1. All VFD's shall have the same customer interface, including digital display, and keypad, regardless of horsepower rating. The keypad shall be used for local control, for setting all parameters, and for stepping through the displays and menus. The keypad shall be removable, capable of remote mounting, and shall have its own non-volatile memory. The keypad shall allow for uploading and downloading of parameter settings as an aid for start-up of multiple VFD's.

2. The VFD's shall utilize plain English digital display (code numbers and letters are not acceptable). All set-up parameters, indications, faults, warnings and other information must be displayed in words to allow the user to understand what is being displayed without the use of an installation manual or cross-reference table. VFD's utilizing codes are not acceptable.

3. The keypad shall include Hand-Off-Auto membrane selections. The drive shall incorporate "bumpless transfer" of speed reference when switching between "Auto" and "Hand" modes and vice-versa.

4. VFD's shall be provided with displays or meters showing:

    a. Output frequency

    b. Motor Speed (RPM)

    c. Motor Current

    d. Motor Power (kW)

    e. DC Bus Voltage

    f. Output Voltage

    g. Heat Sink Temperature

    h. Analog Input Values

    i. Elapsed Time Meter (resettable)

    j. kWh meter (resettable)

    k. Last three faults

5. The VFD shall be capable of starting into a rotating load (forward or reverse) and accelerate or decelerate to setpoint without safety tripping or component damage (flying start). The VFD shall also be capable of DC injection braking at start to stop a reverse spinning motor prior to ramp.

6. Three (3) programmable critical frequency lockout ranges to prevent the VFD from continuously operating at an unstable speed.

C. The VFD's shall have the following field programmable features:

1. If the input reference (4-20mA or 2-10V) is lost, the VFD shall give the user the option of either; (1) stopping and displaying a fault, (2) running at a programmable preset speed, (3) hold the VFD speed based on the last good reference received, or (4) cause a warning to be issued, as selected by the user. The drive shall be programmable to signal this condition via a keypad warning, relay output and/or over the serial communications bus.

2. Control Inputs and Outputs:

    a. Isolated.

b. Five digital inputs.

c. Two digital outputs.

d. Two analog inputs.

e. One analog output.

f. Fully field programmable.

3. Digital outputs shall include field adjustable motor current levels for motor status. Drives not having this feature shall provide and install field adjustable three phase current relays for digital status of motor (proof of flow). Digital outputs must be true, form C type contacts; open collector outputs are not acceptable. Relays shall be capable of programmable on and off delay times.

4. Analog output capabilities shall include, but not be limited to, frequency, speed, current, voltage, active reference, and kW indications. Manufacturers not having kW output shall provide current transformers and kW transducers for kW output.

SECURITY REQUIREMENTS DURING CONSTRUCTION

MARTIN STATE AIRPORT

BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

ITEM X-1 SECURITY REQUIREMENTS DURING CONSTRUCTION

DESCRIPTION

1.1 DESCRIPTION. This item shall consist of all labor and materials necessary to establish one or more secure perimeters around the construction site, and to provide personnel to maintain secure access/escorting and secure worksites for the duration of the project. Work shall be completed in accordance with the contract specifications and the approved Project Security Plan (submitted by the selected contractor after bidding). A Security Bid Plan (SBP) will be provided with the Contract Drawings to serve as the basis for the PSP. The Contractor shall also reference the General Construction and Safety Notes, and the Project Phasing Plan(s) as necessary for timing and safety restrictions included as part of the Contract Drawings.

1.2 SECURITY REQUIREMENTS DOCUMENTATION. It is the Contractor's responsibility to become familiar with the various aspects of 49 CFR 1542, *Transportation Security Administration, Department of Transportation, Airport Security*. Any violation by the Contractor and any subsequent fines imposed due to any violation will be the responsibility of the Contractor. UPON ISSUANCE OF NOTICE OF RECOMMENDED AWARD (NORA) THE CONTRACTOR MUST CONTACT the OFFICE OF AIRPORT SECURITY (OAS) AND REQUEST A SECURITY MEETING TO FINALIZE THE PROJECT SECURITY PLAN (PSP). The meeting shall include (at a minimum):

- Maryland Aviation Administration (MAA) OAS
- Project Manager from the General Contractor (GC)
- Project Manager from MAA OAS approved Security contractor
- Resident Engineer or MAA Construction Representative(s)

The Security Bid Plan (SBP) is included in the Contract Documents for bidding purposes and to provide the contractor with a baseline for Security requirements. The SBP, a component of the contract drawings will take precedence over Section X-1 for the specific project identified in the contract documents. For purposes of bidding, the SBP will be used to develop costs along with the X-1 specification included in the Contract Documents. Additional security information is located in various parts of the Contract Documents including the Project Phasing Plan(s), and General Construction and Safety Notes. The SBP includes a detailed drawing with detailed project specific notes for application and the included specification that is signed. The SBP is developed in coordination with the Project Phasing Plan(s) which must be approved by MAA Airport Operations (OPS). The Contractor is responsible for implementation of the approved PSP and is required to maintain constant communication with MAA OAS throughout the duration of construction. It is required that the construction phasing matches the approved PSP once submitted. Therefore, any changes to project phasing will require modification of the PSP.

1.3 DEFINITIONS.

a. **Airport Operator.** An entity holding an FAA Airport Operating Certificate who operates an airport regularly serving scheduled passenger operations or public charter operations. These entities are regulated under TSR 1542. The MAA is the Airport Operator for Baltimore/Washington International Thurgood Marshall (BWI) Airport.

b. **Air Operations Area (AOA).** The portion of an airport designed and used for landing, taking off or surface maneuvering of airplanes (includes aprons, taxiways, and runways) and enclosed by a security fence or line of building which is not open to the public.

c. **Airfield Registered Vehicle.** A vehicle that has been issued a decal from MAA Airport Operations allowing the use of that vehicle within the restricted areas of the Airport when driven by a person who has a BWI Security Identification Display Area (SIDA) access badge with power gate and driving privileges. The vehicle must be properly maintained in accordance with all Airport standard operating procedures and must have appropriate safety equipment on board and adequate insurance requirements. In order to obtain the decal, a badged person with power gate and driving privileges must take the vehicle to MAA Airport Operations for the vehicle inspection and, upon approval, pick up the decal.

d. **Airport Security Contractor.** The approved private company under contract to the Maryland Aviation Administration providing personnel and equipment to perform all assigned security duties at BWI Marshall. The Contractor must contact the MAA OAS approved security contractor for bid prices related to internal secure perimeter system guards (labor), supplemental perimeter guards (labor), and vehicle and personnel escorting (labor and vehicles), including supervisor coverage and breakers. Initial contact MUST occur prior to bidding to confirm labor needs and costs prior to bid submission.

e. **Airport Security Coordinator.** The Director of the Office of Airport Security who is an MAA employee serving as the primary contact for all security-related activities and communications with the Transportation Security Administration (TSA). The approved MAA OAS contact shall be The Manager or Director of MAA OAS.

f. **Office of Airport Security (OAS).** The organization within the MAA charged with coordinating, directing, and approving (in writing) all Airport security functions at BWI Marshall.

g. **Aviation Security Regulatory Unit (ASRU).** The section within the TSA responsible for conducting tests of an Airport's Security Program. They perform special emphasis assessments and comprehensive assessments of the Airport's security posture. The ASRU regularly conducts field checks to verify that badged

personnel are performing their responsibilities, including but not limited to challenging a non-badged person in a restricted area. Failure to pass a field check will result in penalties imparted by the TSA. Refer to "Challenge Procedure."

h. **Badged Personnel (also Badge Holder).** A person who has obtained Sterile or SIDA BWI Marshall badge. SIDA badges allow access to the SIDA. Refer to the definitions of Sterile Area and SIDA. A badge holder is not automatically granted authority to provide escort services; request badges as an Authorized Signer; to drive on the airfield; or to access Federal Inspection Sites (FIS). These privileges must be requested at the initiation of the badging process and will only be granted as needed. All badged personnel are responsible for challenging non-badged unescorted personnel within the restricted area. Badges will be valid for the construction contract duration only.

i. **BWI SIDA Access Badge.** Allows the badge holder unescorted access to the BWI Air Operations Area/Security Identification Display Area (AOA/SIDA). A badge holder is not automatically granted authority to provide escort services; to drive on the airfield; or to access Federal Inspection Sites (FIS). These privileges must be requested at the initiation of the badging process and will only be granted as needed. Note also that driving privileges do not allow for unescorted access in aircraft movement areas. Additional training is required for movement area access. Additional information on movement area access can be found in the General Construction and Safety Notes contained in the Contract Drawings. Refer also to Challenge Procedure. Badges will be valid for the construction contract duration only.

j. **BWI Sterile Area Access Badge.** Allows the badge holder access through Airport passenger screening security, but not secure areas outside of the building. A badge holder is not automatically granted authority to provide escort services or granted access to Federal Inspection Sites (FIS). These privileges must be requested at the initiation of the badging process and will only be granted as needed. Refer also to Challenge Procedure. Badges will be valid for the construction contract duration only.

k. **Challenge Procedure.** It shall be the responsibility of each badge holder with unescorted access to the SIDA or other areas controlled for security purposes, to contact, approach, or point out to appropriate authorities, individuals or vehicles present in the SIDA or other areas controlled for security purposes but not displaying appropriate Airport-approved identification.

l. **Criminal History Records Check (CHRC).** A fingerprint based check of an individual's criminal history performed through the FBI's Criminal Fingerprint Database to determine if an individual has been convicted of a disqualifying crime in accordance with Public Laws 106-528 and 107-71. This is required of all new applicants requesting a BWI Marshall Access Badge after December 23, 2000, by Public Law 106-528 and for all Airport Employees having unescorted SIDA

access by Public Law 107-71. The disqualifying crimes are listed on the badge application form.

m. **Escort.** The individual BWI Marshall Badge holder, having escort authority, who may accompany non-badged people or vehicles into an Airport restricted area. Under typical conditions, an escort may accompany from one to five people and shall have no other duties other than escorting. Any modifications to these typical conditions will be identified in **Paragraph 2.4** of this item. Proper escort procedures at BWI Marshall require the badged employee providing the escort to be able to identify the specific individual(s) they are escorting at any time and that they remain within sight and reasonable speaking distance and positive control of badged individual while in the SIDA. As a badged person, each escort is responsible for challenging non-badged, unescorted personnel within the secure area.

(1) **Escorting within the Sterile Area.** Escorts into the Sterile Area must be for official business purposes only. The names and other required information for individuals being escorted into the Sterile Area must be compared against the most recent No-Fly and Selectee Lists prior to gaining access to the Sterile Area. A written request for a name comparison against the No-Fly and Selectee Lists must be submitted to either the Director or the Manager of the Office of Airport Security ten (10) business days prior to the scheduled visit. When submitting a written request, the following information is required: full name of the individual to be escorted (to include alias and/or maiden names), date of birth, current mailing address, social security number, and point-of-contact for the escort. The point-of-contact will be informed whether the individual may be escorted into the sterile area. In special cases, if cleared by the Director of the OAS, the individual may be granted temporary access privileges where an escort is not required and be provided documentation to that regard.

n. **Internal Secure Perimeter System.** A perimeter system set up within the SIDA or Sterile Area of the Airport within which non-badged personnel may move about unescorted. Contractor-provided Airport Security Contractor personnel will guard all ingress/egress points. However, the perimeter must also be monitored by the Security Liaison. Non-badged workers must be escorted to and from the internal perimeter, but once inside they can move about within the perimeter unescorted.

o. **Movement Area.** Runways, taxiways, and other areas within the Air Operations Area of the airport that are used for taxiing, hover-taxiing, air-taxiing, takeoff, and landing of aircraft, exclusive of aircraft loading ramps and aircraft parking areas. Refer to the General Construction and Safety Notes sheets in the Contract Drawings for additional information on accessing movement areas.

p. **Non-Badged Personnel.** An individual requiring access to a restricted area that does not have an appropriate access badge. This person must be escorted to and from the worksite and remain under continuous escort at all times while in a restricted area.

q. **Project Security Coordinator.** The individual BWI Marshall SIDA access badge holder, having escort authority, designated by the Contractor who is responsible for ensuring compliance by all Contractor and Subcontractor personnel to all OAS and TSA security rules and regulations. This person shall oversee and coordinate the implementation of and compliance with all established security rules, regulations and procedures. The individual is responsible for security on all worksites under this Contract and is the primary point of contact for security issues encountered during both working and non-working hours. An alternate shall be designated as a secondary contact. The Project Security Coordinator or an alternate must be available to respond to the Office of Airport Security 24 hours per day, 7 day a week, 365 days per year for the duration of the contract. Refer to **Paragraph 2.4** of this item for additional requirements and restrictions.

r. **Project Security Plan (PSP).** Documentation depicting project specific security requirements that is submitted after a contractor is selected. The PSP is coordinated in detail with the project phasing and includes access points, delivery routes, security guard locations, details for construction of internal security perimeters, identification of worksites, and any other job specific security requirements. The PSP should be based on the SBP provided in the contract documents for bidding. The Contractor shall complete the following portions of the PSP for review and approval by the OAS:

(1) Name and contact information for the Project Security Coordinator and a designated alternate;

(2) Name and contact information for each Security Liaison/Worksite Supervisor and designated alternates (these two individuals can be the same);

(3) Approximate dates for each phase of construction, duration, location, and access points. Staging areas must be identified, including, security measures to control un-badged individuals, equipment, associated tools, and Security Sensitive Information (SSI).

s. **Restricted Area.** Includes the Sterile Area and the SIDA.

t. **Restricted Public Area.** Public areas inside the Airport's main terminal building and extending 300 feet from the non-secure (public-side) face of the main terminal building, as well as, public areas within ten feet of both sides of the security perimeter fence, although public areas, have specific security

requirements for construction. Note that the Hourly Garage is exempt from these restrictions.

u. **Security Bid Plan.** The Security drawings and notes provided in the contract documents. These documents serve as a baseline for the Contractor to develop a PSP for submission to OAS after award of the contract. The SBP must be developed by the design team and signed by the Airport Security Coordinator.

v. **Security Identification Display Area (SIDA).** The area of the Airport enclosed by security fence, security checkpoints, and/or building egress to the airfield. Each person within this area is required to display an Airport-approved identification badge, unless the person is under Airport-approved escort. At BWI Marshall, the SIDA is considered to be everything within the Airport's security fence-line.

w. **Security Liaison.** The BWI Marshall SIDA badge holder with escort authority designated by the General Contractor (GC) who is responsible for ensuring compliance by all Contractor and Subcontractor personnel to all OAS and TSA security rules and regulations. This person is responsible for compliance with all security measures and PSP implementation. This includes monitoring of the internal secure perimeter system, if one is established by the PSP. If a security violation occurs anywhere within the worksite, penalties may be assessed against the badge holder(s) in violation. The Security Liaison is the primary point of contact for his/her assigned worksite regarding issues encountered during working hours. The Contractor must also designate an alternate for each Security Liaison with the same authority and responsibility as the designated Security Liaison who shall assume the responsibilities of the Security Liaison in his/her absence. Should the Security Liaison need to leave the worksite for any reason for any length of time, a designated alternate shall be assigned the duties of Security Liaison until relieved of this responsibility by the original Security Liaison or by the Project Security Coordinator. Refer to **Paragraph 2.4** of this item for additional requirements and restrictions.

x. **Security Perimeter Fence (SPF).** Any portion of the perimeter fence that controls access to any of the BWI Marshall Airport Restricted Areas.

y. **Security Threat Assessment (STA).** Check conducted by the TSA of databases relevant to confirming (1) that an individual does not pose a security threat; (2) that an individual possesses lawful status in the United States (rights to live and work); and (3) an individual's identity.

z. **Sensitive Security Information (SSI).** 49 CFR Part 1520 discusses the protection of Sensitive Security Information (SSI) and requires entities involved in activities inside the restricted areas of a commercial airport to maintain, safeguard, and control the disclosure of sensitive security information. Individuals privileged to have this information **MUST** have an

operational need to know and **MUST** understand the importance of safeguarding the information.

aa. **Sterile Area.** The Sterile Areas at BWI Marshall Airport are the concourses, or piers, and are restricted to ticketed passengers and appropriately badged or documented personnel. The appropriately badged person will have a Sterile Area or SIDA access badge issued by the MAA OAS. Otherwise, access is controlled by the inspection of persons and property with reason to be within the Sterile Areas in accordance with an approved security program.

bb. **Transportation Security Administration (TSA).** An agency of the United States Federal Government (Executive Branch) responsible for Civil Aviation Security through the enforcement of regulations (under Title 49) designed to safeguard Civil Aviation Operations against acts of violence or acts of unlawful interference. TSA is responsible for the safety and security of passengers, flight crews, ground operations personnel, and the general public.

cc. **Unescorted Access.** Authority to be in the SIDA or Sterile Areas for completion of Airport-related services. An individual must possess and properly display a BWI Marshall access badge in order to have unescorted access privileges.

dd. **Worksite.** The largest MAA OAS approved area within which the Security Liaison can maintain positive control of all workers and activities. A single construction project may be comprised of a single worksite or numerous worksites dependent on approval of the MAA OAS and PSP. Worksites do not remove the requirement for positive control of escorted individuals in restricted areas.

ee. **Worksite Supervisor.** The person assigned by the Contractor to a worksite in a restricted public/non-public area responsible for ensuring compliance by all Contractor and Subcontractor personnel to all security rules and regulations. Each worksite supervisor (or a designated alternate) must be present at the worksite at all times while work is in progress and be available to respond to the OAS or its authorized representatives upon demand. Refer to **Paragraph 2.4** of this item for additional requirements and restrictions.

ff. **APPROVED SECURITY SUBCONTRACTOR STAFF DEFINITIONS**:

Guards:	To support Airport Security Project (ASP) and Project Security Plan (PSP).
Breakers:	To provide bathroom and meal breaks and additional break dependent on weather (more frequent for hot and cold).
Supervisors:	To coordinate and schedule with construction company(s) to ensure guards are assigned, in position, and performing

duties, meet daily to ensure construction needs are met and any personnel issue are addressed and coordinate breaks.

Rovers: To provide routine checks and additional control/security.

Escorts: To provide escorts to and from access points and work site.

Compliance Officer: To ensure PSP and ASP are adhered by guards and construction workers; attend progress meetings; conduct inspections; act as security liaison bringing security issues/needs, changes and concerns to the Office of Airport Security. (Compliance Officers will be provided by and report directly to MAA OAS)

REQUIREMENTS

2.1 GENERAL REQUIREMENTS. All work within the Airport's restricted areas are required to have an approved Project Security Plan (PSP).

As part of the PSP, each project shall have an overall Security Coordinator who is in charge of enforcing the approved security requirements for the project as a whole. This person is named the Project Security Coordinator. In addition, each worksite shall have a designated person and alternate responsible for security requirements unless otherwise approved by MAA OAS. For work within the SIDA or Sterile Area, this person is the Security Liaison. For work in restricted public areas, this person is the Worksite Supervisor. Specific requirements and restrictions for these personnel are discussed in the definitions above and in **Paragraph 2.4** of this item. The General Contractor shall initiate contact with the MAA OAS Representative(s) a minimum of **thirty (30) days prior** to construction activities. The above-mentioned individuals should be present along with the required individuals (MAA- OAS, PM from GC, and PM from approved security sub-contractor).

An approved (signed) SBP is included as part of the Contract Documents. The Plan considers the requirements of this Specification and is coordinated with the Project Phasing Plan(s). Upon award of the Contract, the Contractor is to review the approved SBP, make changes necessary specific to the bid proposal, and amend it with the required information. At this time, the Contractor will obtain all paperwork from OAS to submit an official PSP for review and approval (signature must be obtained). Any revisions to the PSP that are in require additional compensation of the SBP must be identified (in writing) at this time and provided to the Resident Engineer and OAS for review and concurrence (in writing). The Contractor and all subcontractors engaged under this Contract are equally bound by all security rules, regulations, and procedures/requirements in effect at BWI Marshall. The Contractor is responsible for overseeing all subcontractors and ensuring full compliance with all security rules and regulations for all work performed as part of this Contract.

Any action required by TSA or MAA in response to security violations based on the PSP and this Specification shall be addressed immediately by the Contractor at his/her expense. This includes payment of any fees, fines, or other payment that the Contractor is required to make as a result of a security infraction(s) by the Contractor's or Subcontractor's personnel. Payment of such fees, fines, etc. shall not be the basis for a claim, as the Contractor shall bear the financial responsibility for any actions taken by MAA or TSA for security violations, including potential temporary closures of work site(s).

2.2 RESTRICTED AREAS (STERILE AREAS AND SIDA).

The Contractor must evaluate the SBP and develop a PSP to ensure that it details all measures he/she will undertake to implement the requirements of this Specification. Key personnel (PM, QC) or any designated security individuals within this Specification are required to have an appropriate BWI Marshall access badge. Refer also to definition m. (1), Escorting in the Sterile Area, for additional restrictions.

a. As part of the PSP, the Contractor shall make provisions to obtain the appropriate BWI Marshall access badges for all Contractor and Subcontractor personnel working on the project at least twenty (20) calendar days prior to the commencement of work. To obtain badges, each applicant must complete an application that includes the Criminal History Records Check (CHRC), Security Threat Assessment, and fingerprinting. Once approved, the contractor shall participate in the appropriate training program. The Contractor shall contact the MAA Security Center (410-859-7488) for badging hours and to obtain current forms.

(1) Non-Badged Personnel. All individuals who require access into the restricted areas and who have not processed for a BWI Marshall access badge must remain under continuous escort at all times while in the restricted areas in accordance with Paragraph a.(2), below. The Contractor must provide to the OAS the full name, date of birth, and Social Security Number of each person being escorted for security screening purposes. Some individuals may be denied access at the discretion of the Airport Security Director and/or his/her designee(s).

If the individual has been processed and was denied eligibility for a BWI Marshall access badge they CAN NOT be under escort at any time. This is a direct violation of the Airport Security Program and Federally regulated Security Directives pertaining to Airport Security.

(2) Escorts. The Contractor shall provide the number of escorts that will be responsible for escorting non-badged employees. All escorts must be conducted through a guarded portal. Escorts may be conducted by the Contractor's own personnel, or by the OAS Approved Airport Security Contractor. Under normal circumstances, one badge holder with escort privileges may escort up to five non-badged workers. One BWI Marshall

Airport approved stickered vehicle can escort up to three (3) non-stickered vehicles. Contractor personnel acting as escort for non-badged personnel shall have no other work related responsibilities while performing escort duties unless otherwise defined in Paragraph 2.4 of this Specifications.

(3) Vehicles: All self-propelled vehicles must be inspected per the MAA airfield vehicle requirements. Vehicles that have not been inspected but need access to the restricted areas must be escorted in accordance with the above-mentioned procedures.

b. If the Contractor has no proposed changes to the SBP, the following information shall be added to the plan and submitted to the OAS for final approval as a PSP during the initial submittal period of the Contract (Mobilization), but no later than thirty (30) calendar days prior to start of work:

(1) Name and contact information for the Project Security Coordinator and a designated alternate;

(2) Name and contact information for each Security Liaison/Worksite Supervisor and designated alternates (these two individuals can be the same);

(3) Approximate dates for each phase of construction, duration, location, and access points. Staging areas must be identified, including, security measures to control un-badged individuals; equipment; associated tools; and Security Sensitive Information (SSI).

c. The Contractor shall submit any proposed changes to the SBP to the Resident Engineer thirty (30) calendar days prior to the commencement of work for review and approval. All revisions to the SBP must be documented in the submission of the PSP for concurrence. All modifications must be submitted to the OAS and approved before the commencement of construction. .

d. All work expected to require access through a non-power/unguarded perimeter gate, including any work involving tunneling below the secure line of the Airport, is included in the SBP. Should additional access be required, a written amendment to the PSP must be submitted for approval to the Resident Engineer a minimum of thirty (30) calendar days prior to the commencement of such work. All non-power/unguarded perimeter gates used to escort vehicles and equipment into any of the Airport's restricted areas shall be staffed by the MAA approved Airport Security Contractor personnel scheduled and provided for at the Contractor's expense. The Director or designee of the OAS shall determine whether the appropriate security personnel have been provided.

e. All work expected to be performed within ten (10) feet of either side of the Security Perimeter Fence (SPF) is included in the PSP. Should work within ten (10) feet of the SPF be added, a written amendment to the PSP must be submitted for approval to the Resident Engineer a minimum of thirty (30) calendar days

prior to the commencement of such work. If work being performed as indicated in the Contract Documents requires the opening, repositioning, or dismantling of any portion of the SPF where access into the Airport's restricted area may be gained, an adequate number of security guards shall be provided by the Airport Security Contractor at the Contractor's expense. If any damage to the SPF is noted at any time during the project, the Contractor must immediately notify Airport Operations at 410-859-7018 and make arrangements to provide Airport Security Contractor personnel to maintain security at the site of the damage until the damage is repaired by the Contractor and inspected and approved by the OAS. The Security Liaison shall assign a badged employee to stand at the breach location until relieved by the OAS or the Airport Security Contractor. If the damage results from the Contractor's work, the procedure should be followed and the cost of the guards will be at the Contractor's expense.

2.3 RESTRICTED PUBLIC AREAS.

With the exception of the Hourly Garage, work performed inside the Airport's main terminal and extending to within 300 feet of the non-secure (public-side) face of the main terminal building, as well as public areas within ten feet of the Security Perimeter Fence (SPF) falls within a Restricted Public Area and is subject to restrictions as identified herein.

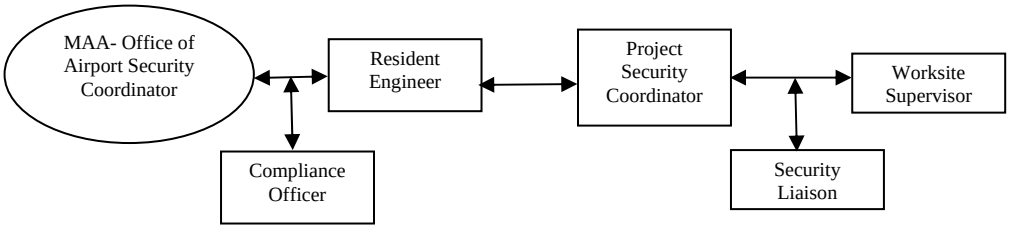
The Contractor must evaluate the SBP and ensure that it details all measures he/she will undertake to implement the requirements of this Specification for restricted public areas.

a. If the Contractor has no proposed changes to the SBP, the standard information as stated in this Specification shall be provided for final acceptance by MAA OAS in the PSP submission.

b. All work expected to be performed within ten (10) feet of either side of the SPF shall be included in the PSP. Should work within ten (10) feet of the SPF be added, a written amendment to the PSP must be submitted for approval to the OAS a minimum of thirty (30) calendar days prior to the commencement of such work. If at any point the work being performed requires the opening, repositioning, or dismantling of any portion of the SPF where access into the Airport's restricted area may be gained, an adequate number of security guards shall be provided by the Airport Security Contractor at the Contractor's expense. This information should be provided forty five (45) calendar days in advance to MAA OAS for coordination with TSA. If any damage to the SPF is noted at any time during the project, the Contractor must immediately notify Airport Operations at 410-859-7018 and make arrangements to provide Airport Security Contractor personnel to maintain security at the site of the damage until the damage is repaired by the Contractor and inspected and approved by the OAS. The Security Liaison shall assign a badged employee to stand at the breach location until relieved by the OAS or the Airport Security Contractor. If any

damage to the SPF results from the Contractor's work, the procedure above should be followed and the cost of the guards will be at the Contractor's expense.

c. Following is the general hierarchy of responsibility for personnel working in restricted public areas. Transportation Security Administration personnel may contact or challenge any individual at any point in the hierarchy. In most cases, the Resident Engineer will serve as the liaison between the OAS and the Contractor. However, direct coordination in emergency situations should be expected.



2.4

PROJECT SPECIFIC REQUIREMENTS. The project shall require that all procedures for escorting, badging, access, and security be followed as outlined above. In addition to the general requirements, specific requirements are included in this section.

As mentioned above, the following personnel must be available and maintained for this project:

a. *Project Security Coordinator (PSC)* - As defined above in Section 1.3, this individual must be assigned and available for all phases of construction. Each Project Security Plan sheet must identify the Contractor's proposed coordinator along with the available alternate. The coordinator must be available by phone during all work hours of this project (including all night work). The PSC can have other duties in addition to security but must be different from the Security Liaison.

b. *Escort*- As defined above in Section 1.3, this individual can escort up to five (5) individuals into the Airport's restricted areas. This individual could be either the PSC or the Security Liaison as long as the escorting regulation is followed as defined in this Specification. Any escort must be solely committed to escorting of individuals and should not have any other responsibilities during the time of escorting.

c. *Security Liaison* – As defined above in Section 1.3, this individual must be assigned and be on site for all phases of construction. The Security Liaison will need to be on site during all work hours and have radio contact with all of the identified escorts. The Security Liaison will be responsible on this project to provide the following each working day:

(1) Daily report of the escorts on site for all phases of construction;
(2) Maintain positive control of escorting personnel at all times;
(3) Identify the quantity of inspected and badged vehicles construction site(s).

The Security Liaison must be able to accurately present that the PSP is being implemented and enforced on the worksite to the TSA and/or MAA as required during the construction periods. As the project will require (see note to Engineer below)

> ***NOTE TO ENGINEER***: (ENGINEER SHOULD DESCRIBE CONDITIONS OF PROJECT AND ANY UNIQUE RESTRICTIONS FOR THE CONTRACTOR TO CONSIDER, INCLUDE ANY APPROPRIATE TRAINING REQUIRED FOR THE MOVEMENT AREA ACCESS)
>
> EXAMPLE: night work activities and closure of the airport's runways, the Security Liaison shall also have radio access to the Air Traffic Control Tower (ATCT) and maintain continuous contact with all worksite supervisors and subcontractors to confirm that all security issues for the project are responded to expeditiously.

d. *Worksite Supervisor*- As defined above, the worksite supervisor must be available if activities are occurring in multiple areas at the same time. The Contractor shall assign a supervisor and the Security Liaison shall maintain continuous radio contact with the supervisor at all times during work hours.

e. *Guards* - Guards shall be limited to eight (8) hour shifts to the maximum extent possible. Guards can work a maximum of 16-hours only if approved in writing prior to the starting the shift by the MAA OAS. Every four (4) guards will require a breaker guard (1 individual for relief) to be available during the entire shift. Therefore, Contractor must assume that any requirement up to four (4) guards includes an additional guard to act as a breaker (total of 5 guards).

The Security Bid Plan (SBP) is included in the contract drawings for this project and includes the following:

(1) Project specific security requirements coordinated in detail with Project phasing.

(2) Project Phases and the durations of each phase. (as shown on contract documents)

(3) Guard locations.

(4) Access points/SIDA entrance/security guard locations. The designer shall make note of anticipated processing times at access points, if any inspections should be anticipated, etc. The designer shall make note that

the Contractor shall consider the processing time when computing his bid price for this item.

(5) Delivery routes.

(6) Identification of worksites.

(7) Locations/phases where an escort from MAA Operations is required.

(8) Signature Block with OAS Project Security Plan

The SBP shall be used as a basis for the PSP submittal after a Contractor has been awarded the project. Contractor shall request and obtain any necessary documentation from the OAS for PSP submission. The OAS requires a thirty (30) calendar day period for review of the PSP. Consider that more than one submittal may be required when scheduling the submittal.

Upon completion of the PSP, a meeting shall be set up with the OAS. If the plans are intended to be final, three sets of PSP shall be brought to the meeting so that if they are approved without changes, three original signatures shall be obtained at the meeting - one set of PSP will remain on file with the OAS; one set of PSP will remain with the Resident Engineer; and the other will become part of the Contract Documents.

The mobilization or submittal duration for this contract has been set to allow the Contractor time to obtain PSP submittal approval by OAS. Construction Notice To Proceed (NTP) will only be granted following approval of PSP by MAA OAS. If acceptance of the PSP occurs after the specified thirty (30) calendar day period, due to late or non-conforming submissions by the Contractor, the contract performance time specified elsewhere in the contract shall be reduced by the number of days of delay in acceptance of the PSP.

2.5 ACCESS TO THE SITE. Access point locations for this project to the airfield are shown on the construction phasing plans and SBP's and PSP's. Gate usage will vary from phase to phase and shall be as shown on the Contract Documents.

a. All perimeter fence gates (manual and automatic) shown on the Contract Drawings as being contractor controlled shall be secured and staffed by MAA OAS approved Airport Security Contractor personnel. The Contractor shall provide a minimum of 30 days notice to the MAA OAS prior to utilizing any gate for project access and confirm with the MAA OAS that the Contractor's plans for providing appropriate security personnel will be adequate. Any access portal (gates/doors) found to be unsecured, or cause any entry by any unauthorized person(s) and/or vehicle(s) as a result of the Contractor's failure to follow proper Airport Security procedures per this specification shall subject the Contractor to TSA-imposed fine(s), work stoppage; and/or suspension/revocation of the violator(s) BWI Marshall Access Badge.

Project specific TSA-mandated security rules and regulations, as well as, BWI Airport Security Program requirements will be provided by the OAS to the successful bidder.

METHOD OF MEASUREMENT

3.1 No direct measurement will be made for Security Requirements During Construction as payment will be made on an hourly basis. Perimeter guard staffing will be measured by the hour. Vehicle/Staffing will be measured by the hour. This includes Gate guards, Breakers, Escorts, etc. or any staffing required for implementation of the Project Security Plan.

BASIS OF PAYMENT

4.1 Payment will be made at the contract unit bid price for "Security Requirements During Construction – Perimeter Guards/Rover/Gate Guards" and "Security Requirements During Construction - Vehicle/Staffing. "Security Materials/Equipment" will be made per lump sum bid price. This payment shall be full compensation for all costs associated with the security requirements identified in this Specification and shall include all labor, materials, training, and equipment required to complete the work specified. This cost shall include establishment and removal of security perimeter/s; badging of employees; registering of airfield vehicles; provision of all Security Liaisons, designated alternates; internal secure perimeter system guards; supplemental perimeter guards; escorts; provision of equipment for appropriate identification of personnel of varying security clearance levels (i.e. hardhats); and all other items related to the provision of security for the site(s). In developing costs, the Contractor shall consider that the MAA is responsible for costs associated with perimeter guards under normal operating conditions (i.e. Power Gate G guards for every day usage) except when a security breach is caused by the Contractor's work (as noted in 2.1e; and 2.2b). However, in order to expedite construction, the Contractor shall staff perimeter gate locations (i.e. Gate G) with supplemental perimeter guards during heavy construction vehicle volume conditions as directed and approved by the Director of the OAS. The Contractor shall consider that they are responsible for the supplemental perimeter guard costs. Providing guards at gates utilized for construction access purposes that would not regularly require that staffing, or currently have no guards (i.e. Gate 55), should all be considered supplemental and shall be the responsibility of the Contractor. The Contractor is also responsible for breaker guards with a minimum of 1 available for every four (4) guards needed. A breaker guard will be required up to every 4 guards.

Payment for these items will be made per hour for individuals and lump sum for the equipment required. Staffing hourly backup will be required based on tracked timesheets for all individuals used for security on-site by the MAA-approved security contractor company. The first payment on the lump sum item will be ten percent (10%) of the bid price for that item and shall be included in the first progress estimate following the initiation of construction work. The remaining ninety percent (90%) of the lump sum item price will be included as installments in subsequent progress estimates as the project progresses.

Payment will be made under:

Item X-1.1 Perimeter Guards/Rover/Gate Guards – per hour

Item X-1.2 Vehicle/Staffing – per hour

Item X-1.3 Security Materials/Equipment – per lump sum

END OF ITEM X-1

SENSITIVE SECURITY INFORMATION (SSI) SPECIFICATION

MARTIN STATE AIRPORT

BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

ITEM X-2 – SENSITIVE SECURITY INFORMATION (SSI) SYSTEM REQUIREMENTS DURING CONSTRUCTION

DESCRIPTION

2-1.1 DESCRIPTION. This item shall consist of all labor, materials and effort necessary to prepare and execute a Contractor's Sensitive Security Information (SSI) Management Plan for the project. The management plan shall be completed in accordance with these specifications.

2-1.2 RELATED DOCUMENTS. Drawings and general provisions of the Contract, including Maryland Department of Transportation/Maryland Aviation Administration Standard Provisions for Construction Contract, Volume I, December 1993, and Interim Standards Provision Addendum (ISPA) dated February 2004 for Construction Contracts; and other Technical Specification Sections, apply to this Section.

2-1.3 SSI REQUIREMENTS DOCUMENTATION. It is the Contractor's responsibility to become thoroughly familiar with the various aspects of 49 CFR 1542, *Transportation Security Administration, Department of Transportation, Airport Security* and the Maryland Aviation Administration (MAA) Design Standard for the Management of SSI. Any violation by the Contractor or his Subcontractors and any subsequent fines or civil penalties imposed due to a violation of these requirements will be the responsibility of the Contractor.

2.1.4 AFFECTED SECURITY SYSTEMS. Design and information concerning the following security systems and their components in use at Baltimore/Washington International Thurgood Marshall Airport (BWI Marshall) and Martin State Airport (MTN) constitute SSI:

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

b. **CASS.** The Controlled Access Security System (CASS) provides a means of opening and closing doors to secure areas through the use of a card reader and data contained on an access card (MAA Security Badge). The system produces an automated log of all activity and interfaces with other security systems.

Additionally, there are subsystems which use the same components for limited, related applications.

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

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

Each of these security systems is maintained and/or operated by a sole source system contractor with whom the Contractor shall coordinate during bidding and construction.

2.1.5 DEFINITIONS.

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

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

c. *Contractor*. The entity that has been awarded a contract by MAA and will construct the SSI project using his employees and/or those of a subcontractor he subsequently employs. The Contractor is responsible for the safeguarding and management of SSI by all employees and subcontractors in his charge throughout the entire duration of the project.

d. *Covered Person.* An individual or entity with transportation security or transportation security-related responsibilities. Covered persons include appropriate MAA employees, consultants, contractors (and their sub-contractors),

as well as stakeholders and industry partners. A list of covered persons is contained in 49 CFR 1520.7.

e. *Freedom of Information Act (FOIA).* The Federal Law ensuring public access to U.S. government records. FOIA carries a presumption of disclosure; the burden is on the government to substantiate why information may not be released. Upon written request, agencies of the United States government are required to disclose those records, unless they can be lawfully withheld from disclosure under one of nine specific exemptions in the FOIA. This right of access is ultimately enforceable in federal court. SSI is exempt from the provisions of FOIA.

f. *MAA Project Manager (Construction).* The MAA Facilities Development and Engineering or Information Technology (IT) staff member designated to direct and to manage the construction of projects involving SSI. The MAA Project Manager (Construction) bears responsibility for the safeguarding and management of SSI by all construction management team members in his charge throughout the entire duration of the project.

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

h. *Need to Know.* A designation made by a responsible MAA Project Manager which is limited to persons who carry out, supervise, or are in training for transportation security activities, if necessary, for the performance of their job.

i. *Project SSI Coordinator.* The individual designated by the Contractor who is responsible for ensuring compliance by all Contractor and Subcontractor personnel for SSI safeguarding and management. An alternate shall be designated as a secondary contact, but SSI responsibility remains with the Project SSI Coordinator. The Project SSI Coordinator and the designated alternate shall undergo MAA SSI training and obtain an MAA Security (Red) Badge.

j. *Project SSI Management Plan.* A plan, developed by the Contractor and approved by the MAA Construction Manager, that addresses the management, reproduction, accounting, security, storage and return of SSI in accordance with provisions contained herein. Minimum content requirements are listed in the REQUIREMENTS section of this Specification.

k. *Sensitive Security Information (SSI).* A category of information that requires protection because public disclosure would be detrimental to the security of transportation. SSI is considered Sensitive But Unclassified (SBU). Civil penalties are assigned for unauthorized disclosure of SSI. Classified national security information is subject to more stringent handling requirements. Criminal penalties can be incurred for unauthorized release of classified national security information.

l. *Sole Source System Contractor*. An employee of the sole source contractor that provides operation and maintenance for one of the four identified physical security systems (CASS, CCTV, Flex Response and CAD) whose components constitute SSI.

m. *Transportation Security Administration (TSA).* An agency of the United States Federal Government (Executive Branch) responsible for Civil Aviation Security through the enforcement of regulations (under Title 49) designed to safeguard Civil Aviation Operations against acts of violence or acts of unlawful interference. TSA is responsible for the safety and security of passengers, flight crews, ground operations personnel, and the general public.

REQUIREMENTS

2-2.1 GENERAL REQUIREMENTS. All project documents and other media containing SSI shall be safeguarded and managed by the Contractor's Project SSI Coordinator in accordance with this specification. The Contractor shall prepare and submit for approval by the MAA Construction Manager a Project SSI Management Plan. The Contractor shall be required to submit the SSI Management Plan after receipt of a Notice of Recommended Award (NORA) and the Contractor's SSI Management Plan must be accepted by MAA before MAA will issue a Notice to Proceed (NTP) for the project.

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

Documents covered as SSI include, but are not limited to, contract plans and specifications, submittals, shop drawings, requests for information (RFIs), contract revisions, system drawings, system manuals, software documentation, training

documents and materials operation and maintenance manuals and system codes.

The Contractor shall coordinate with the Sole Source System Contractor(s) for the execution of work on physical security systems associated with this project that contains SSI.

2-2.2 MARKING AND HANDLING OF SSI. The following shall apply:

a. Protective Marking of media containing SSI:

General - Any person who creates a record containing SSI shall include a protective marking and distribution limitation statement.

Paper ("Hard Copy") - All SSI documents shall contain this protective marking in the document header:

Sensitive Security Information

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

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

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

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

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

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

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

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

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

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

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

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

Electronic - SSI contained on electronic media and magnetic media must have the protective marking and the distribution limitation statement applied at the beginning and end of the electronic and magnetic text; on each side of the disk and the disk sleeve/jacket; on the non-optical side of the CD-ROM, DVD or other format disk; and on both sides of the CD-ROM, DVD or other format disk case. Memory sticks that contain SSI shall be indelibly marked "SSI" on both sides of the devise.

Electronic Mail (e-mail) - SSI contained within an electronic mail message must include the protective marking within the subject line of the message and the distribution limitation statement applied at the end of the message text.

b. Protection and Safeguarding of SSI:

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

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

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

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

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

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

c. Transmission of SSI:

Non-electronic methods:

Mail – SSI may be transmitted by First Class mail, regular Parcel Post, or by delivery services (Federal Express or UPS).

Interoffice mail – SSI must be transmitted in a sealed envelope to prevent inadvertent visual disclosure.

Hand-carrying between buildings – SSI material carried by hand within or between buildings must be protected to prevent inadvertent visual disclosure.

Electronic methods:

Electronic Mail (e-mail) - When transmitted by e-mail, SSI must be in a password-protected attachment. The passwords and procedures must comply with standards set by the MAA DOAS. Passwords shall contain no fewer that five characters that are a combination of letters and numbers. Passwords cannot accompany the protected file.

Web Posting - MAA does not authorize the posting of SSI on Internet or intranet sites, unless the site has met prescribed MAA security standards.

Facsimile - The sender of SSI transmitted by facsimile must confirm that the fax number of the recipient is current and valid and the intended recipient can promptly retrieve the information.

Facsimiles sent to a controlled, secure area where unauthorized people cannot intercept the SSI material may be sent without requiring the recipient to be there.

Telephone - For SSI communicated via telephone, the caller must ensure that the person receiving the SSI is a "covered person" with "a need to know."

People transmitting SSI via telephone should avoid cellular or cordless phones.

d. Destruction of SSI:

When copies of records containing SSI are no longer needed, they must be promptly and completely destroyed. The objective of destruction is to preclude recognition or reconstruction of the information. Any means approved for the destruction of national security classified material may also be used for SSI. The preferred method of destruction is shredding. The Construction Manager shall supervise and coordinate the destruction of SSI and will ensure destruction at the earliest appropriate time.

When a Contractor proposes to destroy records containing SSI, the Contractor must first provide notification in writing, to the Construction Manager for approval. This notification must include the following minimum information; identification of information to be destroyed, quantities of copies, date and place of destruction, method of destruction, and residual SSI remaining in the custody of the Contractor. After destruction of the documents, the Contractor shall submit to the Construction Manager a certification and register of all documents destroyed.

2-2.3 CONTRACTOR'S SSI MANAGEMENT PLAN. The following information shall, at a minimum, be included in the Contractor's SSI Management Plan:

1. Name and contact information for the Project SSI Coordinator and designated alternate;
2. Name and contact information for the MAA Project Manager (Construction);
3. Name and contact information for the Construction Manager;
4. Name(s) and contact information of the sole source system contractor(s);
5. Roster (Full name, Date of Birth, Social Security Number (SSN) and/or MAA Security Badge Number) of Contractor and Subcontractor "covered persons" with the "need to know" by security system;
6. Names of Contractors and Subcontractors personnel who will possess or hold SSI documents and information. These personnel will be required to pass a TSA Criminal History Record Check (CHRC) and a TSA Security Threat Assessment (STS) and undergo MAA SSI training.
7. A description of the means employed by the Contractor by which reproduction of SSI shall be minimized during the project;
8. Physical description of the means of storage of all media containing SSI in Contractor and Subcontractor offices;
9. Physical description of the means of storage of all media containing SSI by Contractor and Subcontractor personnel on the project site;
10. Internal procedures for the reproduction and accounting of all documents (plans, specifications, shop drawings, cut sheets, *etc*) used by the Contractor and Subcontractor employees.
11. Method of accounting and means of destruction of any SSI documents in possession of the Contractor or their subcontractors.
12. Any other control measures deemed necessary by the Contractor.

The Contractor's SSI Management Plan is not considered SSI.

METHOD OF MEASUREMENT

2-3.1 No direct measurement will be made for SSI System Requirements During Construction.

BASIS OF PAYMENT

2-4.1 Payment will be made at the lump sum bid price for "SSI System Requirements During Construction." This payment shall be full compensation for all costs associated with the SSI requirements identified in this Specification and shall include all labor, materials, training, and equipment required to prepare and comply with the requirements specified.

Payment for these items will be made in installments throughout the project. The first payment of 25% of the lump sum price will be included in the first progress estimate. The remaining 75% of the lump sum price will be included as installments in subsequent progress estimates. Each such installment will be determined based on the ratio of the total work completed to date to the total contract amount.

Payment will be made under:

Item X-2 SSI System Requirements During Construction - per lump sum

END OF ITEM X-2

MAINTENANCE, REPAIR, AND OPERATING ITEMS (MROI)

MARTIN STATE AIRPORT

BWI BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

ITEM X-3 – MAINTENANCE, REPAIR AND OPERATING ITEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings, General Provisions, Special Provisions of the Contract, including Interim Standard Provisions Addendum and Technical Specification sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements governing Maintenance, Repair and Operating Items (MROI).

1.3 DEFINITIONS

A. MROI is an amount, incorporated in the Contract as excess construction materials or equipment, held to allow for maintenance, repairs and operations. MROI may also be referred to as "attic supplies" or "attic stock."

1.4 PROCEDURES

A. Measurement and Payment: See individual Specification sections or plan notes for work that requires establishment of MROI. Methods of measurement and payment for MROI are specified in those Sections or notes.

B. List of MROI: A schedule of MROI entitled "MROI List" is included at end of Section. Specification sections or plan notes referenced in the schedule contain requirements for materials described that must be purchased or salvaged for MROI. If during construction the Contractor generates additional surplus materials to be turned over to the MAA, the Contractor shall add those materials to the "MROI List." Contractor must complete the 'Unit Price Value,' 'Total Value' and 'Date Delivered' on "MROI List."

C. Record of Delivery: Contractor shall complete "Record of Delivery" form for each MROI to be delivered to MAA. "Record of Delivery" form can be found at the end of the Section. The Contractor shall coordinate through the Engineer the delivery and acceptance of purchased or salvaged MROI at the MAA Warehouse (or at another location if so designated in the Specifications sections or plan notes), completion of the "Record of Delivery" form, and any other required documentation.

****

The designer is required to fill out the Table entitled "MROI List" and include it at the end of Section. The designer shall include blank lines at the bottom of the list for additional MROI generated during construction. The designer shall complete the columns for the serial number, specification section, material/product/description, quantity and units. A specific quantity and

measurable unit is required which corresponds to the justification provided in the Engineer's Report. A percentage of materials is not acceptable.

****

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine products purchased under an MROI promptly on delivery for damage or defects. Replace damaged or defective products.

3.2 DELIVERY

A. Contractor must complete the 'Unit Price Value,' 'Total Value' and 'Date Delivered' columns in the "MROI List" and complete a "Record of Delivery" form at time of delivery, for each item in order to document item and quantity received by MAA. Contractor shall add to the list any additional MROI generated during construction.

PART 4 -MEASUREMENT

4.1 METHOD OF MEASUREMENT

A. No separate measurement will be made for work under this Section.

PART 5 –PAYMENT

5.1 BASIS OF PAYMENT

A. No separate payment will be made for work under this Section. The cost of the work described in this section shall be included in the individual referenced Specification sections.

5.2 RELEASE OF FINAL PAYMENT

A. Release of Final Payment and Contract Close-Out will not occur until Contractor completes administrative and procedural requirements outlined in this Section.

END OF ITEM X-3

MANAGEMENT OF WASTES

MARTIN STATE AIRPORT

BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

ITEM X-105 MANAGEMENT OF UNIVERSAL WASTES

DESCRIPTION

105-1.1 This item provides specifications for the characterization, handling, storage, transport, and disposal of universal wastes (UW) generated as a result of this construction contract. UWs are a class of hazardous waste which are subject to less stringent regulation than hazardous wastes. UW generated from construction projects at the Maryland Aviation Administration (MAA) properties may include mercury-containing equipment, batteries, mercury-containing lamps or bulbs, and fluorescent light ballasts that contain polychlorinated biphenyls (PCBs).

Examples of wastes which may fall under this category of UW include:

- Mercury-containing Lamps or Bulbs
  - Fluorescent light tubes (FLTs)
  - Compact fluorescent bulbs
  - Neon lights
  - High intensity lamps
  - Sodium vapor lamps
- Mercury-containing Equipment
  - Thermostats and thermometers
  - Gas flow regulators
  - Pressure or vacuum gauges (e.g. u-tube manumeters, barometers)
  - Switches (e.g. tip switches in portable heaters, silent wall switches)
- Batteries
  - Lead-acid batteries
  - Nickel-cadmium batteries

The contractor must manage the UW generated under this contract per applicable federal and state regulations for small quantity-handlers of UW as described below. A small quantity-handler (SQH) of UW is defined as a universal waste handler that does not accumulate 5,000 kilograms or more of universal waste at any time during a calendar year.

State regulations pertinent to UW management within Maryland are found in the Code of Maryland Regulations 26.13.10. Management of UW includes, but is not limited to, the characterization, handling, storage, transport, and disposal of UW. The Contractor shall designate an employee to oversee the proper management of UW generated under this contract. All activities shall conform to the standards described in this specification and or as directed by the Engineer.

105-1.2 WASTE CHARACTERIZATION. Contractors must properly characterize wastes prior to disposal in a manner that meets Federal and State regulations. Waste lamps, mercury-containing equipment, batteries, and PCB-containing ballasts characterized as hazardous waste must be managed as UW. Methods of characterization include the use of owner/generator knowledge and material analysis performed by a laboratory designed for such analyses. Either method may be used, but waste evaluations must be able to be substantiated. For construction waste, the use of owner/generator knowledge should be based on Material Safety Data Sheets which MAA may supply upon request or data from reliable sources regarding waste produced from similar activities. Material analyses require correct sampling procedures to be performed; therefore the Contractor shall communicate with a laboratory prior to sampling suspect hazardous waste materials for proper sampling techniques.

For suspect UW, the Contractor shall assume that suspect UW *is* UW and manage the waste in accordance with this specifications. In some cases, nonhazardous wastes may be labeled by the manufacturer as such. For example, most PCB-free ballasts are labeled "No PCBs" (all ballasts manufactured after 1978 do not contain PCBs). In most cases, however, suspect UW wastes do not contain manufacture content labels, such as FLTs. Since most FLTs do contain mercury in concentrations which require managing the FLTs as UW, contractors should assume that FLTs are UW and manage them as such. Other wastes, such as switches and gauges, should be analyzed before disposal.

MATERIALS

105-2.1 Not Applicable.

CONSTRUCTION METHODS

105-3.1 HANDLING AND ACCUMULATION. All UW must be handled and accumulated in such a manner as to prevent a release to the environment. Contractors shall use containers to store the waste which minimize the chances of a waste release and accumulate the waste in areas which reduce the chances of a release to the environment. Some UWs, such as bulbs, are fragile and require special care in handling and accumulation. For waste FLTs, a common storage technique is to immediately store the waste in sleeves within cardboard boxes or cylinders following the generation of the waste (i.e. removal from a light fixture). These containers must be large enough to fully protect all the FLTs in the container and have lids or other features that allow the containers to be closed when not in use. Generally, the following guidelines should be met when considering container types for UW:

- The container must be closed;
- The container must be structurally sound;

- The container must be compatible with the contents of the waste; and
- The container must lack evidence of leakage, spillage, or damage that could cause a release under reasonably foreseeable conditions.

Contractors must label or mark containers which contain UW or label or mark the waste per state regulations. To identify UW, a colored label is affixed typically to the container. State regulations require that the container be marked with one of three phrases:

- "Universal waste--*name of waste*",
- "Waste *name of waste*", or
- "Used *name of waste*".

Additionally, the waste must be marked with the accumulation start date, or the date that the first waste was placed in the container.

The Contractor shall designate and clearly identify a specific location within the construction site to accumulate containers of UW. The location should be away from areas where construction activities occur which could damage UW, but easily accessible to the Contractors' staff. When the Contractor expects to generate large quantities of UW from a construction project, the Contractor must coordinate with MAA's Division of Environmental Compliance (DEC) thru the Engineer to identify proper accumulation areas and a timeline for disposal.

The Contractor may not accumulate wastes on MAA property longer than the Federal or State guidelines permit, or as directed by the Engineer, or beyond the date of the end of the Contract, whichever is shorter. Regulations require accumulation of UW no longer than one year after the accumulation start date (date that the first UW was placed in that container).

105-3.2 RESPONSE TO RELEASE. If a release to the environment occurs, the Contractor shall determine whether any of the material resulting from a release is a hazardous waste. If the material is a hazardous waste, the waste must be managed per hazardous waste (not universal waste) regulations. Should a release to the environment occur; the Contractor shall notify the Engineer and the Airport Operations Center (AOC) of the incident via telephone immediately and provide the following Information:

- Location and time of incident
- Name and/or type of material spilled or released
- Amount and size of container(s) from which spill or release occurred
- Dangerous properties of the material
- Identification of personnel involved
- Type of personal injuries, if any
- Any actions taken to remediate the release

MAA will be responsible for notifying the Maryland Department of the Environment (MDE) of the release. Contractor shall notify MAA's DEC.

105-3.3 TRANSPORT AND DISPOSAL. The contractor must transport or ensure the transport of UW waste to a disposal or recycling facility in a manner which meets all Federal and State transportation guidelines for UW. Most hazardous waste haulers will accept UW. The Contractor is prohibited from processing, diluting or treating the waste on MAA's property.

Unlike hazardous waste, UW shipments do not need to have manifests completed prior to shipping—shipping papers, bills of lading, or similar documents identifying the transfer of waste from the Contractor to a waste hauler are approved forms of documentation. Shipping documents should have the following information on them:

- The name and address of the originating UW handler or foreign shipper from whom the UW was sent;
- The quantity of each type of UW received; and
- The date of receipt of the shipment of UW.

Once completed, the contractor must provide legible copies of shipping documents to the Engineer for submittal to the MAA's Division of Environmental Compliance.

Waste haulers may use manifests to document waste transfer. In these cases, the Contractor shall provide the hauler with MAA's Environmental Protection Agency Identification Number (EPA ID Number) for inclusion on all manifests.

- For wastes generated from BWI Marshall the Contractor must use the following identification number: MDD041354002.
- For wastes generated from MTN the Contractor must use the following identification number: MDD980918973.

When manifests are used, the Contractor must provide copies of the manifest to the Engineer upon receipt and copies of the signed returned manifest from the transport, storage, and disposal facility (TSDF) or other facility immediately upon receipt.

105-3.4 TRAINING. Contractors must communicate the management requirements and release response procedures described in this Item "Management of Universal Waste" to their employees who handle or have responsibility for managing universal waste. This communication should be documented.

105-3.5 INSPECTION OF JOB SITES - Federal, State and/or MAA representatives reserve the right to inspect contractors' job site(s) to observe work practices associated with the requirements identified herein.

METHOD OF MEASUREMENT

105-4.1 No separate measurement will be made for work performed under this Specification Section.

BASIS OF PAYMENT

105-5.1 No separate payment will be made for work performed under this Specification Section. The cost of the work, complete in place, described in this Specification Section shall be included in the respective bid price under Item **XX-XXX** "Demolition". Costs include all labor, material, services, and equipment necessary to complete the work in every respect.

END OF ITEM X-105

ITEM X-110 MANAGEMENT OF RADIOACTIVE WASTES

DESCRIPTION

110-1.1 This item provides specifications for the identification, handling, storage, transferring, and disposal of common radioactive wastes generated at MAA properties as a result of this construction contract. Common radioactive wastes generated during the construction of this project includes self-luminous exit signs that may contain radioactive gas, such as tritium or radium.

The contractor must manage the radioactive wastes generated under this contract per applicable federal and state regulations. Federal regulations that govern tritium or radium-containing signs are found in the Nuclear Regulatory Commission regulations, 10 CFR 31. Management of waste radioactive exit signs includes, but is not limited to, the identification, handling, transferring, and reporting of these signs. The Contractor shall designate an employee to oversee the proper management of radioactive wastes generated under this contract. All activities shall conform to the standards described in this specification and or as directed by the Engineer.

110-1.2 **IDENTIFICATION**. It is the responsibility of the Contractor to correctly identify the presence of radioactive material in all waste exit signs generated from the contractor's project at MAA. Exit signs which contain tritium usually have a permanent warning label which mentions the presence of tritium (H-3); displays the three bladed radiation warning symbol; and states "Caution-Radioactive Materials". The tritium or radium is housed within the sign in a small glass tube. In some cases, labels may not be present on exit signs, but the signs may contain tritium, radium, or other radioactive material. For these unmarked signs, the Contractor should have the waste exit signs analyzed for radiation levels.

MATERIALS

110-2.1 Not Applicable.

CONSTRUCTION METHODS

110-3.1 **HANDLING.** The Contractor shall handle radioactive waste exit signs in a manner that ensures that the radioactive waste is not released. The Contractor shall use containers to store the waste and/or store the waste in areas which reduce the chances of release.

General container guidelines are as follows:

- The container must be closed;
- The container must be structurally sound; and

- The container must lack evidence of leakage, spillage, or damage that could cause a release under reasonably foreseeable conditions.

The Contractor shall designate and clearly identify a specific location for containers that contain radioactive exit signs. The location should be away from areas where construction activities occur which could damage the container or sign, but easily accessible to staff.

110-3.2 RESPONSE TO RELEASE. Should damage to a sign occur, the Contractor should not handle the sign, and evacuate personnel from the immediate area. The contractor should prevent entry to the area and if possible ventilate the area to the outside. The Contractor shall notify the Engineer and the Airport Operations Center (AOC) of the incident via telephone immediately and provide the following information:

- Location and time of incident
- Name and/or type of material spilled or released
- Amount and size of container(s) from which spill or release occurred
- Dangerous properties of the material
- Identification of personnel involved
- Type of personal injuries, if any

MAA will be responsible for notifying the Maryland Department of the Environment (MDE) of the release. Contractor shall notify MAA's Department of Environmental Compliance (DEC).

110-3.3 TRANSFERRING. Federal regulations allow exit signs to be reused in the same location if specified for re-use in the contract documents; however exit signs may not be resold or used in other locations. When a radioactive waste exit sign is deemed "waste", the contractor shall arrange to transfer the sign to a "specific licensee" for disposal, such as a manufacturer, distributor, licensed radioactive waste broker, or licensed low-level disposal facility. In the majority of instances, the tritium exit sign can be returned to the manufacturer. The address of the manufacturer usually can be found on the back of the tritium exit sign. The manufacturer can provide instructions on how to ship the tritium exit sign safely. The Contractor must transport or ensure the transport of radioactive waste to a disposal or recycling facility in a manner which meets all federal and state transportation guidelines for such material. The Contractor may not accumulate wastes on MAA property longer than the federal or state guidelines permit, or as directed by the Engineer, or beyond the date of the end of the contract, whichever is shorter.

110-3.4 REPORTING. Five working days prior to the transfer of a radioactive waste exit sign, the Contractor shall inform the Engineer and the MAA's Division of Environmental Compliance (DEC) of the impending transfer and provide requested information to the Engineer and DEC about the transfer. This information shall include the device manufacturer's (or distributor's) name, model number and serial

number; the name, address, and license number of the person receiving the device; and the expected date of transfer. The Engineer and /or MAA reserve the right to halt the transfer should the Contractor not abide by regulations or MAA requirements as described herein. MAA will be responsible for notifying MDE of the transfer within 30 days of transfer.

Waste haulers may use manifests to document waste transfer. In these cases, the Contractor shall provide the hauler with MAA's Environmental Protection Agency Identification Number (EPA ID Number) for inclusion on all manifests.

- For wastes generated from BWI Marshall the Contractor must use the following identification number: MDD041354002.
- For wastes generated from MTN the Contractor must use the following identification number: MDD980918973.

When manifests are used, the Contractor must provide copies of the manifest to the Engineer upon receipt and copies of the signed returned manifest from the transport, storage, and disposal facility (TSDF) or other facility immediately upon receipt.

110-3.5 INSPECTION OF JOB SITES. Federal, State and/or MAA representatives reserve the right to inspect contractors' job site(s) to observe work practices associated with the requirements identified herein.

METHOD OF MEASUREMENT

110-4.1 No separate measurement will be made for work performed under this Specification Section.

BASIS OF PAYMENT

110-5.1 No separate payment will be made for work performed under this Specification Section. The cost of the work, complete in place, described in this Specification Section shall be included in the respective bid price under Item **XX-XXX** "Demolition". Costs include all labor, material, services, and equipment necessary to complete the work in every respect.

END OF ITEM X-110

CRUSHED AGGREGATE BASE COURSE

MARTIN STATE AIRPORT

BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

ITEM P-209 CRUSHED AGGREGATE BASE COURSE

DESCRIPTION

209-1.1 This item consists of a base course composed of crushed aggregates constructed on a prepared course in accordance with these specifications and in conformity to the dimensions and typical cross sections shown on the plans.

MATERIALS

209-2.1 **AGGREGATE**. Aggregates shall consist of clean, sound, durable particles of crushed stone, crushed gravel, or crushed slag and shall be free from coatings of clay, silt, vegetable matter, and other objectionable materials and shall contain no clay balls. Fine aggregate passing the No. 4 (4.75 mm) sieve shall consist of fines from the operation of crushing the coarse aggregate. If necessary, fine aggregate may be added to produce the correct gradation as outlined in paragraph 209-2.2. The fine aggregate shall be produced by crushing stone, gravel, or slag that meet the requirements for wear and soundness specified for coarse aggregate.

The crushed slag shall be an air-cooled, blast furnace slag and shall have a unit weight of not less than 70 pounds per cubic foot (1.12 Mg/cubic meter) when tested in accordance with ASTM C 29.

The coarse aggregate portion, defined as the material retained on the No. 4 (4.75 mm) sieve and larger, shall contain not more than 15 percent, by weight, of flat or elongated pieces as defined in ASTM D 693 and shall have at least 90 percent by weight of particles with at least two fractured faces and 100 percent with at least one fractured face. The area of each face shall be equal to at least 75 percent of the smallest midsectional area of the piece. When two fractured faces are contiguous, the angle between the planes of fractures shall be at least 30 to count as two fractured faces.

The percentage of wear shall not be greater than 45 percent when tested in accordance with ASTM C 131. The sodium sulfate soundness loss shall not exceed 12 percent, after 5 cycles, when tested in accordance with ASTM C 88.

The fraction passing the No. 40 (0.42 mm) sieve shall have a liquid limit no greater than 25 and a plasticity index of not more than 4 when tested in accordance with ASTM D 4318. The fine aggregate shall have a minimum sand equivalent value of 35 when tested in accordance with ASTM D 2419.

a. **Sampling and Testing**. Aggregates for preliminary testing shall be furnished by the Contractor prior to the start of production. All tests for initial aggregate

submittals necessary to determine compliance with the specification requirements will be made by the Engineer at no expense to the Contractor.

Samples of aggregates shall be furnished by the Contractor at the start of production and at intervals during production. The sampling points and intervals will be designated by the Engineer. The samples will be the basis of approval of specific lots of aggregates from the standpoint of the quality requirements of this section.

In lieu of testing, the Engineer may accept certified state test results indicating that the aggregate meets specification requirements. Certified test results shall be less than 6 months old. If certified test results are submitted, the following tests at a minimum must be submitted:

1. Percent of Wear (ASTM C 131).

2. Soundness (ASTM C 88).

3. Liquid Limit and Plasticity Index (ASTM D 4318).

4. Clay Lumps and Friable Particles (ASTM C 142).

5. Sand Equivalent (ASTM D 2419).

6. Flat or Elongated Particles (ASTM D 693, Paragraph 5 and ASTM D 4791).

7. California Bearing Ratio (ASTM D 1883-05).

Samples of aggregates to check gradation shall be taken by the Engineer at least two per lot. The lot will be consistent with acceptable sampling for density. The samples shall be taken from the in-place, compacted material. Sampling shall be in accordance with ASTM D 75, and testing shall be in accordance with ASTM C 136 and ASTM C 117.

b. **Gradation Requirements**. The gradation (job mix) of the final mixture shall fall within the design range indicated in Table 1, when tested in accordance with ASTM C 117 and ASTM C 136. The final gradation shall be continuously well graded from coarse to fine and shall not vary from the low limit on one sieve to the high limit on an adjacent sieve or vice versa.

TABLE 1. REQUIREMENTS FOR GRADATION OF AGGREGATE \1

Sieve Size	Design Range Percentage by Weight Passing Sieves	Job Mix Tolerances Percent
2 in (50.0 mm)	100	0
1-1/2 (37.0 mm)	95-100	+/- 5
1 in (25.0 mm)	70-95	+/- 8
3/4 in (19.0 mm)	55-85	+/- 8
No. 4 (4.75 mm)	30-60	+/- 8
No. 30 (0.60 mm)	12-30	+/- 5
No. 200 (0.075 mm)	0-8	+/- 3

\1\ Where environmental conditions (temperature and availability of free moisture) indicate potential damage due to frost action, the maximum percent of material, by weight, of particles smaller than 0.02 mm shall be 3 percent when tested in accordance with ASTM D 422. It also may be necessary to have a lower percentage of material passing the No. 200 sieve to help control the percentage of particles smaller than 0.02 mm.

The job mix tolerances in Table 1 shall be applied to the job mix gradation to establish a job control grading band. The full tolerance still will apply if application of the tolerances results in a job control grading band outside the design range.

The fraction of the final mixture that passes the No. 200 (0.075 mm) sieve shall not exceed 60 percent of the fraction passing the No. 30 (0.60 mm) sieve.

The job mix shall include an explicit windage (offset) factor for the expected increase in the percentage of minus #200 size particles due breakdown of larger particles during transport from stockpile to placement, but prior to compaction. A windage factor of 1% to 3% will be considered normal.

209-2.2 ADDITIONAL FINE MATERIAL. If additional fine material, in excess of that naturally present in the base course material, is necessary for correcting the gradation to the limitations of the specified gradation, or for the satisfactory bonding of the base material, or for changing the soil constraints of the material passing the No. 40 mesh sieve, it shall be uniformly blended and mixed with the base course material at the crushing plant or by an approved plant. There shall be no reworking of the base course material in place to obtain the specified gradation. The additional fine material for this purpose shall be obtained from the crushing of stone, gravel or slag and when used, shall be of a gradation as necessary to accomplish the specified gradation in the final mixed base course material. Any additional fine material shall be submitted to the Engineer for approval.

CONSTRUCTION METHODS

209-3.1 PREPARING UNDERLYING COURSE. The underlying course shall be checked and accepted by the Engineer before placing and spreading operations are started. Any ruts or soft yielding places caused by improper drainage conditions, hauling, or any other cause shall be corrected at the Contractor's expense before the base course is placed thereon. Material shall not be placed on frozen subgrade.

209-3.2 MIXING. The aggregate shall be uniformly blended during crushing operations or mixed in a plant. The plant shall blend and mix the materials to meet the specifications and to secure the proper moisture content for compaction.

209-3.3 PLACING. The crushed aggregate base material shall be placed on the moistened subgrade in layers of uniform thickness with a mechanical spreader.

The maximum depth of a compacted layer shall be 6 inches (150 mm). If the total depth of the compacted material is more than 6 inches (150 mm), it shall be constructed in two or more layers. In multi-layer construction, the base course shall be placed in approximately equal-depth layers.

The previously constructed layer should be cleaned of loose and foreign material prior to placing the next layer. The surface of the compacted material shall be kept moist until covered with the next layer.

209-3.4 COMPACTION. Immediately upon completion of the spreading operations, the crushed aggregate shall be thoroughly compacted. The number, type, and weight of rollers shall be sufficient to compact the material to the required density.

The moisture content of the material during placing operations shall not be below, nor more than 2 percentage points above, the optimum moisture content as determined by ASTM D 1557.

209-3.5 ACCEPTANCE SAMPLING AND TESTING FOR DENSITY. Aggregate base course shall be accepted for density on a lot basis. A lot will consist of one day's production where it is not expected to exceed 2400 square yards (2000 square meters). A lot will consist of one-half day's production where a day's production is expected to consist of between 2400 and 4800 square yards (2000 and 4000 square meters).

Each lot shall be divided into two equal sublots. One test shall be made for each sublot. Sampling locations will be determined by the Engineer on a random basis in accordance with statistical procedures contained in ASTM D 3665. Testing will be made by the Engineer at no expense to the Contractor.

Each lot will be accepted for density when the field density is at least 100 percent of the maximum density of laboratory specimens prepared from samples of the base course material delivered to the job site. The specimens shall be compacted and tested in accordance with ASTM D 1557. The in-place field density shall be determined in accordance with ASTM D 1556. If the specified density is not attained, the entire lot shall be reworked and/or recompacted and two additional random tests made. This procedure shall be followed until the specified density is reached.

In lieu of the core method of field density determination, acceptance testing may be accomplished using a nuclear gage in accordance with ASTM D 2922 and ASTM D 3017. The gage should be field calibrated in accordance with paragraph 4 of ASTM D 2922. Calibration tests shall be conducted on the first lot of material placed that meets the density requirements.

Use of ASTM D 2922 results in a wet unit weight, and when using this method, ASTM D 3017 shall be used to determine the moisture content of the material. Calibration and Standardization shall be conducted in accordance with ASTM standards.

If a nuclear gage is used for density determination, two random readings shall be made for each sublot.

209-3.6 FINISHING. The surface of the aggregate base course shall be finished by blading or with automated equipment especially designed for this purpose.

In no case will the addition of thin layers of material be added to the top layer of base course to meet grade. If the elevation of the top layer is 1/2 inch (12 mm) or more below grade, the top layer of base shall be scarified to a depth of at least 3 inches (75 mm), new material added, and the layer shall be blended and recompacted to bring it to grade. If the finished surface is above plan grade, it shall be cut back to grade and rerolled.

209-3.7 SURFACE TOLERANCES. The finished surface shall not vary more than 3/8 inch (9 mm) when tested with a 16-foot (4.8 m) straightedge applied parallel with or at right angles to the centerline. Any deviation in excess of this amount shall be corrected by the Contractor at the Contractor's expense.

209-3.8 THICKNESS CONTROL. The completed thickness of the base course shall be within 1/2 inch (12 mm) of the design thickness. Four determinations of thickness shall be made for each lot of material placed. The lot size shall be consistent with that specified in paragraph 3.5. Each lot shall be divided into four equal sublots. One test shall be made for each sublot. Sampling locations will be determined by the Engineer on a random basis in accordance with procedures contained in ASTM D 3665. Where the thickness is deficient by more than 1/2 inch (12 mm), the

Contractor shall correct such areas at no additional cost by excavating to the required depth and replacing with new material. Additional test holes may be required to identify the limits of deficient areas.

209-3.9 **MAINTENANCE**. The base course shall be maintained in a condition that will meet all specification requirements until the work is accepted. Equipment used in the construction of an adjoining section may be routed over completed portions of the base course, provided no damage results and provided that the equipment is routed over the full width of the base course to avoid rutting or uneven compaction.

The Contractor shall remove all survey and grade hubs from the base courses prior to placing any bituminous surface course.

METHOD OF MEASUREMENT

209-4.1 The quantity of Crushed Aggregate Base Course to be paid for will be determined by measurement of the number of square yards of material actually constructed, at the design thickness, and accepted by the Engineer as complying with the plans and specifications. Thickness in excess of the design thickness shall be considered as the specified thickness, and no measurement will be made of crushed aggregate base course which exceeds design thickness, unless authorized in writing by the Engineer.

BASIS OF PAYMENT

209-5.1 Payment shall be made at the contract unit price per square yard for Crushed Aggregate Base Course – [ ] inch depth. This price shall be full compensation for furnishing all materials, for preparing and placing these materials, and for all labor, equipment tools, and incidentals necessary to complete the item.

Payment will be made under:

Item P-209-5.1 Crushed Aggregate Base Course – [ ] inch depth – per square yard.

TESTING REQUIREMENTS

ASTM C 29 Unit Weight of Aggregate

ASTM C 88 Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate

ASTM C 117	Materials Finer than 75µm (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C 131	Resistance to Degradation of Small-Size Coarse Aggregate by abrasion and impact in the Los Angeles Machine
ASTM C 136	Sieve Analysis of Fine and Coarse Aggregates
ASTM C 142	Clay Lumps and Friable Particles in Aggregates
ASTM D 75	Sampling Aggregate
ASTM D 422	Particle Size Analysis of Soils
ASTM D 693	Crushed Aggregate for Macadam Pavements
ASTM D 698	Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 5.5-lb (2.49-kg) Rammer and 12-in (305mm) Drop
ASTM D 1556	Density of Soil in Place by the Sand-Cone Method
ASTM D 1557	Test for Laboratory Compaction Characteristics of Soil Using Modified Effort
ASTM D 1883	CBR (California Bearing Ratio) of Laboratory-Compacted Soils
ASTM D 2419	Sand Equivalent Value of Soils and Fine Aggregate
ASTM D 2922	Density of Soil and Soil-Aggregate in Place by Nuclear Methods
ASTM D 3017	Water Content of Soil and Rock in Place by Nuclear Methods
ASTM D 3665	Random Sampling of Construction Materials
ASTM D 4318	Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D 4791	Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate

END OF ITEM P-209

PLANT MIX BITUMINOUS PAVEMENTS

MARTIN STATE AIRPORT

BWI BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

ITEM P-401 PLANT MIX BITUMINOUS PAVEMENTS

DESCRIPTION

401-1.1 This item shall consist of pavement courses composed of mineral aggregate and bituminous material mixed in a central mixing plant and placed on a prepared course in accordance with these specifications and shall conform to the lines, grades, thicknesses, and typical cross sections shown on the plans. Each course shall be constructed to the depth, typical section, and elevation required by the plans and shall be rolled, finished, and approved before the placement of the next course.

MATERIALS

401-2.1 AGGREGATE. Aggregates shall consist of crushed stone, crushed gravel, or crushed slag with or without natural sand or other inert finely divided mineral aggregate. The portion of materials retained on the No. 4 (4.75 mm) sieve is coarse aggregate. The portion passing the No. 4 (4.75 mm) sieve and retained on the No. 200 (0.075 mm) sieve is fine aggregate, and the portion passing the No. 200 (0.075mm) sieve is mineral filler.

a. Coarse Aggregate. Coarse aggregate shall consist of sound, tough, durable particles, free from adherent films of matter that would prevent thorough coating and bonding with the bituminous material and be free from organic matter and other deleterious substances. The percentage of wear shall not be greater than 40 percent when tested in accordance with ASTM C 131. The sodium sulfate soundness loss shall not exceed 10 percent, or the magnesium sulfate soundness loss shall not exceed 13 percent, after five cycles, when tested in accordance with ASTM C 88.

Aggregate shall contain at least 70 percent by weight of individual pieces having two or more fractured faces and 85 percent by weight having at least one fractured face. The area of each face shall be equal to at least 75 percent of the smallest mid-sectional area of the piece. When two fractured faces are contiguous, the angle between the planes of fractures shall be at least 30 degrees to count as two fractured faces. Fractured faces shall be obtained by crushing.

The aggregate shall not contain more than a total of 8 percent, by weight, of flat particles, elongated particles, and flat and elongated particles, when tested in accordance with ASTM D 4791 with a value of 5:1.

Slag shall be air-cooled, blast furnace slag, and shall have a compacted weight of not less than 70 pounds per cubic foot (1.12 mg/cubic meter) when tested in accordance with ASTM C 29.

b. Fine Aggregate. Fine aggregate shall consist of clean, sound, durable, angular shaped particles produced by crushing stone, slag, or gravel that meets the requirements for wear and soundness specified for coarse aggregate. The aggregate particles shall be free from coatings of

clay, silt, or other objectionable matter and shall contain no clay balls. The fine aggregate, including any blended material for the fine aggregate, shall have a plasticity index of not more than 6 and a liquid limit of not more than 25 when tested in accordance with ASTM D 4318.

Natural (nonmanufactured) sand may be used to obtain the gradation of the aggregate blend or to improve the workability of the mix. The amount of sand to be added will be adjusted to produce mixtures conforming to requirements of this specification. The fine aggregate shall not contain more than 15 percent natural sand by weight of total aggregates. If used, the natural sand shall meet the requirements of ASTM D 1073 and shall have a plasticity index of not more than 6 and a liquid limit of not more than 25 when tested in accordance with ASTM D 4318.

The aggregate shall have sand equivalent values of 45 or greater when tested in accordance with ASTM D 2419.

c. Sampling. ASTM D 75 shall be used in sampling coarse and fine aggregate, and ASTM C 183 shall be used in sampling mineral filler.

401-2.2 MINERAL FILLER. If filler, in addition to that naturally present in the aggregate, is necessary, it shall meet the requirements of ASTM D 242.

401-2.3 BITUMINOUS MATERIAL. Bituminous material shall conform to the following requirements: Asphalt cement binder shall conform to AASHTO M320 Performance Grade (PG) 76-22 for Bituminous Surface and Base Courses.

The Contractor shall furnish vendor's certified test reports for each lot of bituminous material shipped to the project. The vendor's certified test report for the bituminous material can be used for acceptance or tested independently by the Engineer.

401-2.4 PRELIMINARY MATERIAL ACCEPTANCE. Prior to delivery of materials to the job site, the Contractor shall submit certified test reports to the Engineer for the following materials:

a. Coarse Aggregate.

(1) Percent of Wear.
(2) Soundness.
(3) Unit Weight of Slag.
(4) Percent Fractured Faces.
(5) Flat or Elongated Particles.

b. Fine Aggregate.

(1) Liquid Limit and Plasticity Index.
(2) Clay Lumps and Friable Particles.
(3) Sand Equivalent.

c. Mineral Filler.

d. Bituminous Material. Test results for bituminous material shall include temperature/viscosity charts for mixing and compaction temperatures.

The certification(s) shall show the appropriate ASTM test(s) for each material, the test results, and a statement that the material meets the specification requirement.

The Engineer may request samples for testing, prior to and during production, to verify the quality of the materials and to ensure conformance with the applicable specifications.

401-2.5 ANTI-STRIPPING AGENT. Any anti-stripping agent or additive if required shall be heat stable, shall not change the asphalt cement viscosity beyond specifications, shall contain no harmful ingredients, shall be added in recommended proportion by approved method, and shall be a material approved by the Maryland Department of Transportation.

COMPOSITION

401-3.1 COMPOSITION OF MIXTURE. The bituminous plant mix shall be composed of a mixture of well-graded aggregate, filler and anti-strip agent if required, and bituminous material. The several aggregate fractions shall be sized, handled in separate size groups, and combined in such proportions that the resulting mixture meets the grading requirements of the job mix formula (JMF).

401-3.2 JOB MIX FORMULA. No bituminous mixture for payment shall be produced until a job mix formula has been approved in writing by the Engineer. The bituminous mixture shall be designed using procedures contained Chapter 5, MARSHALL METHOD OF MIX DESIGN, of the Asphalt Institute Manual Series No. 2 (MS-2), Mix Design Methods for Asphalt Concrete, sixth edition (referred to on past BWI Marshall/MTN projects as Eastern Region Laboratory Procedures Manual (ERLPM), Section 2).

The design criteria in Table 1 are target values necessary to meet the acceptance requirements contained in paragraph 401-5.2b. The criteria are based on a production process which has a material variability with the following standard deviations:

Stability (lbs.) = 270
Flow (0.01 inch) = 1.5
Air voids (%) = 0.65

If material variability exceeds the standard deviations indicated, the job mix formula and subsequent

production targets shall be based on a stability greater than shown in Table 1, and the flow and air voids shall be targeted close to the mid-range of the criteria in order meet the acceptance requirements.

Tensile Strength Ratio (TSR) of the composite mixture, as determined by ASTM D 4867, shall not be less than 75. Anti-stripping agent shall be added to the asphalt, as necessary to produce a TSR of not less than 75. If an anti-strip agent is required, it will be provided by the Contractor at no additional cost to the owner.

The job mix formula shall be submitted in writing by the Contractor to the Engineer at least 21 days prior to the start of paving operations and shall include as a minimum:

a. Percent passing each sieve size for total combined gradation, individual gradation of all aggregate stockpiles and percent by weight of each stockpile used in the job mix formula.
b. Percent of asphalt cement.
c. Asphalt performance, viscosity or penetration grade and type of modifier if used.
d. Number of blows of hammer compaction per side of molded specimen.
e. Mixing temperature.
f. Compaction temperature.
g. Temperature of mix when discharged from the mixer.
h. Temperature-viscosity relationship of the asphalt cement.
i. Plot of the combined gradation on the Federal Highway Administration (FHWA) 45 power gradation curve.
j. Graphical plots of stability, flow, air voids, voids in the mineral aggregate, and unit weight verses asphalt content.
k. Percent natural sand.
l. Percent fractured faces.
m. Percent by weight of flat particles, elongated particles, and flat and elongated particles (and criteria).
n. Tensile Strength Ratio (TSR).
o. Anti-strip agent (if required).
p. Date the job mix formula was developed.

The Contractor shall submit to the Engineer the results of verification testing of three (3) asphalt samples prepared at the optimum asphalt content. The averages of the results of this testing shall indicate conformance with the job mix formula requirements specified in Tables 1, 2 and 3. Test results for determining the job mix formula as well as the JMF verification testing shall be less than three (3) months old.

When the project requires asphalt mixtures of differing aggregate gradations, a separate job mix formula and the results of job mix formula verification testing must be submitted for each mix.

The job mix formula for each mixture shall be in effect until a modification is approved in writing by the Engineer. Should a change in sources of materials be made, a new job mix formula must be

submitted within 21 days and approved by the Engineer in writing before the new material is used. After the initial production job mix formula(s) has/have been approved by the Engineer and a new or modified job mix formula is required for whatever reason, the subsequent cost of the Engineer's approval of the new or modified job mix formula will be borne by the Contractor. There will be no time extension given or considerations for extra costs associated with the stoppage of production paving or restart of production paving due to the time needed for the Engineer to approve the initial, new or modified job mix formula.

TABLE 1. MARSHALL DESIGN CRITERIA

Test Property	Pavements Designed for Aircraft Gross Weights of 60,000 Lbs. or More or Tire Pressures of 100 psi or More
Number of blows	75
Stability , pounds (minimum)	2150
Flow, 0.01 in.	10-14
Air voids (percent)	2.8-4.2
Percent voids in mineral aggregate (minimum)	See Table 2

TABLE 2. MINIMUM PERCENT VOIDS IN MINERAL AGGREGATE

Maximum Particle Size		Minimum Voids in Mineral Aggregate, percent
in.	mm	Percent
½	12.5	16
¾	19.0	15
1	25.0	14
1-½	37.5	13

The mineral aggregate shall be of such size that the percentage composition by weight, as determined by laboratory sieves, will conform to the gradation or gradations specified in Table 3 when tested in accordance with ASTM C 136 and C 117.

The gradations in Table 3 represent the limits which shall determine the suitability of aggregate for use from the sources of supply. The aggregate, as selected (and used in the JMF), shall have a gradation within the limits designated in Table 3 and shall not vary from the low limit on one sieve to the high limit on the adjacent sieve, or vice versa, but shall be well graded from coarse to fine.

Deviations from the final approved mix design for bitumen content and gradation of aggregates shall be within the action limits for individual measurements as specified in paragraph 401-6.5a. The limits still will apply if they fall outside the master grading band in Table 3.

The maximum size aggregate used shall not be more than one-half of the thickness of the course being constructed, except where otherwise shown on the plans or ordered by the Engineer.

TABLE 3. AGGREGATE - BITUMINOUS PAVEMENTS

Sieve Size	Percentage by Weight Passing Seive	
	¾" max. (19.0 mm)	½" max. (12.5 mm)
1 in. (25.0 mm)	---	---
¾ in. (19.0 mm)	100	---
½ in. (12.5 mm)	79-99	100
⅜ in. (9.5 mm)	68-88	79-99
No. 4 (4.75 mm)	48-68	58-78
No. 8 (2.36 mm)	33-53	39-59
No. 16 (1.18 mm)	20-40	26-46
No. 30 (0.600 mm)	14-30	19-35
No. 50 (0.300 mm)	9-21	12-24
No. 100 (0.150 mm)	6-16	7-17
No. 200 (0.075 mm)	3-6	3-6
Asphalt percent:		
Stone or gravel	5.0-7.5	5.5-8.0
Slag	6.5-9.5	7.0-10.5

The aggregate gradations shown are based on aggregates of uniform specific gravity. The percentages passing the various sieves shall be corrected when aggregates of varying specific gravities are used, as indicated in the Asphalt Institute Manual Series No. 2 (MS-2), Chapter 3.

401-3.3 RECYCLED ASPHALT CONCRETE. Recycled HMA shall consist of reclaimed asphalt pavement (RAP), course aggregate, fine aggregate, mineral filler, and asphalt cement. The RAP shall be of a consistent gradation and asphalt content and properties. When RAP is fed into the plant, the maximum RAP chunk size shall not exceed 2 inches. The recycled HMA mix shall be designed using procedures contained in AI MS-02. The recycled asphalt concrete mix shall be designed using procedures contained in the Asphalt Institute's Manual Series Number 2 (MS-2). The percentage of asphalt in the RAP shall be established for the mixture design according to ASTM D 2172 using the appropriate dust correction procedure. The job mix shall meet the requirements of paragraph 401-3.2. RAP should only be used for shoulder surface course mixes and for any intermediate courses on runway, taxiway and apron pavements. RAP will not be permitted in the

top six inches on runway, taxiway, and apron pavements. The amount of RAP shall be limited to 20 percent.

In addition to the requirements of paragraph 401-3.2, the job mix formula shall indicate the percent of reclaimed asphalt pavement and the percent and viscosity of new asphalt. The Contractor shall submit documentation to the Engineer, indicating that the mixing equipment proposed for use is adequate to mix the percent of RAP shown in the job mix formula and meet all local and national government regulations.

The blend of new asphalt cement and the RAP asphalt binder shall meet the requirements in paragraph 401-2.3. The virgin asphalt cement shall not be more than two standard asphalt material grades different than that specified in paragraph 401-2.3.

401-3.4 TEST SECTION. Prior to full production, the Contractor shall prepare and place a quantity of bituminous mixture according to the job mix formula. The amount of mixture shall be sufficient to construct a test section 300 feet long and 20 feet wide, placed in two lanes, with a longitudinal cold joint, and shall be of the same depth specified for the construction of the course which it represents. A cold joint is an exposed construction joint at least 4 hours old or whose mat has cooled to less than 160ºF. The underlying grade or pavement structure upon which the test section is to be constructed shall be the same as the remainder of the course represented by the test section. The equipment used in construction of the test section shall be the same type and weight to be used on the remainder of the course represented by the test section.

THE TEST SECTION SHALL BE EVALUATED FOR ACCEPTANCE AS A SINGLE LOT IN ACCORDANCE WITH THE ACCEPTANCE CRITERIA IN PARAGRAPH 401-5.1 AND 401-6.3. THE TEST SECTION SHALL BE DIVIDED IN EQUAL SUBLOTS. AS A MINIMUM THE TEST SECTION SHALL CONSIST OF 3 SUBLOTS.

The test section shall be considered acceptable if; 1) stability, flow, mat density, air voids, and joint density are 90 percent or more within limits, 2) gradation and asphalt content are within the action limits specified in paragraphs 401-6.5a and 5b, and 3) the voids in the mineral aggregate are within the limits of Table 2.

If the initial test section should prove to be unacceptable, the necessary adjustments to the job mix formula, plant operation, placing procedures, and/or rolling procedures shall be made. A second test section shall then be placed. If the second test section also does not meet specification requirements, both sections shall be removed at the Contractor's expense. Additional test sections, as required, shall be constructed and evaluated for conformance to the specifications. Any additional sections that are not acceptable shall be removed at the Contractor's expense. Full production shall not begin until an acceptable section has been constructed and accepted in writing by the Engineer. Once an acceptable test section has been placed, payment for the initial test section and the section that meets specification requirements shall be made in accordance with paragraph 401-8.1.
Job mix control testing shall be performed by the Contractor at the start of plant production and in conjunction with the calibration of the plant for the job mix formula. If aggregates produced by the plant do not satisfy the gradation requirements or produce a mix that meets the JMF, it will be

necessary to reevaluate and redesign the mix using plant-produced aggregates. Specimens shall be prepared and the optimum bitumen content determined in the same manner as for the original design tests.

Contractor will not be allowed to place the test section until the Contractor's Quality Control Program, showing conformance with the requirements of paragraph 401-6.1, has been approved, in writing, by the Engineer.

401-3.5 TESTING LABORATORY. The Contractor's laboratory used to develop the job mix formula shall meet the requirements of ASTM D 3666 including the requirement to be accredited by a national authority such as the National Voluntary Laboratory Accreditation Program (NVLAP), the American Association for Laboratory Accreditation (AALA), or AASHTO Accreditation Program (AAP). Laboratory personnel shall meet the requirements of Item X-4 of the specifications. A certification signed by the manager of the laboratory stating that it meets these requirements shall be submitted to the Engineer prior to the start of construction. The certification shall contain as a minimum:

a. Qualifications of personnel; laboratory manager, supervising technician, and testing technicians.

b. A listing of equipment to be used in developing the job mix.

c. A copy of the laboratory's quality control system.

d. Evidence of participation in the AASHTO Materials Reference Laboratory (AMRL) program.

e. ASTM D 3666 certification of accreditation by a nationally recognized accreditation program.

CONSTRUCTION METHODS

401-4.1 WEATHER LIMITATIONS. The bituminous mixture shall not be placed upon a wet surface or when the surface temperature of the underlying course is less than specified in Table 4. The temperature requirements may be waived by the Engineer, if requested; however, all other requirements including compaction shall be met.

TABLE 4. BASE TEMPERATURE LIMITATIONS

Mat Thickness	Base Temperature (Minimum) Deg. F
3 in. or greater	40
Greater than 1 in. but less than 3 in.	45
1 in. or less	50

401-4.2 BITUMINOUS MIXING PLANT. Plants used for the preparation of bituminous mixtures shall conform to the requirements of ASTM D 995 with the following changes:

a. Requirements for All Plants.

(1) Truck Scales. The bituminous mixture shall be weighed on approved scales furnished by the Contractor, or on certified public scales at the Contractor's expense. Scales shall be inspected and sealed as often as the Engineer deems necessary to assure their accuracy. Scales shall conform to the requirements of the General Provisions, Section 90-01.

In lieu of scales, and as approved by the Engineer, asphalt mixture weights may be determined by the use of an electronic weighing system equipped with an automatic printer which weighs the total paving mixture. Contractor must furnish calibration certification of the weighing system prior to mix production and as often thereafter as requested by the Engineer.

(2) Testing Facilities. The Contractor shall provide laboratory facilities at the plant for the use of the Engineer's acceptance testing and the Contractor's quality control testing. The Engineer will always have priority in the use of the laboratory. The lab shall have sufficient space and equipment so that both testing representatives (Engineer's and Contractor's) can operate efficiently. The lab shall also meet the requirements of ASTM D 3666.

The plant testing laboratory shall have a floor space area of not less than 150 square feet with a ceiling height of not less than 7½ feet. The laboratory shall be weather tight, sufficiently heated in cold weather, air-conditioned in hot weather to maintain temperatures for testing purposes of 70 degrees F +/- 5 degrees F. The plant testing laboratory shall be located on the plant site to provide and unobstructed view, from one of its windows, of the trucks being loaded with the plant mix materials.

Laboratory facilities shall be kept clean, and all equipment shall be maintained in proper working condition. The Engineer shall be permitted unrestricted access to inspect the Contractor's laboratory facility and witness quality control activities. The Engineer will advise the Contractor in writing of any noted deficiencies concerning the laboratory facility, equipment, supplies, or testing personnel and procedures. When the deficiencies are serious enough to be adversely affecting the test results, the incorporation of the materials into the work shall be suspended immediately and will not be permitted to resume until the deficiencies are satisfactorily corrected.

As a minimum, the plant testing laboratory shall have:

a. Adequate artificial lighting.
b. Electrical outlets sufficient in number and capacity for operating the required testing equipment and drying samples.
c. Fire extinguishers (2), Underwriter's Laboratories (UL) approved.
d. Work benches for testing, minimum 2-½ feet by 10 feet.
e. Desk with 2 chairs
f. Sanitary facilities convenient to testing laboratory.
g. Exhaust fan to outside air, minimum 12 inch blade diameter.
h. A direct telephone line and telephone including a FAX machine operating 24 hours per day, seven days per week.
i. File cabinet with lock for Engineer.
j. Sink with running water, attached with drain board and drain capable of handling separate material.
k. Metal stand for holding washing sieves.
l. Two element hot plate or other comparable heating device, with dial type thermostatic controls for drying aggregates.
m. Mechanical shaker and appropriate sieves (listed in JMF, Table 3) meeting the requirements of ASTM E-11 for determining the gradation of coarse and fine aggregates in accordance with ASTM C 136.
n. Marshall testing equipment meeting ASTM D 6926, ASTM D 6927, automatic compaction equipment capable of compacting three specimens at once and other apparatus as specified in ASTM C 127, D 2172, D2726, and D 2041.
o. Oven, thermostatically controlled, inside minimum 1 cubic foot.
p. Two volumetric specific gravity flasks, 500 cc.
q. Other necessary hand tools required for sampling and testing.
r. Library containing contract specifications, latest ASTM volumes 4.01, 4.02, 4.03, and 4.09, AASHTO standard specification parts I and II, and Asphalt Institute Publication MS-2.
s. Equipment for Theoretical Specific Gravity testing including a 4,000 cc pycnometer, vacuum pump capable of maintaining 30 ml mercury pressure and a balance, 16-20 kilograms with accuracy of 0.5 grams.
t. Extraction equipment, centrifuge and reflux types and ROTOflex equipment.
u. A masonry saw with diamond blade for trimming pavement cores and samples.
v. Telephone.

Approval of the plant and testing laboratory by the Engineer requires all facilities and equipment to be in good working order during production, sampling and testing. Failure to provide the specified facilities shall be sufficient cause for disapproving bituminous plant operations.

The Owner shall have access to the lab and plant whenever Contractor is in production.

(3) Inspection of Plant. The Engineer, or Engineer's authorized representative, shall have access, at all times, to all areas of the plant for checking adequacy of equipment; inspecting operation of the plant: verifying weights, proportions, and material properties; and checking the temperatures maintained in the preparation of the mixtures.

(4) Storage Bins and Surge Bins. Use of surge and storage bins for temporary storage of hot bituminous mixtures will be permitted as follows:

(a) The bituminous mixture may be stored in surge bins for a period of time not to exceed 3 hours.

(b) The bituminous mixture may be stored in insulated storage bins for a period of time not to exceed 24 hours.

The bins shall be such that mix drawn from them meets the same requirements as mix loaded directly into trucks.

If the Engineer determines that there is an excessive amount of heat loss, segregation or oxidation of the mixture due to temporary storage, no temporary storage will be allowed.

401-4.3 HAULING EQUIPMENT. Trucks used for hauling bituminous mixtures shall have tight, clean, and smooth metal beds. To prevent the mixture from adhering to them, the truck beds shall be lightly coated with a minimum amount of paraffin oil, lime solution, or other approved material. Petroleum products shall not be used for coating truck beds. Each truck shall have a suitable cover to protect the mixture from adverse weather. When necessary, to ensure that the mixture will be delivered to the site at the specified temperature, truck beds shall be insulated or heated and covers shall be securely fastened.

401-4.4 BITUMINOUS PAVERS. Bituminous pavers shall be self-propelled with an activated heated screed, capable of spreading and finishing courses of bituminous plant mix material that will meet the specified thickness, smoothness, and grade. The paver shall have sufficient power to propel itself and the hauling equipment without adversely affecting the finished surface.

The paver shall have a receiving hopper of sufficient capacity to permit a uniform spreading operation. The hopper shall be equipped with a distribution system to place the mixture uniformly in front of the screed without segregation. The screed shall effectively produce a finished surface of the required evenness and texture without tearing, shoving, or gouging the mixture.

The paver shall be equipped with a control system capable of automatically maintaining the specified screed elevation. The control system shall be automatically actuated from either a reference line and/or through a system of mechanical sensors or sensor-directed mechanisms or devices that will maintain the paver screed at a predetermined transverse slope and at the proper elevation to obtain the required surface. The transverse slope controller shall be capable of maintaining the screed at the desired slope within plus or minus 0.1 percent.

The controls shall be capable of working in conjunction with any of the following attachments:

a. Ski-type device of not less than 30 feet in length.

b. Taut stringline (wire) set to grade.

c. Short ski or shoe.

d. Laser control.

If, during construction, it is found that the spreading and finishing equipment in use leaves tracks or indented areas, or produces other blemishes in the pavement that are not satisfactorily corrected by the scheduled operations, the use of such equipment shall be discontinued and satisfactory equipment shall be provided by the Contractor.

401-4.5 ROLLERS. Rollers of the vibratory, steel wheel, and pneumatic-tired type shall be used. They shall be in good condition, capable of operating at slow speeds to avoid displacement of the bituminous mixture. The number, type, and weight of rollers shall be sufficient to compact the mixture to the required density while it is still in a workable condition.

All rollers shall be specifically designed and suitable for compacting hot mix bituminous concrete and shall be properly used. Rollers that impair the stability of any layer of a pavement structure or underlying soils shall not be used. Depressions in pavement surfaces caused by rollers shall be repaired by the Contractor at his own expense.

The use of equipment that causes crushing of the aggregate will not be permitted.

a. Nuclear Densometer. The Contractor shall have on site a nuclear densometer during all paving operations in order to assist in the determination of the optimum rolling pattern, type of roller and frequencies, as well as to monitor the effect of the rolling operations during production paving. The Contractor shall also supply a qualified technician during all paving operations to calibrate the nuclear densometer and obtain accurate density readings for all new bituminous concrete. These densities shall be supplied to the Engineer upon request at any time during construction. No separate payment will be made for supplying the density gauge and technician.

401-4.6 PREPARATION OF BITUMINOUS MATERIAL. The bituminous material shall be heated in a manner that will avoid local overheating and provide a continuous supply of the bituminous material to the mixer at a uniform temperature. The temperature of the bituminous material delivered to the mixer shall be sufficient to provide a suitable viscosity for adequate coating of the aggregate particles, but shall not exceed 325 degrees F (160 degrees C), unless otherwise required by the manufacturer.

401-4.7 PREPARATION OF MINERAL AGGREGATE. The aggregate for the mixture shall be heated and dried prior to introduction into the mixer. The maximum temperature and rate of heating shall be such that no damage occurs to the aggregates. The temperature of the aggregate and

mineral filler shall not exceed 350 degrees F (175 degrees C) when the asphalt is added. Particular care shall be taken that aggregates high in calcium or magnesium content are not damaged by overheating. The temperature shall not be lower than is required to obtain complete coating and uniform distribution on the aggregate particles and to provide a mixture of satisfactory workability.

401-4.8 PREPARATION OF BITUMINOUS MIXTURE. The aggregates and the bituminous material shall be weighed or metered and introduced into the mixer in the amount specified by the job mix formula.

The combined materials shall be mixed until the aggregate obtains a uniform coating of bitumen and is thoroughly distributed throughout the mixture. Wet mixing time shall be the shortest time that will produce a satisfactory mixture, but not less than 25 seconds for batch plants. The wet mixing time for all plants shall be established by the Contractor, based on the procedure for determining the percentage of coated particles described in ASTM D 2489, for each individual plant and for each type of aggregate used. The wet mixing time will be set to achieve 95 percent of coated particles. For continuous mix plants, the minimum mixing time shall be determined by dividing the weight of its contents at operating level by the weight of the mixture delivered per second by the mixer. The moisture content of all bituminous mix upon discharge shall not exceed 0.5 percent.

401-4.9 PREPARATION OF THE UNDERLYING SURFACE. Immediately before placing the bituminous mixture, the underlying course shall be cleaned of all dust and debris. A prime coat or tack coat shall be applied in accordance with Item P-602 or P-603, if shown on the plans.

401-4.10 LAYDOWN PLAN, TRANSPORTING, PLACING, AND FINISHING. Prior to the placement of the bituminous concrete mixture, the Contractor shall prepare a laydown plan for approval by the Engineer. This is to minimize the number of cold joints in the pavement. The laydown plan shall include the sequence of paving laydown by stations, width of lanes, temporary ramp location(s), and laydown temperature. The laydown plan shall also include estimated time of completion for each portion of the work (i.e. milling, paving, rolling, cooling, etc.). Modifications to the laydown plan shall be approved by the Engineer.

The bituminous mixture shall be transported from the mixing plant to the site in vehicles conforming to the requirements of paragraph 401-4.3. Deliveries shall be scheduled so that placing and compacting of mixture is uniform with minimum stopping and starting of the paver. Hauling over freshly placed material shall not be permitted until the material has been compacted, as specified, and allowed to cool to atmospheric temperature.

The Contractor may elect to use a material transfer vehicle to deliver mix to the paver.

Paving during nighttime construction shall require the following:

a. All paving machines, rollers, distribution trucks and other vehicles required by the Contractor for his operations shall be equipped with artificial illumination sufficient to safely complete the work.

b. Minimum illumination level shall be twenty (20) horizontal foot candles and maintained in the following areas:

1. An area of 30 feet wide by 30 feet long immediately behind the paving machines during the operations of the machines.

2. An area 15 feet wide by 30 feet long immediately in front and back of all rolling equipment, during operation of the equipment.

3. An area 15 feet wide by 15 feet long at any point where and area is being tack coated prior to the placement of pavement.

c. As partial fulfillment of the above requirements, the Contractor shall furnish and use complete artificial lighting units with a minimum capacity of 3,000 watt electric beam lights, affixed to all equipment in such a way to direct illumination on the area under construction.

d. In addition, the Contractor shall furnish a sufficient number of floodlight units to properly illuminate the work area.

e. If the Contractor places any out of specification mix in the project work area, the Contractor is required to remove it at its own expense, to the satisfaction of the Engineer. If the Contractor has to continue placing non-payment bituminous concrete, as directed by the Engineer, to make the surfaces safe for aircraft operations, the Contractor shall do so to the satisfaction of the Engineer. It is the Contractor's responsibility to leave the facilities to be paved in a safe condition ready for aircraft operations. No consideration for extended closure time of the area being paved will be given. As a first order of work for the next paving shift, the Contractor shall remove all out of specification material and replace with approved material to the satisfaction of the Engineer. When the above situations occur, there will be no consideration given for additional construction time or payment for extra costs.

The initial placement and compaction of the mixture shall occur at a temperature suitable for obtaining density, surface smoothness, and other specified requirements but not less than 250 degrees F (121 degrees C).

Edges of existing bituminous pavement abutting the new work shall be saw cut and carefully removed as shown on the drawings and painted with bituminous tack coat before new material is placed against it.

Upon arrival, the mixture shall be placed to the full width by a bituminous paver. It shall be struck off in a uniform layer of such depth that, when the work is completed, it shall have the required thickness and conform to the grade and contour indicated. The speed of the paver shall be regulated to eliminate pulling and tearing of the bituminous mat. Unless otherwise permitted, placement of the mixture shall begin along the centerline of a crowned section or on the high side of areas with a

one-way slope. The mixture shall be placed in consecutive adjacent strips having a minimum width of 20 feet except where edge lanes require less width to complete the area. Additional screed sections shall not be attached to widen paver to meet the minimum lane width requirements specified above unless additional auger sections are added to match. The longitudinal joint in one course shall offset the longitudinal joint in the course immediately below by at least 1 foot; however, the joint in the surface top course shall be at the centerline of crowned pavements. Transverse joints in one course shall be offset by at least 10 feet from transverse joints in the previous course.

Transverse joints in adjacent lanes shall be offset a minimum of 10 feet.

On areas where irregularities or unavoidable obstacles make the use of mechanical spreading and finishing equipment impractical, the mixture may be spread and luted by hand tools. Areas of segregation in the surface course, as determined by the Engineer, shall be removed and replaced at the Contractor's expense. The area shall be removed by saw cutting and milling a minimum of 2 inches deep. The area to be removed and replaced shall be a minimum width of the paver and a minimum of 10 feet long.

401-4.11 COMPACTION OF MIXTURE. After placing, the mixture shall be thoroughly and uniformly compacted by power rollers. The surface shall be compacted as soon as possible when the mixture has attained sufficient stability so that the rolling does not cause undue displacement, cracking or shoving. The sequence of rolling operations and the type of rollers used shall be at the discretion of the Contractor. The speed of the roller shall, at all times, be sufficiently slow to avoid displacement of the hot mixture and be effective in compaction. Any displacement occurring as a result of reversing the direction of the roller, or from any other cause, shall be corrected at once.

Sufficient rollers shall be furnished to handle the output of the plant. Rolling shall continue until the surface is of uniform texture, true to grade and cross section, and the required field density is obtained.

To prevent adhesion of the mixture to the roller, the wheels shall be equipped with a scraper and kept properly moistened but excessive water will not be permitted.

In areas not accessible to the roller, the mixture shall be thoroughly compacted with approved power driven tampers. Tampers shall weigh not less than 275 pounds, have a tamping plate width not less than 15 inches, be rated at not less than 4,200 vibrations per minute, and be suitably equipped with a standard tamping plate wetting device.

Any mixture that becomes loose and broken, mixed with dirt, contains check-cracking, or in any way defective shall be removed and replaced with fresh hot mixture and immediately compacted to conform to the surrounding area. This work shall be done at the Contractor's expense. Skin patching shall not be allowed.

401-4.12 JOINTS. The formation of all joints shall be made in such a manner as to ensure a continuous bond between the courses and obtain the required density. All joints shall have the same texture as other sections of the course and meet the requirements for smoothness and grade.

The roller shall not pass over the unprotected end of the freshly laid mixture except when necessary to form a transverse joint. When necessary to form a transverse joint, it shall be made by means of placing a bulkhead or by tapering the course. The tapered edge shall be cut back to its full depth and width on a straight line to expose a vertical face prior to placing the adjacent lane. In both methods all contact surfaces shall be given a tack coat of bituminous material before placing any fresh mixture against the joint.

Longitudinal joints which are irregular, damaged, uncompacted, or otherwise defective shall be cut back to expose a clean, sound surface for the full depth of the course. All contact surfaces shall be cleaned and dry prior and given a tack coat of bituminous material prior to placing any fresh mixture against the joint. The cost of this work and tack coat shall be considered incidental to the cost of the bituminous course.

401-4.13 SKID RESISTANT SURFACES/SAW-CUT GROOVING. If shown on the plans, skid resistant surfaces for asphalt pavements shall be provided by construction of saw-cut grooves. Saw-cut grooves must meet the requirements of Item P-621.

MATERIAL ACCEPTANCE

401-5.1 ACCEPTANCE SAMPLING AND TESTING. Unless otherwise specified, all acceptance sampling and testing necessary to determine conformance with the requirements specified in this section will be performed by the Contractor at no cost to the Engineer, in conformance with the Quality Control Plan described in Section 6. Testing organizations performing these tests shall meet the requirements of ASTM D 3666. All equipment in Contractor furnished laboratories shall be calibrated by an independent testing organization prior to the start of operations at the Contractors expense. The Engineer may perform verification testing to validate the Contractor's test results. All testing operations and facilities shall be available to the Engineer for inspection at all times.

a. Plant-Produced Material. Plant-produced material shall be tested for stability, flow, and air voids on a lot basis. Sampling shall be from material deposited into trucks at the plant or from trucks at the job site. Samples shall be taken in accordance with ASTM D 979. A lot will consist of:

- one day or shift's production not to exceed 2,000 tons, or

- a half day or shift's production where a day's production is expected to consist of between 2,000 and 4,000 tons, or

- similar subdivisions for tonnages over 4,000 tons.

Where more than one plant is simultaneously producing material for the job, the lot sizes shall apply separately for each plant.

(1) Sampling. Each lot will consist of four equal sublots. Sufficient material for preparation of test specimens will be sampled by the Engineer on a random basis, in accordance with the procedures contained in ASTM D 3665. One set of laboratory compacted specimens will be prepared for each sublot in accordance with ASTM D 6926, at the number of blows required by paragraph 401-3.2, Table 1. Each set of laboratory compacted specimens will consist of three test portions prepared from the same sample increment.

The sample of bituminous mixture may be put in a covered metal tin and placed in an oven for not less than 30 minutes nor more than 60 minutes to stabilize compaction temperature. The compaction temperature of the specimens should be as specified in the job mix formula.

(2) Testing. Sample specimens shall be tested for stability and flow in accordance with ASTM D 6927. Air voids will be determined by the Engineer in accordance with ASTM D 3203.

Prior to testing, the bulk specific gravity of each test specimen shall be measured by the Engineer in accordance with ASTM D 2726 using the procedure for laboratory-prepared thoroughly dry specimens, or ASTM D 1188, whichever is applicable, for use in computing air voids and pavement density.

For air voids determination, the theoretical maximum specific gravity of the mixture shall be measured one time for each sublot in accordance with ASTM D 2041, Type C, D or E container. The value used in the air voids computation for each sublot shall be based on theoretical maximum specific gravity measurement for the sublot.

The stability and flow for each sublot shall be computed by averaging the results of all test specimens representing that sublot.

(3) Acceptance. Acceptance of plant produced material for stability, flow, and air voids shall be determined by the Engineer in accordance with the requirements of paragraph 401-5.2b.

b. Field Placed Material. Material placed in the field shall be tested for mat and joint density on a lot basis.

(1) Mat Density. The lot size shall be the same as that indicated in paragraph 401-5.1a and shall be divided into four equal sublots. One core of finished, compacted materials shall be taken by the Contractor from each sublot. Core locations will be determined by the Engineer on a random basis in accordance with procedures contained in ASTM D 3665. Cores shall not be taken closer than one foot from a transverse or longitudinal joint.

(2) Joint Density. The lot size shall be the total length of longitudinal joints constructed by a lot of material as defined in paragraph 401-5.1a. The lot shall be divided into four equal sublots. One core of finished, compacted materials shall be taken by the Contractor from each sublot. Core locations will be determined by the Engineer on a random basis in accordance with procedures contained in ASTM D 3665. ALL CORING SHALL BE CENTERED ON THE JOINT.

THE MINIMUM CORE DIAMETER FOR JOINT DENSITY DETERMINATION SHALL BE 5 INCHES.

(3) Sampling. Samples shall be neatly cut with a core drill. The cutting edge of the core drill bit shall be of hardened steel or other suitable material with diamond chips embedded in the metal cutting edge. The minimum diameter of the sample shall be five inches. Samples that are clearly defective, as a result of sampling, shall be discarded and another sample taken. The Contractor shall furnish all tools, labor, and materials for cutting samples and filling the cored pavement. Cored pavement shall be cleaned and core holes shall be filled in a manner acceptable to the Engineer and within one day after sampling.

(4) Testing. The bulk specific gravity of each cored sample will be measured by the Engineer in accordance with ASTM D 2726 or ASTM D 1188, whichever is applicable. The percent compaction (density) of each sample will be determined by dividing the bulk specific gravity of each sublot sample by the average bulk specific gravity of all laboratory prepared specimens for the lot, as determined in paragraph 401-5.1a(2). The bulk specific gravity used to determine the joint density at joints formed between different lots shall be the lowest of the bulk specific gravity values from the two different lots.

(5) Acceptance. Acceptance of field placed material for mat density will be determined by the Engineer in accordance with the requirements of paragraph 401-5.2b(1). Acceptance for joint density will be determined in accordance with the requirements of paragraph 401-5.2b(3).

c. Partial Lots - Plant-Produced Material. When operational conditions cause a lot to be terminated before the specified number of tests have been made for the lot, or when the Contractor and Engineer agree in writing to allow overages or other minor tonnage placements to be considered as partial lots, the following procedure will be used to adjust the lot size and the number of tests for the lot.

The last batch produced where production is halted will be sampled, and its properties shall be considered as representative of the particular sublot from which it was taken. In addition, an agreed to minor placement will be sampled, and its properties shall be considered as representative of the particular sublot from which it was taken. Where three sublots are produced, they shall constitute a lot. Where one or two sublots are produced, they shall be incorporated into the next lot and the total number of sublots shall be used in the acceptance plan calculation, i.e., n = 5 or n = 6, for example. Partial lots at the end of asphalt production on the project shall be included with the previous lot.

d. Partial Lots - Field Placed Material. The lot size for field placed material shall correspond to that of the plant material, except that, in no cases, shall less than (3) cored samples be obtained, i.e., n = 3.

401-5.2 ACCEPTANCE CRITERIA.

a. General. Acceptance will be based on the following characteristics of the bituminous

mixture and completed pavement as well as the implementation of the Contractor's Quality Control plan and test results:

(1) Stability
(2) Flow
(3) Air voids
(4) Mat density
(5) Joint density
(6) Thickness
(7) Smoothness
(8) Grade

Mat density and air voids will be evaluated for acceptance in accordance with paragraph 401-5.2b(1). Stability and flow will be evaluated for acceptance in accordance with paragraph 401-5.2b(2). Joint density will be evaluated for acceptance in accordance with paragraph 401-5.2b(3).

Thickness will be evaluated by the Engineer for compliance in accordance with paragraph 401-5.2.b(4). Acceptance for smoothness will be based on the criteria contained in paragraph 401-5.2b(5). Acceptance for grade will be based on the criteria contained in paragraph 401-5.2b(6).

The Engineer may at any time, notwithstanding previous plant acceptance, reject and require the Contractor to dispose of any batch of bituminous mixture which is rendered unfit for use due to contamination, segregation, incomplete coating of aggregate, or improper mix temperature. Such rejection may be based on only visual inspection or temperature measurements. In the event of such rejection, the Contractor may take a representative sample of the rejected material in the presence of the Engineer, and if it can be demonstrated in the laboratory, in the presence of the Engineer, that such material was erroneously rejected, payment will be made for the material at the contract unit price.

b. Acceptance Criteria

(1) Mat Density and Air Voids. Acceptance of each lot of plant produced material for mat density and air voids shall be based on the percentage of material within specification limits (PWL). If the PWL of the lot equals or exceeds 90 percent, the lot shall be acceptable. Acceptance and payment shall be determined in accordance with paragraph 401-8.1.

(2) Stability and Flow. Acceptance of each lot of plant produced material for stability and flow shall be based on the percentage of material within specification limits (PWL). If the PWL of the lot equals or exceeds 90 percent, the lot shall be acceptable. If the PWL is less than 90 percent the Contractor shall determine the reason and take corrective action. If the PWL is below 80 percent, the Contractor must stop production until the reason for poor stability and/or flow has been determined and adjustments to the mix are made. Lots of PWL below 80 percent for stability or flow values shall be removed and replaced at the expense of the Contractor.

(3) Joint Density. Acceptance of each lot of in-place pavement for joint density shall be based on the percentage of material within specification limits (PWL). If the PWL of the lot is equal to or exceeds 90 percent, the lot shall be considered acceptable. If the PWL is less than 90 percent, the Contractor shall evaluate the reason and act accordingly. If the PWL is less than 80 percent, the Contractor shall cease operations and until the reason for poor compaction is determined. IF THE PWL IS LESS THAN 71 PERCENT, THE PAY FACTOR FOR THE LOT USED TO COMPLETE THE JOINT SHALL BE REDUCED BY 5 PERCENTAGE POINTS. This lot pay factor reduction shall be incorporated and evaluated in accordance with paragraph 401-8.1.

(4) Thickness. Thickness of each lift of surface course shall be evaluated by the Engineer for compliance to the requirements shown on the plans. Measurements of thickness shall be made by the Engineer using the cores extracted for each sublot for density measurement. The maximum allowable deficiency at any point shall not be more than ¼ inch less than the thickness indicated for the lift. Average thickness of lift, or combined lifts shall not be less than the indicated thickness. Where the thickness tolerances are not met, the lot or sublot shall be corrected by the Contractor at his expense by removing the deficient area and replacing with new pavement. The Contractor, at his expense, may take additional cores as approved by the Engineer to circumscribe the deficient area.

(5) Smoothness. The final surface shall be free from roller marks. The finished surfaces of each course of the pavement, except the finished surface of the final course, shall not vary more than 3/8 inch when evaluated with a 16 foot straightedge. The finished surface of the final course of pavement shall not vary more than ¼ inch when evaluated with a 16 foot straightedge. The lot size shall be 2000 square yards. Smoothness measurements shall be made at 50 foot intervals and as determined by the Engineer. In the longitudinal direction, a smoothness reading shall be made at the center of each paving lane. In the transverse direction, smoothness readings shall be made continuously across the full width of the pavement. However, transverse smoothness readings shall not be made across designed grade changes. At warped transition areas, straightedge position shall be adjusted to measure surface smoothness and not design grade transitions. When more than 15 percent of all measurements within a lot exceed the specified tolerance, the Contractor shall remove the deficient area to the depth of the final course of pavement and replace with new material. Skin patching shall not be permitted. Isolated high points may be ground off providing the course thickness complies with the thickness specified on the plans. High point grinding will be limited to 15 square yards. Areas in excess of 15 square yards will require removal and replacement of the pavement in accordance with the limitations noted above.

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NOTE TO DESIGNER: Add the following paragraph on profilograph to the smoothness paragraph to measure the longitudinal surface smoothness for runways and taxiways when the use of the profilograph on the project is approved by the FAA. Use of the profilograph is recommended for new construction or overlays designed to correct grade and smoothness deficiencies. If the profilograph is included, straightedge requirements need only apply to the perpendicular direction. To include profilograph requirements, add ASTM E 1274 "Test for Measuring Pavement Roughness Using a Profilograph" to the referenced testing list.

(a) Profilograph. The Contractor shall furnish a 25 foot wheel base California type profilograph and competent operator to measure pavement surface deviations. The profilograph shall be operated in accordance with the manufacturer's instructions and at a speed no greater than 3 mph. Original profilograms for the appropriate locations interpreted in accordance with ASTM E 1274 shall be furnished to the Engineer. The profilograms shall be recorded on a scale of one inch equal to 25 feet longitudinally and one inch equal to one inch (or full scale) vertically. Profilographs shall be calibrated prior to testing.

The surface of the runway and/or taxiway pavements of continuous placement of 50 feet or more shall be tested and evaluated as described herein. One pass along the centerline shall be required for each paving lane. Runs shall be continuous through a day's production. Each trace shall be completely labeled to show paving lane and stationing.

The Contractor shall furnish paving equipment and employ methods that produce a riding surface for each section of pavement having an average profile index meeting the requirements of Table 7. A typical section will be considered to be the width of the paving lane and 1/10 of a mile long. The profile index will be determined in accordance with ASTM E 1274. A blanking band of 0.2 inches shall be used. Within each 1/10 mile section, all areas represented by high points having a deviation in excess of 0.4 inches in 25 feet or less shall be removed by the Contractor using an approved method. After removing all individual deviations in excess of 0.4 inches, additional corrective work shall be performed if necessary to achieve the required ride quality. All corrective work shall be completed prior to determination of pavement thickness.

On pavement sections where corrections were necessary, second profilograph runs shall be performed to verify that the corrections have produced an average profile index of 15 inches per mile or less. If the initial average profile index was less than 15, only those areas representing greater than 0.4 inch deviation will be re-profiled for correction verification.

Individual sections shorter than 50 feet and the last 15 feet of any section

where the Contractor is not responsible for the adjoining section shall be straightedged in accordance with paragraph 401-5.2b(5).

If there is a section of 250 feet or less, the profilogram for the section shall be included in the evaluation of the previous section. If there is an independently placed section of 50 to 250 feet in length, a profilogram shall be made for that section and the pay adjustment factors for short section of Table 7 shall apply.

All costs necessary to provide the profilograph and related to furnishing the appropriate profilograms as required in this provision are incidental to pavement construction and no direct compensation will be made therefore.

*** ***

(6) Grade. The finished surface of the pavement shall not vary from the gradeline elevations and cross sections shown on the plans by more than 1/2 inch. The finished grade of each lot will be determined by running levels at intervals of 50 feet or less longitudinally and all breaks in grade transversely (not to exceed 50 feet) to determine the elevation of the completed pavement. The Contractor shall pay the cost of surveying of the level runs that shall be performed by a licensed surveyor. The documentation, stamped and signed by a licensed surveyor, shall be provided by the Contractor to the Engineer. The lot size shall be 2,000 square yards. When more than 15 percent of all the measurements within a lot are outside the specified tolerance, or if any one shot within the lot deviates ¾ inch or more from planned grade, the Contractor shall remove the deficient area to the depth of the final course of pavement and replace with new material. Skin patching shall not be permitted. Isolated high points may be ground off providing the course thickness complies with the thickness specified on the plans. The surface of the ground pavement shall have a texture consisting of grooves between 0.090 and 0.130 inches wide. The peaks and ridges shall be approximately 1/32 inch higher than the bottom of the grooves. The pavement shall be left in a clean condition. The removal of all of the slurry resulting from grinding operation shall be continuous. The grinding operation should be controlled so the residue from the operation does not flow across other lanes of pavement. High point grinding will be limited to 15 square yards. Areas in excess of 15 square yards will require removal and replacement of the pavement in accordance with the limitations noted above.

c. Percentage of Material Within Specification Limits (PWL). The percentage of material within specification limits (PWL) shall be determined in accordance with procedures specified in Item X-110 of the specifications. The specification tolerance limits (L) for lower and (U) for upper are contained in Table 5.

d. Outliers. All individual tests for mat density and air voids shall be checked for outliers (test criterion) in accordance with ASTM E 178, at a significance level of 5 percent. Outliers shall be discarded, and the PWL shall be determined using the remaining test values.

TABLE 5. MARSHALL ACCEPTANCE LIMITS FOR STABILITY, FLOW, AIR VOIDS, DENSITY

Test Property	Pavements Designed for Aircraft Gross Weights of 60,000 Lbs. Or More or Tire Pressures of 100 Psi or More	
Number of Blows	75	
	Specification Tolerance	
	L	U
Stability, minimum, pounds	1800	--
Flow, 0.01-inch	8	16
Air Voids Total Mix, percent	2.0	5.0
Mat Density, percent	96.3	--
Joint density, percent	93.3	--

The criteria in Table 5 are based on production processes which have a variability with the following standard deviations:

Surface Course Mat Density (%), 1.30
Base Course Mat Density (%), 1.55
Joint Density (%), 2.1

The Contractor should note that (1) 90 PWL is achieved when consistently producing a surface course with an average mat density of at least 98 percent with 1.30% or less variability, (2) 90 PWL is achieved when consistently producing a base course mat density of at least 97.5 percent with 1.55% or less variability. 90 PWL is achieved when consistently producing a joint density of at least 96 percent with 2.1% or less variability.

401-5.3 RESAMPLING PAVEMENT FOR MAT DENSITY.

a. General. Resampling of a lot of pavement will be only be allowed for mat density, and then, only if the Contractor requests same, in writing, within 48 hours after receiving the written test results from the Engineer. A retest will consist of all the sampling and testing procedures contained in paragraphs 401-5.1b and 401-5.2b(1). Only one resampling per lot will be permitted.

(1) A redefined PWL shall be calculated for the resampled lot. The number of tests used to calculate the redefined PWL shall include the initial tests made for that lot plus the retests.

(2) The cost for resampling and retesting shall be borne by the Contractor.

b. Payment for Resampled Lots. The redefined PWL for a resampled lot shall be used to calculate the payment for that lot in accordance with Table 6.

c. Outliers. Check for outliers in accordance with ASTM E 178, at a significance level of 5 percent.

[401-5.4 LEVELING COURSE. Any course used for truing and leveling shall meet the requirements of paragraph 401-3.2, 401-5.2b(1) for air voids and 401-5.2b(2), but shall not be subject to the density requirements of paragraph 401-5.2b(1) for mat density and 401-5.2b(3). The leveling course shall be compacted with the same effort used to achieve density of the test section. The truing and leveling course shall not exceed a nominal thickness of 1-½ in (37.5 mm). The leveling course is the first variable thickness lift of an overlay placed prior to subsequent courses.]

CONTRACTOR QUALITY CONTROL

401-6.1 GENERAL. The Contractor shall develop a Quality Control Program in accordance with Item X-4 of the specifications. The program shall address all elements that affect the quality of the pavement including, but not limited to:

a. Mix Design
b. Aggregate Grading
c. Quality of Materials
d. Stockpile Management
e. Proportioning
f. Mixing and Transportation
g. Placing and Finishing
h. Joints
i. Compaction
j. Surface Smoothness
k. Personnel
l. Laydown Plan

The Contractor shall perform quality control sampling, testing, and inspection during all phases of the work and shall perform them at a rate sufficient to ensure that the work conforms to the contract requirements, and at minimum test frequencies required by paragraph 401-6.3 and Item X-4 of the Specifications. As a part of the process for approving the Contractor's plan, the Engineer may require the Contractor's technician to perform testing of samples to demonstrate an acceptable level of performance.

No partial payment will be made for materials that are subject to specific quality control requirements without an approved plan.

401-6.2 TESTING LABORATORY. The Contractor shall provide a fully equipped asphalt laboratory meeting the requirements of paragraph 401-3.5 and 401-4.2a(2) located at the plant or job site. The Contractor shall provide the Engineer with certification stating that all of the testing equipment to be used is properly calibrated and will meet the specifications applicable for the specified test procedures.

401-6.3 QUALITY CONTROL TESTING. The Contractor shall perform all quality control tests necessary to control the production and construction processes applicable to these specifications and as set forth in the approved Quality Control Program. The testing program shall include, but not necessarily be limited to, tests for the control of asphalt content, aggregate gradation, temperatures, aggregate moisture, field compaction, and surface smoothness. A Quality Control Testing Plan shall be developed as part of the Quality Control Program.

a. Asphalt Content. A minimum of two tests shall be performed per lot in accordance with ASTM D 6307 or ASTM D 2172 for determination of asphalt content. The weight of ash portion of the test, as described in ASTM D 2172, shall be determined as part of the first extraction test performed at the beginning of plant production; and as part of every tenth extraction test performed thereafter, for the duration of plant production. The last weight of ash value obtained shall be used in the calculation of the asphalt content for the mixture. The asphalt content for the lot will be determined by averaging test results.

The use of the nuclear method for determining asphalt content in accordance with ASTM D 4125 is permitted, provided that it is calibrated for the specific mix being used.

b. Gradation. Aggregate gradations shall be determined a minimum of twice per lot from mechanical analysis of extracted aggregate in accordance with ASTM D 544 and ASTM C 136 (Dry Sieve). When asphalt content is determined by the nuclear method, aggregate gradation shall be determined from hot bin samples on batch plants, or from the cold feed on drum mix or continuous mix plants, and tested in accordance with ASTM C 136 (dry sieve) using actual batch weights to determine the combined aggregate gradation of the mixture.

c. Moisture Content of Aggregate. The moisture content of aggregate used for production shall be determined a minimum of once per lot in accordance with ASTM C 566.

d. Moisture Content of Mixture. The moisture content of the mixture shall be determined once per lot in accordance with ASTM D 1461.

e. Temperatures. Temperatures shall be checked, at least four times per lot, at necessary locations to determine the temperatures of the dryer, the bitumen in the storage tank, the mixture at the plant, and the mixture at the job site.

f. In-Place Density Monitoring. The Contractor shall conduct any necessary testing to ensure that the specified density is being achieved. A nuclear gauge may be used to monitor the pavement density in accordance with ASTM D 2950.

g. Additional Testing. Any additional testing that the Contractor deems necessary to control the process may be performed at the Contractor's option.

h. Monitoring. The Engineer reserves the right to monitor any or all of the above testing.

401-6.4 SAMPLING. When directed by the Engineer, the Contractor shall sample and test any material which appears inconsistent with similar material being sampled, unless such material is voluntarily removed and replaced or deficiencies corrected by the Contractor. All sampling shall be in accordance with standard procedures specified.

401-6.5 CONTROL CHARTS. The Contractor shall maintain linear control charts both for individual measurements and range (i.e., difference between highest and lowest measurements) for aggregate gradation and asphalt content.

Control charts shall be posted in a location satisfactory to the Engineer and shall be kept current. As a minimum, the control charts shall identify the project number, the contract item number, the test number, each test parameter, the Action and Suspension Limits applicable to each test parameter, and the Contractor's test results. The Contractor shall use the control charts as part of a process control system for identifying potential problems and assignable causes before they occur. If the Contractor's projected data during production indicates a problem and the Contractor is not taking satisfactory corrective action, the Engineer may suspend production or acceptance of the material.

a. Individual Measurements. Control charts for individual measurements shall be established to maintain process control within tolerance for aggregate gradation and asphalt content. The control charts shall use the job mix formula target values as indicators of central tendency for the following test parameters with associated Action and Suspension Limits:

CONTROL CHART LIMITS FOR INDIVIDUAL MEASUREMENTS

Sieve	Action Limit	Suspension Limit
¾ inch	0%	0%
½ inch	+/-6%	+/-9%
⅜ inch	+/-6%	+/-9%
No. 4	+/-6%	+/-9%
No. 16	+/-5%	+/-7.5%
No. 50	+/-3%	+/-4.5%
No. 200	+/-2%	+/-3%
Asphalt Content	+/-0.45%	+/-0.70%

b. Range. Control charts for range shall be established to control process variability for the test parameters and Suspension Limits listed below. The range shall be computed for each lot as the

difference between the two test results for each control parameter. The Suspension Limits specified below are based on a sample size of n = 2. Should the Contractor elect to perform more than two tests per lot, the Suspension Limits shall be adjusted by multiplying the Suspension Limit by 1.18 for n = 3 and by 1.27 for n = 4.

CONTROL CHART LIMITS BASED ON RANGE

Sieve	Suspension Limit
½ inch	11 percent
⅜ inch	11 percent
No. 4	11 percent
No. 16	9 percent
No. 50	6 percent
No. 200	3.5 percent
Asphalt Content	0.8 percent

c. Corrective Action. The Quality Control Plan shall indicate that appropriate action shall be taken when the process is believed to be out of tolerance. The Plan shall contain sets of rules to gauge when a process is out of control and detail what action will be taken to bring the process into control. As a minimum, a process shall be deemed out of control and production stopped and corrective action taken, if:

(1) One point falls outside the Suspension Limit line for individual measurements or range; or

(2) Two points in a row fall outside the Action Limit line for individual measurements.

401-6.6 QUALITY CONTROL REPORTS. The Contractor shall maintain records and shall submit reports of quality control activities daily, in accordance with the Quality Control Plan, described in the Item X-4 of the specifications.

*** ***

NOTE TO DESIGNER: The aggregate control chart parameters and Suspension and Action Limits contained in the above paragraphs are based on ¾ in (19.0 mm) maximum size aggregate gradation. When 1 in (25.0 mm) or 1 ½ in (37.5 mm) maximum size aggregate is specified, the Individual Measurements Chart requirements should be amended as follows:

Sieve	Action Limit	Suspension Limit
1 in or 1-½ in	0%	0%
¾ in	6%	11%

When ½ in (12.5 mm) maximum size aggregate is specified, the ¾ in (19.0 mm) and 1 in (25.0 mm) sieves should be deleted from the Individual Measurements Chart and the ½ in (12.5 mm) sieve Action and Suspension Limits should be changed to 0%. For the ½ in (12.5 mm) gradation, the ½ in sieve should be deleted from the Range Chart.

* *

METHOD OF MEASUREMENT

401-7.1 MEASUREMENT. Plant mix bituminous concrete pavement shall be measured by the number of tons of bituminous mixture used in the accepted work. Recorded batch weights or truck scale weights will be used to determine the basis for the tonnage.

BASIS OF PAYMENT

401-8.1 PAYMENT. Payment for an accepted lot of bituminous concrete pavement shall be made at the contract unit price per ton for bituminous mixture adjusted according to paragraph 401-8.1a, subject to the limitation that:

The total project payment for plant mix bituminous concrete pavement shall not exceed 106 percent of the product of the contract unit price and the total number of tons of bituminous mixture used in the accepted work (see Note 1 under Table 6).

The price shall be compensation for furnishing all materials, for all preparation, mixing, and placing of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

a. Basis of Adjusted Payment. The pay factor for each individual lot shall be calculated in accordance with Table 6. A pay factor shall be calculated for both mat density and air voids. The lot pay factor shall be the higher of the two values when calculations for both mat density and air voids are 100 percent or higher. The lot pay factor shall be the product of the two values when only one of the calculations for either mat density or air voids is 100 percent or higher. The lot pay factor shall be the lower of the two values when calculations for both mat density and air voids are less than 100 percent.

TABLE 6. PRICE ADJUSTMENT SCHEDULE[1]

Percentage of Material Within Specification Limits (PWL)	Lot Pay Factor (Percent of Contract Unit Prices)
96 – 100	106
90 – 95	PWL + 10
75 – 89	0.5 PWL + 55

55 – 74	1.4 PWL – 12
Below 55	Reject[2]

[1] ALTHOUGH IT IS THEORETICALLY POSSIBLE TO ACHIEVE A PAY FACTOR OF 106 PERCENT FOR EACH LOT, ACTUAL PAYMENT ABOVE 100 PERCENT SHALL BE SUBJECT TO THE TOTAL PROJECT PAYMENT LIMITATION SPECIFIED IN PARAGRAPH 401-8.1.

[2] The lot shall be removed and replaced. However, the Engineer may decide to accept the deficient lot. In that case, if the Engineer and Contractor agree in writing that the lot shall not be removed, it shall be paid for at 50 percent of the contract price and the total project payment shall be reduced by the amount withheld for the rejected lot.

For each lot accepted, the adjusted contract unit price shall be the product of the lot pay factor for the lot and the contract unit price. Payment shall be subject to the total project payment limitation specified in Paragraph 401-8.1. Payment in excess of 100 percent for accepted lots of bituminous concrete pavement shall be used to offset payment for accepted lots of bituminous concrete pavement that achieve a lot pay factor less than 100 percent.

* *

NOTE TO DESIGNER: If a profilograph is used, add the following paragraphs and change existing paragraphs 401-8.1b and 401-8.1c to 401-8.1d and 401-8.1e, respectively (The pay adjustment in Table 7 is optional to the Owner and Engineer when using the profilograph):

b. Profilograph Smoothness. When the final average profile index (subsequent to any required corrective action) does not exceed 7 inches per mile, payment will be made for that section at the contract unit price for the completed pavement. If the final average profile index (subsequent to any required corrective action) exceeds 7 inches per mile, but does not exceed 15 inches per mile, the Contractor may elect to accept a contract unit price adjustment in lieu of reducing the profile index.

c. Basis of Adjusted Payment for Smoothness. Price adjustment for pavement smoothness will be made in accordance with Table 7. The adjustment will apply to the total tonnage of asphalt concrete within a lot of pavement and shall be applied with the following equation:

(Tons of asphalt concrete in lot) x (lot pay factor) x (unit price per ton) x (smoothness pay factor) = payment for lot

TABLE 7. AVERAGE PROFILE INDEX SMOOTHNESS PAY FACTOR

(Inches per mile per 1/10 mile)	Short Sections	Pay Factor
00.0 - 7	00.0 - 15.0	100%
7.1 - 9	15.1 - 16	98%
9.1 - 11	16.1 - 17	96%
11.1 - 13	17.1 - 18	94%
13.1 - 14	18.1 - 20	92%
14.1 - 15	20.1 - 22	90%
15.1 & up	22.1& up	corrective work required[1]

[1] The Contractor shall correct pavement areas not meeting these tolerances by removing and replacing the defective work. If the Contractor elects to construct an overlay to correct deficiencies, the minimum thickness of the overlay shall not be less than twice the size of the maximum size aggregate. The corrective overlay shall not violate grade criteria and butt joints shall be constructed by sawing and removing the original pavement in compliance with the thickness/maximum aggregate size ratio. Skin patching shall not be permitted.

Unit bid price adjustment will apply to total bituminous mixture and asphalt cement quantities within the 1/10 mile segment of pavement. Deductions will be applied to recorded project quantities. Any pavement section less than 1/10 mile will be accepted on a pro-rated basis.

Material used in building the pavement above the specified grade shall not be included in the quantities for payment.

* *

b. Payment. Payment will be made under:

* *

NOTE TO DESIGNER: Pay item indicating mix aggregate size shall be determined by the Designer. If multiple aggregate sizes are used, pay items, including incentive items, shall be numbered consecutively.

* *

Item P-401-8.1	19.0 mm Bituminous Concrete Base/Surface Course (PG 76-22) – per ton.
Item P-401-8.1	12.5mm Bituminous Concrete Surface Course (PG 76-22) – per ton.

An allowance has been included as Item P-401-8.2. Payment of any or all of the bid amount for P-401-8.2 will be based on any adjusted payment in excess of 100 percent when computed in accordance with Paragraph 401-8.1a.

Payment will be made under:

Item P-401-8.2	19.0 mm Bituminous Concrete Base/Surface Course (PG 76-22) Incentive – per lump sum.
Item P-401-8.2	12.5mm Bituminous Concrete Surface Course (PG 76-22) Incentive – per lump sum.

Item P-401-8.2 shall be a maximum of 6% of the total price for Item P-401-8.1.

TESTING REQUIREMENTS

ASTM C 29	Bulk Density ("Unit Weight") and Voids in Aggregate
ASTM C 88	Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM C 117	Materials Finer than 75-µm (No.200) Sieve in Mineral Aggregates by Washing
ASTM C 127	Specific Gravity and Absorption of Coarse Aggregate
ASTM C 131	Resistance to Degradation of Small Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C 136	Sieve Analysis of Fine and Coarse Aggregates
ASTM C 142	Clay Lumps and Friable Particles in Aggregates
ASTM C 183	Sampling and the Amount of Testing of Hydraulic Cement
ASTM C 566	Total Evaporable Moisture Content of Aggregate by Drying
ASTM D 75	Sampling Aggregates
ASTM D 979	Sampling Bituminous Paving Mixtures

ASTM D 995	Mixing Plants for Hot-Mixed Hot-Laid Bituminous Paving Mixtures
ASTM D 1073	Fine Aggregate for Bituminous Paving Mixtures
ASTM D 1074	Compressive Strength of Bituminous Mixtures
ASTM D 1188	Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Paraffin-Coated Specimens
ASTM D 1461	Moisture or Volatile Distillates in Bituminous Paving Mixtures
ASTM D 2041	Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures
ASTM D 2172	Quantitative Extraction of Bitumen from Bituminous Paving Mixtures
ASTM D 2419	Sand Equivalent Value of Soils and Fine Aggregate
ASTM D 2489	Estimating Degree of Particle Coating of Bituminous-Aggregate Mixtures
ASTM D 2726	Bulk Specific Gravity and Density of Non-Absorptive Compacted Bituminous Mixtures
ASTM D 2950	Density of Bituminous Concrete in Place by Nuclear Method
ASTM D 3203	Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures
ASTM D 3665	Random Sampling of Construction Materials
ASTM D 3666	Minimum Requirements for Agencies Testing and Inspective Road and Paving Materials
ASTM D 4125	Asphalt Content of Bituminous Mixtures by the Nuclear Method
ASTM D 4318	Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D 4791	Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate
ASTM D 4867	Effect of Moisture on Asphalt Concrete Paving Mixtures
ASTM D 5444	Mechanical Size Analysis of Extracted Aggregate

ASTM D 6926	Preparation of Bituminous Specimens Using MARSHALL Apparatus
ASTM D 6927	MARSHALL Stability and Flow of Bituminous Mixtures
ASTM E 11	Wire-Cloth Sieves for Testing Purposes
ASTM E 178	Dealing With Outlying Observations
ASTM 1274	Measuring Pavement Roughness Using a Profilograph
AASHTO T 30	Mechanical Analysis of Extracted Aggregate
The Asphalt Institute's Manual No. 2 (MS-2)	Mix Design Methods for Asphalt Concrete

MATERIAL REQUIREMENTS

ASTM D 242	Mineral Filler for Bituminous Paving Mixtures
ASTM D 946	Penetration Graded Asphalt Cement for Use in Pavement Construction
ASTM D 3381	Viscosity-Graded Asphalt Cement for Use in Pavement Construction
ASTM D 4552	Classifying Hot-Mix Recycling Agents
AASHTO M320	Performance Graded Asphalt Binder

END OF ITEM P-401

PASSENGER BOARDING BRIDGE SPECIFICATIONS

MARTIN STATE AIRPORT

BWI BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

****

Base Technical Specification (Design Standard): This base specification is setup to provide guidance to the engineer for inclusion in the contract documents for bridge installation and procurement. The designer must thoroughly review the guidance indicated and obtain direction as needed from the MAA to complete the specification. The specification sections will have to be modified and tailored as discussed below. The engineer should confirm the procurement process prior to utilizing this specification. ***(ALL ITEMS ITALICIZED AND BOLD MUST BE CONFIRMED BY THE ENGINEER)***

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ITEM PBB-100 APRON DRIVE PASSENGER BOARDING BRIDGES

DESCRIPTION

100-1 This item shall consist of the following. (***Engineer should define removal; storage, reinstallation, and/or installation dependent on the scope of work) (Engineer's description should include defining whether the bridges are purchased, provided, existing, including fixed sections, and all accessories)***.

Any PBB that is scheduled to be removed and intended for disposal shall be disposed of by the Contractor off Airport property at an approved disposal site. Under no conditions should a PBB intended for disposal be disposed of on-site.

The PBBs covered by this specification are designed to extend from a terminal or concourse departure lounge doorway to the aircraft boarding door such that passengers can enplane and deplane during normal or emergency operations while providing an environment that is protected from hazardous and atmospheric conditions. The complete assembly is protected against inclement weather conditions, both when sealed against an aircraft and when parked with the weather door closed.

All new PBB's shall be Regional Jet capable with accessories that include but are not limited to:

- Handrails
- Floor modification for RJ mating
- Cushion attachment to prevent any gaps between the bridge and fuselage.

NOTE: The model numbers indicated on the Contract Documents are based on **[FMC-Jetway Systems]** equipment (or equal). However, other manufacturers' equipment that meet or exceed the fully retracted and fully extended operational limits of the **[Jetway]** models identified will be considered. Note also that the observer is

positioned with his/her back to the terminal end and facing the aircraft end of the PBB when referring to left or right.

Each PBB shall be managed as shown on the contract documents and as described below.

****

THE DESIGNER SHOULD EDIT THE FIRST PARAGRAPH ABOVE TO INCLUDE ONLY PROJECT SPECIFIC ITEMS. THE DESIGNER SHOULD THEN USE SUB-PARAGRAPHS HERE TO DESCRIBE THE PROJECT SPECIFIC WORK FOR EACH ITEM IDENTIFYING EACH GATE AFFECTED BY PBB CHANGES AND WHAT THE AFFECTS ARE. SAMPLE TEXT FOLLOWS, BUT OTHER FORMATS THAT CLEARLY DESCRIBE THE WORK FOR THE CURRENT PROJECT ARE ACCEPTABLE.

THE DESIGNER SHOULD MAKE REFERENCE ON THE CONTRACT DOCUMENTS THAT THE OBSERVER IS POSITIONED WITH HIS/HER BACK TO THE TERMINAL AND FACING THE AIRCRAFT WHEN REFERRING TO LEFT OR RIGHT AND ORGANIZE PLANS ACCORDINGLY.

PROJECTS INSTALLING OR MODIFYING PBBS SHOULD BE DESIGNED AND SPECIFIED TO ALLOW THE OPERATION OF THE PBBS TO ACCESS THE FORWARD TWO LEFT PASSENGER DOORS (L1 AND L2) OF THE AIRCRAFT WHERE APPLICABLE.

****

a. The gates requiring PBB removal during this project are **[provide gate numbers]** as shown on the Plans.

b. The gates requiring installation of existing PBBs are **[provide gate numbers]**

c. The gates that will have new PBBs installed are **[provide gate numbers]** and are shown on plans and details.

REQUIREMENTS

****

DESIGNER TO ENSURE PLANS INCLUDE ADEQUATE INFORMATION TO INDICATE THE INSTALLATION OF THE ITEMS LISTED BELOW. NOTE THAT RENOVATIONS TO EXISTING BOARDING BRIDGES SHALL INCLUDE BRINGING THE PBB UP TO CURRENT NFPA STANDARDS.

****

100-2 GENERAL REQUIREMENTS FOR ALL PBBS WHETHER NEW, REINSTALLED, OR RENOVATED. Existing PBBs shall be inspected to determine which modifications are required and which are already in place. Contractor shall have responsibility to confirm conditions of bridge prior to removal if bridge is to be reinstalled. Confirmation shall include the condition of the fire retardant material connecting the bridge to the terminal (will be replaced as part of installation), identification of the parameters in the Pro Logic Cabinet (PLC), and identification of the settings for recalibration of the potentiometers after the bridge has been reinstalled per the manufacturers requirements. Pre and Post placement operational checks shall be conducted and documented by the Contractor, MAA Contractor responsible for maintenance of the bridges and the Construction Manager. These checks should test the total functionality of the bridge to document and all existing problems prior to the Contractor performing the work.

****

DESIGNER SHALL CONFIRM THAT EXISTING BRIDGES HAVE THE REQUIRED ACCESSORIES TO BE RJ CAPABLE. DESIGNER SHOULD ALSO CONFIRM LIMITS ON BRIDGES FOR PURPOSES OF AIRCRAFT MATING AND FLEET MIX CAPABILITY.

****

100-2.1 Wheel bumpers are required.

100-2.2 The support column is the structural support for the PBB and each is custom made by the manufacturer to meet specific site conditions (DESIGNER SHALL REQUIRE CONTRACTOR TO CONFIRM STRUCTURAL INTEGRITY OF COLUMNS FOR BRIDGE IF USING EXISTING COLUMN OR PROVIDING NEW). There is limited adjustment for height once the column is built. Therefore, it is important that the vertical dimension (from the passenger service level finished floor to the top of concrete of the PBB foundation) and the horizontal dimension (from the service level face of the building to the center of the anchor bolt pattern)

be accurately determined and transmitted to the PBB manufacturer by the contractor at least 15 days prior to the requested ship date.

100-2.3 The anchor bolt pattern and details for the new or existing PBB foundation shall be provided by the PBB's manufacturer. Contractor shall modify the existing foundation as needed to match the bolt pattern provided by the manufacturer.

****

DESIGNER SHALL CONFIRM ANCHOR BOLT PATTERN OF EXISTING FOUNDATION, EXISTING BRIDGE, AND SUPPORT COLUMN IF AN EXISTING BRIDGE IS TO BE REINSTALLED. DESIGNER SHALL CONFIRM THAT BRIDGE BOLT PATTERN WILL FIT EXISTING FOUNDATION BOLT PATTERN.

****

100-2.4 New foundations shall be provided in accordance with the details in accordance with paragraph **[100-4.4]. Contractor shall have responsibility for foundation adjustments if bridge manufacturer is substituted.**

****

DESIGNER SHALL PROVIDE FOUNDATION DETAIL BASED ON STANDARD BRIDGE MANUFACTURER AND MODEL NUMBER. CONTRACTOR SHALL HAVE RESPONSIBILITY FOR FOUNDATION DESIGN IF BRIDGE MANUFACTURER AND MODEL NUMBER IS REVISED.

****

100-2.5 Locks shall be provided and installed by the contractor on the door to the outside apron and shall meet the requirements specified in paragraph **[100-3.3a]**.

100-2.6 PBB signage is required and shall meet the requirements specified in paragraph **[100-3.7k]**. The Contractor shall be responsible for providing signage that is visible from the taxilanes/taxiways that will pass the final Use and Occupancy inspection.

100-2.7 Task lighting is required and shall meet the requirements specified in paragraph **[100-3.7j (2)]**.

100-2.8 A flashing beacon and audible alarm mounted under the cab is required and shall meet the requirements specified in paragraph **[100-3.4a (2) (h)]**.

100-2.9 A GFI duplex outlet is required on the drive column wheel carriage. Refer to paragraph **[100-3.5b]** for additional information.

100-2.10 Spare conductors are required in conduit from the rotunda to the control panel. Refer to paragraph **[100-3.5d]** for additional information.

100-2.11 An electrical disconnect panel, mounted on the rotunda support column is required. Refer to paragraph **[100-3.1c]** for additional information.

100-2.12 Emergency Lighting is required and shall meet the requirements specified in paragraph **[100-3.5c]**.

100-2.13 Provisions for telephone or intercom equipment is required and shall meet the requirements specified in paragraph **[100-3.5a]**.

100-2.14 **400 Hz/PC Air.** The PBB shall be provided with a three-inch diameter aluminum pantograph with length to cover the movable sections of the PBB for routing power to the PC Air and 400 Hz units. Regardless of whether a unit will be installed as part of this project, the Contractor is required to provide the dead loads (as provided in the Contract Drawings) to the PBB manufacturer for inclusion in the structural design. **[See note to designer regardless of whether or not 400Hz/PC Air will be installed.]**

100-2.15 **Aircraft Side Shift Cab.** The PBB shall be provided with the capability to adjust its alignment to increase its flexibility to minimize the time required to service multiple aircraft configurations as specified in paragraph [**100-3.7b**].

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NOTE TO DESIGNER: In addition to the items outlined in the specifications, which are required with all installations, the following items are to be considered and included in the design:

- **THE FOLLOWING ITEMS SHALL BE INCLUDED IN THE PBB DESIGN WHETHER OR NOT 400HZ/PC AIR IS TO BE INCLUDED AS PART OF THE CURRENT PROJECT. THE DESIGNER SHALL PROVIDE ADEQUATE INFORMATION IN THE PLANS AND SPECIFICATIONS TO ENSURE THAT THE LOAD REQUIREMENTS, THE POWER REQUIREMENTS, AND CONTRACTUAL ARRANGEMENTS ARE SATISFIED.**
- **DESIGNER SHALL REFERENCE MAA DST 2001-11, "PRE-CONDITIONED AIR AND 400 HERTZ SYSTEMS AND ASSOCIATED LOADING BRIDGE REQUIREMENTS" AND DST 2002-01, "HARMONICS PRODUCING EQUIPMENT SPECIFICATIONS REQUIREMENTS".**

- **DESIGNER TO PROVIDE STRUCTURAL REQUIREMENTS FOR THE 400HZ/PC AIR WHICH ARE DEPENDENT ON THE CRITICAL DESIGN AIRCRAFT FOR NEW LOADING BRIDGES.**
- **DESIGNER TO EVALUATE EXISTING LOADING BRIDGES TO ENSURE THE STRUCTURAL LOADS CAN BE SUPPORTED BY THE PBB.**
- **THE ELECTRICAL CAPACITY OF THE PIER MUST BE CHECKED TO ENSURE RESERVE CAPACITY IS AVAILABLE TO PROVIDE 400 HZ/PC AIR TO ALL GATES ON THE PIER.**
- **THE DESIGNER MUST PERFORM ELECTRICAL LOAD CALCULATIONS TO ENSURE THE LOADS CAN BE SUPPORTED BY EXISTING ELECTRICAL INFRASTRUCTURE ON AN EXISTING LOADING BRIDGE. AIRCRAFT SIZING CONSIDERATIONS.**
- **THE SIZE OF THE AIRCRAFT SHOULD BE DICTATED BY THE SIZE AIRCRAFT THAT CAN ACCESS THE ALLEY, NOT THE SIZE ANTICIPATED USING THE GATE.**
- **AIRCRAFT USAGE OF THE GATE SHALL BE LIMITED BASED ON THE HOLDROOM SIZING REQUIREMENTS (CURRENTLY UNDER DEVELOPMENT. DESIGNER SHALL COORDINATE WITH THE MAA PROJECT MANAGER IF THE DST HAS NOT BEEN ISSUED AT THE TIME OF THE PROJECT).**

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100-3 SPECIFIC REQUIREMENTS FOR NEW BRIDGES AND REINSTALLED/RENOVATED BRIDGES AS NOTED IN SECTION 100-2.

100-3.1 Rotunda Assembly

The Rotunda assembly is made up of a corridor, rotunda and support column. The assembly shall be designed so that no loads or vibrations are transmitted to the building.

The rotunda assembly shall be designed as the terminal end pivot for PBB's vertical and horizontal motion. As the main pivot for the PBB, the rotunda assembly shall allow the PBB to swing a total of 175°, 87.5° clockwise and 87.5° counterclockwise from the corridor centerline.

Slope, over-travel and operational swing limits shall be located on the rotunda assembly. Slope limits shall be adjustable up to 10% (5.71°) for both up and down slopes as needed to meet local operating conditions and requirements.

The over-travel swing limit switch shall be located on the support column. The trip plate for this switch shall be located on the rotunda and shall be adjustable to meet local conditions. When this switch is actuated it shall cut off all control power so that

the PBB can be moved only by using the by-pass switch in the control console. The rotunda frame shall be equipped with rubber bumper-type mechanical stops to prevent collapse of the telescoping tunnel sections.

A potentiometer on top of the rotunda shall be provided to sense the position of the PBB swing and sound a warning buzzer at the control console prior to the actuation of the over-travel swing limit. The actuation of this warning buzzer shall be adjustable to meet local conditions. The warning buzzer shall be within the over-travel limit envelope and signals the rotational operational limits.

a. Corridor

The corridor is the interface between the rotunda and the terminal building or fixed passageway. The rotation of the PBB may restrict the inside clear width of the corridor to 4'-4 1/2" (1334 mm) for a minimum distance of 15" (381 mm). The clear height shall be a minimum of 7'-7" (2311 mm).

The design of the corridor shall allow the installation of flexible weather seals and a floor threshold to the face of the building or fixed passageway.

b. Rotunda

The rotunda floor remains stationary and level at all times and provides a smooth transition between the terminal and telescoping tunnels.

Flap-type seals provide weather protection between the rotunda and the hinged telescoping tunnel section. The rotunda shall provide a dry environment free from storm blown rain water, snow, and ice.

c. Support Column

The support column is the structural support for the PBB. The support column rests on a foundation that shall be supplied by the Contractor.

Anchor bolt patterns and details for the new PBB's shall be provided by the PBB's manufacturer.

An electrical disconnect panel shall be mounted on the rotunda support column to provide electrical disconnects, over current protection and transformers needed to adapt the specified terminal power to the PBB's electrical requirements.

100-3.2 Telescoping Tunnels

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NOTE TO DESIGNER: APRON DRIVE PBBS ARE AVAILABLE IN EITHER TWO OR THREE TELESCOPING TUNNEL MODELS IN A WIDE VARIETY

OF LENGTHS. THE TELESCOPING TUNNELS, "A" (SMALLEST), "B" (MID-SIZE ON THREE TUNNEL PBBS, LARGEST ON TWO TUNNEL PBBS), AND "C" (LARGEST, THREE TUNNEL PBB ONLY), ARE RECTANGULAR IN CROSS SECTION. THE TUNNELS WITH THE LARGEST CROSS SECTION ARE CLOSEST TO THE AIRCRAFT.

THE SELECTED PBBS WILL ACCOMMODATE THE PROPOSED AIRCRAFT PARKING ARRANGEMENTS AND EXISTING TERMINAL FLOOR HEIGHTS. THE OPERATIONAL TUNNEL FLOOR SLOPE SHALL MEET THE MOST CURRENT ADA AND NFPA 415 STANDARDS. REFER TO 100-3.7I (NOTE TO DESIGNER) FOR METHOD OF COMPUTATION.
****

The roof, wall, and floor panels shall be constructed from 14 gauge (.0747") corrugated steel.

A hinged transition ramp shall accommodate the difference in elevation where telescoping tunnel sections overlap. This area shall consist of a section of floor that is sloped with respect to the tunnel centerline and hinged transition ramp. A very shallow slope shall be provided in the transition area (approximately 3 feet measured with respect to the tunnel centerline). All hinged or elevated surfaces in walkways shall be designed to prevent tripping hazards. Handrails shall be provided on both sides of the tunnel in the ramp area.

Minimum interior clear dimensions for both two-tunnel and three-tunnel PBBs shall be as follows:

Minimum Floor Width	4' - 10" (1473 mm)
Minimum Interior Height	7' - 0" (2134 mm)
Minimum Inter-tunnel Ramp Width	4' - 8" (1422 mm)
Minimum Corridor Width	4'-4 1/2"(1334 mm)

The telescoping tunnels shall be equipped with an exterior electrical cable conveyance system mounted under the PBB. This system shall be accessible to maintenance personnel for inspection or cable addition at all PBB positions and operating conditions. Access to the conveyance system shall not impede passenger traffic or PBB operation. The system shall be capable of supporting a combination of cables and hoses with a maximum weight of 12 pounds per foot (17.9 kg/m) and a maximum cross-sectional area of 12 square inches (7742 mm^2) consisting of two 6 in^2 (3871 mm^2) areas. The largest tunnel shall be equipped with an aluminum wire way to continue electrical cable routing beyond the electrical cable conveyance system.

A 3-inch aluminum pantograph shall be provided for future use.

100-3.3 Service Access

A service door, landing and stair leading to the apron area constitute the service access. The service access shall be located on the right hand side of the cab end of the PBB to provide access between the PBB and apron for authorized personnel.

a. The service door shall be steel, half wire-glass, hollow core, and shall meet or exceed the ¾-hour fire rating per ASTM E152. The minimum door is 2'-6" (762 mm) wide and 6'-8" (2032 mm) high. The door shall be equipped with medium-duty commercial-type hardware and automatic door closure. The door opens outward onto the landing. A keyed outside knob with inside knob shall be provided. A 30" (762 mm) stainless steel kick plate shall be provided to cover the lower inside portion of the door.

b. The service stair landing shall be parallel to the adjacent tunnel floor and shall be made of hot dipped galvanized steel, open mesh grating. The landing shall be protected on the open sides by galvanized steel handrails designed to meet the OSHA standards. A switch operated light shall be provided above the landing.

c. The service stair shall be equipped with self-adjusting risers and open mesh steel treads, which shall be expanded metal with a serrated edge for a gripping surface. All steps shall have an equal rise. The tread width shall be 28" (711 mm) and the maximum tread rise shall be 9-1/2" (241 mm). The length of the stair stringers varies depending on the type of aircraft serviced. (DESIGNER SHALL CONFIRM BASED ON LIMITS AND FLEET MIX OF AIRCRAFT) The service stair shall be equipped with handrails on each side that are designed to meet OSHA standards for handrails located at stairs. The entire service stair assembly shall be galvanized steel. The service stair shall be accessible to ramp service personnel at all operational heights and positions of the PBB.

d. The baggage slide shall be provided as part of the bridge purchase.

100-3.4 Control Station

The control station or operator compartment shall be located at the aircraft end of the PBB to provide the operator with a control console, service utilities, and control interlocks required to accomplish PBB operation. This compartment shall be

positioned on the left side of the cab and oriented to position the operator facing forward in full view of the aircraft during the maneuvering and docking operations. It shall provide the optimum PBB maneuvering visibility for 95% of the adult population (as defined by Henry Dreyfuss in "Human Factors in Design") without obstructing passenger traffic flow. A 10 lb ABC fire extinguisher shall be supplied and mounted in the Control Station Area in a way as to be readily accessible but not interfere with the operation of the PBB.

a. Control Console

The control console shall be located in the operator compartment and is protected from the outside environment.

(1) Controls

All PBB motion controls shall be the momentary contact type (deadman) controls. All of the motion controls shall be designed to be relative to the function of the PBB being controlled, i.e., for raise and lower functions, the "raise" push button shall be located above the "lower" push button. The control console shall include the following controls:

(a) A three-position master key switch used to select "OFF", "OPERATE" or "AUTO" (automatic leveling). The key should be able to be removed only in the "OFF" or "AUTO" positions.

(b) A lever arm (joystick) to control forward and reverse motions while push button controls steer right and left. As the joystick is moved progressively forward or back, PBB speed shall increase proportionally to the position of the joystick. Steering, left or right, shall be able to be accomplished at the same time as forward and reverse motions. An interlock shall prevent the PBB from being driven forward when the aircraft closure is deployed.

(c) Push button switches for raising and lowering the cab end of the PBB.

(d) Push button switches for cab rotation, left or right.

(e) Push buttons for independent adjustment of the left and right side of the bellows-type aircraft closure.

(f) A switch for floodlights that illuminate the apron area under the aircraft and drive column undercarriage.

(g) A switch to change the digital position indicator from its normal vertical height index to a horizontal rotation index.

(h) A switch to change the cab floor level adjustment from an automatic operation to a manual operation.

(i) A relative motion push-button switch to control the cab floor level adjustment while in the manual mode.

(j) An emergency stop button which shuts down all PBB movement when pressed.

(2) Indicators

The control console shall have indicators that display the current PBB status. The PBB status indicators shall be as follows:

(a) A digital position indicator to display the relative vertical position of the lift column. This indicator shall also be able to be switched to give the relative horizontal rotation of the PBB. This indicator is used to vertically and horizontally pre-position the PBB prior to the arrival of the aircraft. The horizontal rotation position indicator shall also allow the operator to accurately move the PBB to an assigned parking position in aircraft "power-out" operations.

(b) A wheel position indicator to display wheel orientation with respect to the operator's position. The wheel position indicator shall maintain correct wheel orientation while the cab is being rotated.

(c) An amber light to indicate that the auto-leveling system is energized and functioning.

(d) A red light and audible warning to indicate the autoleveler sustained travel timer has tripped.

(e) A red light to indicate that the PBB has reached the operational horizontal rotation limits. Illumination of this light shall be preceded by an audible warning.

(f) A red light to indicate aircraft closure is deployed. The closure must be fully retracted before the PBB can be moved forward.

(g) A red light to indicate vertical drive column fault.

(h) Other required indicators that are not located on the control console but shall be provided include a flashing amber beacon mounted under the cab to indicate that power is on and the PBB may move at any moment; and an audible warning bell mounted on the lower wheel bogie which shall ring at 98 decibels measured ten feet (3048 mm) from the PBB when the PBB is moving.

(i) Safety decals shall be placed on the cross tube of the lower wheel assembly. These decals shall warn against storing anything on the cross tube and the chance of getting run over when the bridge is in operation.

(j) External mirrors shall be placed on the PBB to aid operators during PBB movements.

(k) Limits shall be coordinated and verified with installed accessories to ensure that no damage will occur to the accessories or PBB.

100-3.5 Utilities

a. A six pair (twelve conductor) wire outlet for the installation of telephone or intercom equipment shall be located on left side wall adjacent to the control console and on the right wall of the rotunda corridor assembly.

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DESIGNER TO PROVIDE ADEQUATE INFORMATION IN THE PLANS TO ENSURE TELEPHONE SERVICE IS PROVIDED.

b. Duplex outlets (unswitched 120 volt, single phase, 15 amp) shall be located on the access door of the control console, and in the rotunda corridor. An additional GFI duplex outlet shall be provided on the drive column wheel carriage cross beam where it is accessible to maintenance personnel at ground level.

c. Provisions for hardwire emergency lighting shall be provided.

****

NOTE TO DESIGNER: VERIFY THAT CONNECTION TO EMERGENCY BACKUP IS AVAILABLE, IF NOT, NOTIFY MAA DURING DESIGN PHASE AND DETERMINE IF BATTERY BACK-UP WILL BE APPROVED. IF SO, INSERT THE FOLLOWING TEXT IN PLACE OF THE TEXT FOR 100-3.5c.

****

"Sufficient Battery powered emergency light packs shall be provided in the PBB to meet the requirements of Section 5.9 of NFPA 101, "Life Safety Code" for all possible PBB configurations."

d. A minimum of eight spare conductors (#12 THHN) shall be provided in conduit from the rotunda to the control panel for possible future additions or changes to the control system.

e. A fire alarm shall be provided that is connected to the Honeywell METASYS system.

100-3.6 Control Features and Interlocks

a. Mechanical interlocks shall be provided to prevent damage to control circuits or PBB components by selecting opposite motions simultaneously. For example, depressing the "up" button shall prevent depressing the "down" button.

b. When the master key switch is in the "OFF" or "AUTO" position, the controls for horizontal and vertical movement, steering, aircraft closure and cab rotation shall be inoperative.

100-3.7 Aircraft Side Shift Cab

a. The aircraft cab with operator's station shall be designed to rotate a minimum of 125 degrees, a minimum of 92.5 degrees ccw and 32.5 degrees cw on bridges with right-side service stairs and a minimum of 92.5 degrees cw and 32.5 degrees ccw on bridges with left-side service stairs from the tunnel centerline to facilitate alignment with multiple aircraft parking configurations. The rotation speed shall be between 2 and 2.5 degrees per second. The cab shall be enclosed to provide maximum security and protection from the outside environment throughout the docking and passenger boarding operation.

b. The cab shall have the capability of shifting a minimum of 24 inches (12 inches left and right of center) to increase the flexibility and minimize the time required to perform the aircraft docking process. This movement shall be controlled by individual push-buttons marked "Cab Shift Left" and "Cab Shift Right."

c. The operator's station shall be located on the left-hand side of the cab and shall be protected from the outside environment as well as passenger interference. The cab shall be equipped with a forward facing control console. The console shall be located behind laminated glass windows. Operation of the PBB shall be able to be accomplished without opening the weather doors. Additional visibility shall be obtained through the vision panels in the cab side-coiling curtains and windows located in front, left and right of the operator. The front window size shall be 2'-8" x 2' (813 mm x 610 mm). The left window size shall be 11" x 30-1/2" (279 mm x 775 mm). The right window shall be 2'-8" x 6" (813 mm x 152 mm).

d. Weather doors shall be provided adjacent to the console to seal the interior from adverse weather conditions and secure the PBB from unauthorized access when the PBB is not in use. These doors shall be swinging double doors that open inward and can be latched closed. The opening shall have a clear width of 44 inches and a minimum clear height of 7 feet 6 inches. The double swinging doors shall be equipped with 12 inch wide by 32 inch high safety glass windows to enhance visibility.

e. A full width spacer (10'-2" {3099 mm}) shall be located at the aircraft end of the cab floor. The spacer material, which shall meet the fire protection specifications of NFPA-415, shall be sufficiently flexible and non-abrasive to prevent scratching or other damage to the aircraft fuselage.

f. The cab side coiling curtain slats shall be equipped with two (2) view panels in every other curtain slat. The view panels shall be in the low normal positions on the right side and high normal position on the left side. Windows shall be a minimum of 1 ¼ inches wide by 12 inches long. Wind flaps shall be provided around top of curtains.

g. The side coiling curtain barrel assemblies shall be covered to protect them from the weather. Covers shall be hinged to allow easy access to curtain assemblies.

h. A closed circuit television (CCTV) system shall be provided complete with a monitor housed in or near the control console. The camera shall be focused on the horizontal drive wheel bogie and service stair so that the operator has an unobstructed view when servicing all aircraft.

i. The outer most end of the cab shall be equipped with an adjustable floor. The floor shall be individually actuated and independently adjustable to adapt to all aircraft doorsills. This floor must be designed to be automatic with a manual override control switch. The floor shall be capable of providing a level surface adjacent to the aircraft door sill for PBB slopes from –10% to +10%. No portion of the cab floor shall exceed 8.33% slope in the direction of the expected passenger traffic.

(1) The double hinged floor shall provide a smooth transition between the level floor and the tunnel section. This transition floor shall provide a smooth platform sloped approximately in the direction of passenger traffic flow. There shall be no raised surfaces that may introduce a tripping hazard to the passengers. Adjacent surfaces shall be the same level regardless of the position of the cab floor or the PBB.

(2) The floor shall be provided with a Regional Jet (RJ) aircraft service adapter kit. The kit shall allow docking to the Canadair Regional Jet (CRJ), the Embraer Regional Jet (ERJ) with the plug style door, as well as the standard narrow/wide body aircraft mix. The interface between the (CRJ) aircraft and boarding bridge shall be a smooth transition. The top of the cab floor shall abut to the top of the CRJ aircraft step/sill walking surface. The operation of the floor shall be mechanized. A hand ramp to cover any gaps may not be used. The bridge cab floor to aircraft interface is a critical juncture and shall not have any tripping hazards. The bridge cab floor shall be designed to provide positive protection to the CRJ

door, the CRJ door retract cable, and the adjacent pivot tube. The floor shall be equipped with an angle of attack sensor that will slow and/or stop the PBB motion if collision with the aircraft is imminent. The cab floor section that interfaces with the CRJ door shall be free to tip/rotate/move upward so as to prevent serious damage to the CRJ aircraft door in case of misdock or auto-leveling failure.

(3) The passenger boarding bridge shall be designed such that initial docking to the CRJ or ERJ aircraft is made with the full bridge moving to the aircraft to the point that the cab bumper is adjacent to the fuselage. The moving floor shall then be driven out to mate up with the CRJ door top step or to cover the gap under the ERJ TAT sensor. This design shall reduce the possibility of damage to the CRJ aircraft door or ERJ TAT sensor.

(4) Foldable type handrails shall be provided for use when servicing RJ aircraft with retractable air stairs.

j. Exterior floodlights shall be provided for nighttime operation to illuminate the apron area ahead of the PBB. A floodlight shall also be provided to illuminate the drive column wheel bogey area. This light shall be located under the tunnel section.

(1) A weatherproof fluorescent fixture shall also be provided outside the weather doors to illuminate the cab-aircraft interface.

(2) A junction box on the underside of the cab area with a terminal block and 120V circuit shall be provided for connection of external task lights. The junction box shall be labeled "120V-Circuit for External Task Lights." Task lighting shall consist of two floodlight fixtures. The first shall be mounted four feet above the top of the PBB on the right side of the PBB to illuminate the apron area in the swept path of the PBB. The second floodlight fixture shall be mounted ten feet above the left side of the PBB to illuminate the apron area adjacent to the aircraft. Task lighting shall contain two sixty-minute rotary timers.

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DESIGNER TO PREPARE STRUCTURAL AND ELECTRICAL LOAD CALCULATIONS TO ENSURE THE ADDED STRUCTURAL AND ELECTRICAL LOADS CAN BE SUPPORTED BY BOTH THE PBB AND THE ELECTRICAL INFRASTRUCTURE.
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k. Three-face, cab-mounted, (internally) illuminated signs shall be provided. The gate sign shall be installed on top of the cab roof of each new passenger boarding bridge. The sign shall be elevated above the top of bridge with the bottom of sign a minimum 18 inches above the canopy hardware forward of sign. The sign will be weatherproof and designate the gate number on all three sides. Each surface of the sign is to be 30 inches high by 42 inches long with 18 inch high white letters on a black background. The sign shall be controlled by a photocell located on the underside of the passenger boarding bridge.

l. The passenger boarding bridge shall be capable of docking to the Canadair Regional Jet (CRJ), the Embraer Regional Jet (ERJ) with the plug style door, as well as the standard narrow/wide body aircraft mix.

****
DESIGNER SHALL VERIFY THE CURRENT LIST OF REGIONAL JETS AND FLEET MIX FOR THE SPECIFIC ALLEYWAY WITH MAA OPERATIONS DURING DESIGN TO DEVELOP RANGE. DESIGNER SHALL USE METHODOLOGY PROVIDED IN THE DESIGN STANDARD TO COMPLETELY ANALYZE THE FULL FLEET MIX.
****

The interface between the CRJ aircraft and boarding bridge shall be a smooth transition. The top of the cab floor and the top of the CRJ aircraft step/sill shall be flush. The boarding bridge floor shall not lie atop the CRJ aircraft step/sill, but rather shall abut the aircraft walking surface. The apron drive cab floor shall be a mechanized floor and shall be designed to negotiate the sensors on ERJ and CRJ jet aircraft.

The operation of the floor shall be mechanized. A hand ramp to cover any gaps shall not be used.

The bridge cab floor shall not have any steps, ledges, gaps, or surface protrusions when docked to the specified aircraft. These may present tripping hazards at the bridge to aircraft interface and are not permitted.

The bridge cab floor shall be designed to provide positive protection to the CRJ door. The cab floor section that interfaces with the CRJ door shall be free to tip/rotate/move

upward so as to prevent damage to the CRJ aircraft door in case of misdock or auto-leveling failure.

The canopy closure of the boarding bridge shall form a weather seal around the door of the aircraft specified and shall be constructed so as to clear all aircraft antennas, pitot tubes, etc. The canopy shall be designed to keep all heated probes out of the contact of passengers.

Handrails shall be provided to direct and support passengers as they enter/exit the regional jet aircraft. The handrails shall be able to support 200 lbs. loading. The handrails shall keep the passengers away from any heated probes on the regional jet aircraft. The handrails shall be affixed to the bridge and shall be easy to deploy. The handrails shall provide a full barrier system to keep passengers from exiting off of the front of the bridge at any time after the boarding bridge has been docked.

The regional aircraft cab floor shall be controlled from the bridge console. The floor shall extend and retract to accommodate the regional jet aircraft steps and sensors. The extend/retract portion of the cab floor shall use a rubberized belt mechanism to ensure smooth surfaces and excellent traction in the passenger path. The extend/retract portion of the cab floor shall be located on the left side (when facing the aircraft) of the apron drive cab floor area.

The cab floor shall be equipped with appropriate sensors to safeguard the aircraft.

100-3.8 Aircraft Closure

The aircraft end of the cab shall be equipped with a folding bellows aircraft closure. The closure, when fitted against the fuselage, shall surround both the open aircraft door and the doorway to protect passengers from the elements. The covering shall not absorb water, shall be highly tear resistant, and shall remain flexible from -31 °F (-35 °C) to 127 °F (52.8 °C). The aircraft closure color shall be gray.

a. Each side of the aircraft closure shall be independently actuated to seal against aircraft contours.

b. Pressure sensitive switches shall be incorporated into the closure mechanisms to prevent excessive pressure on the aircraft.

c. The contacting seal shall be a soft material to prevent scratching or damage to the aircraft skin. The seals that contact the aircraft shall be segmented and attached to the main closure assembly with Velcro type fastener strips for easy replacement.

100-3.9 Automatic Leveling

The PBB shall be equipped with an automatic leveling system (autoleveler) which shall allow the PBB to follow changes in the aircraft elevation that occur during aircraft loading and unloading. This system shall function with equal reliability for all aircraft contours. The autoleveler shall be located on the right side of the cab and be in full view of the operator at the control console.

(a) The autoleveler shall operate such that it is engaged when the master key switch is in the "AUTO" position.

(b) The autoleveler circuit shall include a sustained travel timer. The timer limits autolevel operation to a time which is adjustable from 1.6 to 16 seconds **[(Jetway recommends 4 seconds)]**. A fault condition shall be assumed if the operation exceeds the set time limit. This fault condition shall cause all motor power to be disconnected and audible and visual alarms to sound.

(c) The main auto level sensing switch shall be activated upon a 5 degree auto level wheel rotation.

100-3.10 Drive Column

The drive column shall provide the vertical and horizontal motion for the PBB. The drive column and control systems shall be designed for smooth, quiet operation. The vertical and horizontal movements shall be capable of being operated simultaneously.

The drive column shall be divided into two major components: Vertical Drive and Horizontal Drive.

a. Vertical Drive

The PBB shall be able to be moved vertically by means of two recirculating ball bearing screw assemblies.

(1) Each assembly shall be independent with individual motors and brakes and shall be capable of supporting the PBB under full design load to provide 100% redundancy.

(2) The ball nut shall be equipped with wiper brushes to remove grit or dirt from the screw threads and shall be equipped with a special thread profile designed to support the PBB in the absence of the recirculating ball bearings.

(3) The vertical drive motors shall be AC induction motors with integral reducer and brakes. The brakes shall be spring applied

and electrically released and shall hold securely at all elevations whenever electrical power is not applied.

(4) A fault detector capable of sensing differential motion of the ball screw assemblies shall be provided. The detector shall disconnect electrical power from the vertical drive motors if a fault is detected.

(5) The vertical travel speed shall be 3.6' (1097 mm) per minute (1057 mm/min for 50 Hz applications) minimum.

(6) Hydraulic lift cylinders with mechanical stops to prevent overtravel shall be provided.

b. Horizontal Drive

A variable speed, electro-mechanical drive system shall provide horizontal travel.

(1) The PBB tires shall be solid rubber.

(2) The horizontal drive system shall use AC gearmotors with integral brakes. The AC motors shall be driven by solid state variable frequency motor controllers. The AC drive system shall provide high efficiency, smooth performance, and good component availability. The controller shall provide a variable frequency signal to provide adjustable speeds from 0 to 90' (27.4 m) per minute. The controller shall be capable of being adjusted to provide optimum responsiveness to the horizontal controls and shall provide built in diagnostics to assist with trouble shooting.

(3) A steer angle of 180° shall be possible. Steering speed shall be adjustable from 16°/sec minimum to 42°/sec maximum.

(4) A regenerative braking system shall allow the PBB to come to smooth controlled stops. Integral spring-applied electrically-released brakes shall be provided with each drive motor to lock the PBB in place when electrical power is disconnected. This shall also occur when the joystick is in the neutral position.

(5) The horizontal drive motors shall be equipped with manual brake releases allowing the PBB to be towed in the event of

power failure. Tow lugs shall be a component of the lower wheel frame.

100-3.11 Interior Finishes

The interior finish of the PBB shall be designed to be durable and easy to clean. The materials shall be time proven to withstand the environmental exposure of airport traffic. All interior finishes shall be Class A rated.

a. The ceiling shall be made of plank type panels. Each plank shall be 7-1/4" (184 mm) wide with a 3/4" (19 mm) space between adjacent planks. The planks shall run perpendicular to the tunnel centerline and continuously from wall to wall. The planks shall be manufactured from 0.020" (0.51 mm) thick aluminum, with a white baked-on enamel finish. Planks located at the ends of light fixtures shall have a black finish to match the fixtures.

b. Tunnel and rotunda interior lighting shall be provided by F32 SPX T8, Bi-Pin, 32 Watt, 2950 Lumen, High Output, Energy Saving, Cool White, Single Lamp, Flourescent Light Fixtures that are powered by instant start electronic ballast's that provide a 1.0 ballast factor. The light fixtures shall be located eight-foot (2438 mm) on center. The average light intensity at the floor shall be 18 foot candles (194 lux). Please note that lighting intensity levels vary significantly with changes in interior color designs. The measurements noted above are based on an interior design that incorporates white wallboard with light colored carpeting and white ceiling.

Single three-way switches shall be located in the rotunda and on the wall near the service door at the aircraft end of the PBB. These switches shall control interior tunnel, bubble, and rotunda lights and the weatherproof florescent cab floodlight mounted outside the cab weather door.

c. The aluminum corner molding that finishes the ends of the ceiling plank and the top edge of the wall panels shall be black to match the interior light fixtures.

d. Insulation in the ceiling shall be 1/2" (12.7 mm) thick, black, fire resistant fiberglass.

e. The subfloor in the cab and bubble area shall be 3/4" (19 mm) marine grade plywood, which has a high resistance to moisture and moisture damage. The subfloor in the remainder of the PBB shall be 3/4" (19 mm) thick American Plywood Association rated Oriented Strand Board Exposure 1.

f. Ribbed rubber 1/4" (6.4 mm) thick shall be applied to the floor from the aircraft end of the PBB to the terminal side of the service door.

g. PBB interior floor covering, other than covered in paragraph 6 above, will be carpet meeting the properties identified below:

Weave:	Tufted
Surface Texture:	Multilevel Loop
Gauge:	5/64
Face Yarn:	3-Ply Dupont BCF Antron Legacy Nylon
Face Yarn Weight:	32 ozs./sq. yd.
Width:	18" Modules
Color:	Light Gray

****

DESIGNER SHALL CONFIRM CARPET TYPE WITH MAA TASK MANAGER.

****

Aluminum carpet molding shall be supplied with the PBB.

h. The tunnel wall treatment shall consist of floor to ceiling high pressure laminate phenolic and melamine plastic panels. The panels shall be approximately 4' (1219 mm) on center and shall be supported by clear anodized aluminum trim with a black accent strip. The design allows each panel to be removed individually. This built-up wall structure results in an average thermal resistance R of 2.6 Hr-Ft^2 ^{o}F/BTU (.46 m^2 ^{o}C/W). The color shall be white.

The walls of the rotunda pivoting section shall be developed using a series of 2-1/2 inch (63.5 mm) wide formed galvanized steel slats that shall be connected together to develop a coiling curtain assembly.

Wall treatments in the cab pivoting section shall be galvanized steel slats. Every other slat in the cab side coiling curtain shall be equipped with a 1-1/2 inch (38mm) wide x 12 inch (305 mm) high wire glass vision panel to enhance operator visibility.

i. Other Interior Surfaces Exposed to Passengers

(1) **Surface preparation**:

(a) Contaminants shall be removed from the surface in accordance with SSPC SP-1 and appropriate SSPC commentaries.

(b) The surface shall be mechanical cleaned in accordance with SSPC SP-3 to remove loose scale and contaminants from the surface where required.

(c) The cab surface shall be dry abrasive blast cleaned in accordance with SSPC SP-6 to obtain a 1-3 mil profile.

(2) **Primer:**

One coat of Sherwin-Williams High Build "Chromate Free" Epoxy Primer E65AC8\E65RC5 (or equivalent) shall be applied. The dry film thickness shall be 2-10 mils.

(3) **Finish Coat:**

Sherwin-Williams high solids Polane H Poly- urethane (or equivalent) shall be applied. The dry film thickness shall be 2-3 mils. The color shall match the wallboard color unless otherwise specified.

The total dry film thickness shall be 4-10 mils.

j. Interior Surfaces Not Exposed to Passengers

(1) **Surface preparation:**

(a) Contaminants shall be removed from the surface in accordance with SSPC SP-1 and appropriate SSPC commentaries.

(b) The surface shall be mechanically cleaned in accordance with SSPC SP-3 to remove loose scale and contaminants from the surface where required.

(2) **Primer:**

One coat of Sherwin-Williams High Build "Chromate Free" Kem Aqua 70P (Grey E61A570) primer shall be applied. The dry film thickness shall be 1.1 mils (27 microns).

k. Small Miscellaneous Assemblies

(1) **Surface preparation:**

The surface shall be dry abrasive blast cleaned in accordance with SSPC SP-6 to obtain a 0.5-1.5 mil profile.

(2) **Finish Coat:**

One coat of Morton Int. Corvel Zinc Rich Gray Epoxy Powder #13-7004 shall be applied and heated to 350°F for 20 minutes. The finished coating thickness shall be 2-5 mils.

100-3.12 Exterior Finishes

a. Surface Preparation:

(1) Contaminants shall be removed from the surface in accordance with SSPC SP-1 (Solvent Wipe) requirements and commentaries.

(2) The surface shall then be dry abrasive blast cleaned in accordance with SSPC SP-6 (Commercial Blast Cleaning) requirement to obtain a 1-3 mil profile.

b. Primer:

One coat of Sherwin-Williams High Build Epoxy Chromate Free Primer E65 AC8\E65RC5 shall be applied over the prepared surface to a dry film thickness shall be 3-17 mils (75-425 microns).

c. Finish Coat:

One finish coat of Sherwin-Williams polane (aliphatic) high solids, catalyzed, pigmented Polyurethane, shall be applied over the primer coat at a dry film thickness shall be 2-3 mils (50-75 microns). The color shall be white.

The total exterior finish shall provide a minimum dry film thickness shall be 6 mils (150 microns).

DESIGN CRITERIA FOR NEW PBBS AND NEW FOUNDATIONS

100-4 The PBB shall be designed in accordance with good engineering practices and the standards developed and adopted by the passenger boarding bridge industry. Particular attention shall be given to keeping components simple, rugged and easily accessible for routine maintenance, including lubrication, component exchange and

ease of adjustment. All access panels and openings shall be sized to accommodate the component being changed or adjusted, as well as the equipment and personnel necessary to accomplish the work.

100-4.1 Environmental Considerations, The PBB shall operate satisfactorily under ambient temperature conditions of -25 °F (-32 °C) to 125 °F (52 °C), with wind up to 60 mph (97 kph). All components and materials shall be individually and collectively designed or selected for long service life under such conditions.

100-4.2 Power Requirements. The PBB shall operate on 480/277 V.A.C., 3 phase, 60 Hz. Wye configuration with neutral and separate ground (5 wire). The 480 V.A.C. shall be transformed to 120/240 VAC for lighting and controls.

100-4.3 Structural Loads

a. The PBB shall support the following loads. These loads may be applied in total or in part, singularly or simultaneously. The design shall be based on the combination that imposes the most adverse loading. PBB manufacturer shall confirm that PCAir and 400Hz unit dead loads submitted by the Contractor can be supported on the new bridges. In addition to the dead loads and strain caused by movement, the entire PBB shall support:

(1) A live load of 40 pounds per square foot (psf) (195 kg/m^2)

(2) A retracted and stowed wind load of: 25 psf (122 kg/m^2) or an approximate wind velocity of 90 mph (145 kph).

An operation wind load of: 12.5 psf (61 kg/m^2) or an approximate wind velocity of 60 mph (97 kph).

(3) A roof load of 25 psf (122 kg/m^2).

b. The structural design shall provide sufficient torsional rigidity to avoid excessive sway when the PBB is brought to a gradual stop.

c. All mechanisms for actuating, guiding and restraining the PBB and its components shall be designed to minimize noise and sway so that no sense of insecurity shall be apparent to passengers. No operating loads shall be transmitted to the terminal building.

100-4.4 Structural Support Elements (Foundation Design)

a. It shall be the Contractor's responsibility to design the foundations for the Passenger Boarding Bridges based on load data provided by the bridge manufacturer. Foundation designs shall be submitted to the Engineer for information and record. Designs shall be signed and sealed by a professional engineer registered in the state of Maryland.

b. Anchor Bolt Assemblies: Anchor Bolts shall be ASTM A36 or ASTM A307 material. Bolts, nuts, washers, and related components shall be hot-dipped galvanized in accordance with ASTM A 123 and ASTM A 153.

All anchor bolts shall be properly protected from bending and damage during, and after construction. The Contractor shall furnish layout templates, anchor bolts, anchor and leveling nuts, as required to complete the installation. Nuts shall meet the requirements of ASTM A 449 and shall be galvanized. In addition, after installation, tack welds shall anchor the nuts to the base. All zinc coating removed or damaged by welding or by any other reason shall be cleaned and repaired with galvanizing repair primer meeting the requirements of FS TT-P-641 G (1).

c. The Contractor shall confirm the PBB configuration and foundation locations prior to fabricating any materials associated with the support column. Exact shaft locations and anchor bolt configuration may vary based on the actual PBB manufacturer and Model being provided. The Contractor shall provide drawings and template location for all anchor bolt locations and detailing all work required to set the anchor bolts. Any expense incurred because of any error in setting anchor bolts shall be borne by the Contractor.

d. An approved non-shrinking, grout shall be used underneath the column baseplate and leveling-plate. Grout shall be a no-iron mix to preclude unsightly rust marks.

CODES, REGULATIONS, AND REFERENCES

100-5 PBBs shall be designed to meet U.S. Codes and Regulations that have been adopted by the passenger boarding bridge industry as described below.

100-5.1 Structural

a. American Institute of Steel Construction (AISC) Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings.

b. American Welding Society (AWS) Standards.

c. Structural Design and Corrugated Steel Panels based on Van Karmon Theory and on buckling studies by Peterson and Card.

100-5.2 Material

Structural Plate/Steel/Shapes:	ASTM-A36
Structural Tube:	ASTM-A500
Steel Pipe:	ASTM-A53
Steel Sheet:	ASTM-A570
Steel Plate:	ASTM-A514
Hinge Pins:	ASTM-A311 Grades 1018 & 1144
Bolts:	High Strength SAE-J429 Grades 5 & 8 or ASTM-A325 & A440

100-5.3 Mechanical. All mechanical components and designs shall conform to the recommendations and standards established by the Society of Automotive Engineers (SAE) and the American Society of Mechanical Engineers (ASME).

100-5.4 Electrical. The PBB shall be listed by ETL Testing Laboratories, an NRTL testing laboratory, for conformance to ANSI/UL-325. All equipment and methods of installation shall conform, where applicable, to the requirements and recommendations of the National Electrical Manufacturers Association (NEMA) and the National Electrical Code (NEC) latest issue.

100-5.5 Fire Protection. PBBs shall meet the requirements of the National Fire Protection Association (NFPA) 415, "Standard on Airport Terminal Buildings, Fueling Ramp Drainage, and Loading Walkways," and NFPA 101, "Life Safety Code."

100-5.6 Paint. Surface preparation and painting of the PBB shall conform to the guidelines and standards of the Structural Steel Painting Council (SSPC).

MANUALS AND TRAINING

100-6.1 Operation and Maintenance manuals shall follow the intent of the Air Transport Association (ATA) Specification 101 and shall include preventative maintenance requirements and problem solving procedures.

100-6.2 Operation and maintenance manuals shall be provided to the Engineer by the Contractor:

****

DESIGNER TO INSERT NUMBER BASED ON FOLLOWING SCHEDULE:

a. One PBB - Three Operation and Maintenance Manuals.

b. Two PBBs - Four Operation and Maintenance Manuals.

c. Three PBBs - Five Operation and Maintenance Manuals.

d. Four or More PBBs - Six Operation and Maintenance Manuals.

****

100-6.3 PBB operator training shall be provided, by PBB type, at scheduled times during the installation. The training schedule shall be set by the MAA for uninterrupted four-hour blocks per PBB type between 8:00 a.m. and 5:00 p.m. during the standard workweek.

WARRANTY

100-7.1 The Contractor shall warrant that the PBBs and all components and accessories comply with the requirements of the contract documents, including approved drawings and this specification. The PBB shall perform to the design function for a minimum period of one (1) year from the date of final acceptance of the PBB by the Owner. Failures caused by normal wear and tear, acts of God, and modifications by the Owner, which have not been approved by the manufacturer, will be excluded from the coverage in this section.

100-7.2 The Contractor shall warrant that the PBBs and all their components are new and manufactured using new materials, are of good quality, are suitable use on aircraft, and are free and clear from liens, encumbrances and title defects.

100-7.3 The Contractor (and/or the manufacturer of the PBB, as applicable) further agrees to repair or replace any warranty defect, including both parts and labor, at his expense, within twenty-four (24) hours of notification from the Owner.

100-7.4 The Contractor (and/or the manufacturer of the PBB, as applicable) further agrees to repair or replace (parts and labor), at his expense, within twenty-four (24) hours, any defect which constitutes a breach of warranty, provided the Contractor is notified of such defect within twelve (12) months following the date of formal written Final Acceptance by the Owner.

100-7.5 Upon Owner's submission of a claim as provided above and following its substantiation, Contractor (and/or the manufacturer of the PBB, as applicable) shall at its option either (1) repair or replace its product or work at the final delivery point or (2) refund an equitable portion of the purchase price.

100-7.6 Failure caused by: (a) Owner's abuse (b) acts of God, which shall include but not be limited to hurricanes, earthquakes, and natural disasters are specifically excluded from the coverage of this section.

CONSTRUCTION METHODS

100-8.1 **General.** The Contractor shall install the Passenger Boarding Bridges at the locations indicated in the Contract Drawings.

100-8.2 **Transport and Deliveries.** Removal and transport to the storage location shall be coordinated with the Engineer and MAA Operations. Delivery of new Passenger Boarding Bridges shall be coordinated with MAA Operations and occur at BWI Gate 55. Contractor will be required to provide security in compliance with the security requirements at Gate 55 when deliveries or transport of the PBBs are scheduled.

100-8.3 **Foundations.** The Contractor shall be required to install new or reinstall existing Passenger Boarding Bridges on existing foundations. Any modifications to the foundations will need to be designed, signed and sealed by a PE registered in the State of Maryland and submitted to Engineer for information and record prior to the installation.

100-8.4 **Utilities.** The Contractor shall be responsible for all interface connections between the PBB and the building systems. During removal, installation, or re-installation, the contractor shall coordinate with MAA Maintenance regarding disassembly and reconnection of building systems with the PBB.

100-8.5 **Safety and Weathersealing.** Prior to removal of the PBB, the Contractor shall submit to the Engineer a plan for temporarily covering the opening left by the PBB removal. The covering shall be weathertight to prevent any penetration of water into the building as a result of the removal of the PBB.

100-8.6 **Testing.** After installation or re-installation of a Passenger Boarding Bridge, the Contractor and a Manufacturer Representative of the Passenger Boarding Bridge shall test the PBB according to the Specifications and the satisfaction of the Engineer. The operation of each PBB shall undergo an aircraft test park for the most demanding aircraft docking procedures to ensure proper mating of the PBB to the aircraft. Temporary tape shall be used for the stop bar and lead-in lines for the aircraft test park. Following a successful test part, the final pavement marking for the aircraft may be placed. If any problems are encountered with regards to the Passenger Boarding Bridge the Contractor shall correct at his expense and to the Engineer's satisfaction and re-tests.

METHOD OF MEASUREMENT

****

DESIGNER SHALL DEFINE THE METHOD OF MEASUREMENT BASED ON THE TYPE OF PROCUREMENT FOR THE PROJECT. THE MAA TASK MANAGER SHOULD APPROVE THE METHOD OF MEASURMENT AND THE ITEMS INCLUDED. A STANDARD LIST IS PROVIDED.

****

100-9.1 PASSENGER BOARDING BRIDGE REMOVAL AND STORAGE: The work for this item shall be measured per each and includes performing all mechanical and electrical system disconnects, removal of the bridge from the foundation, protection of the terminal gate openings, transport of the bridge to the storage location identified on the Contract Documents, protection of the PBB from damage during transport and storage, and provision of all materials, labor, transport, handling, storage materials and fees, and other associated items necessary to accomplish this work.

100-9.2 PASSENGER BOARDING BRIDGE REMOVAL AND DISPOSAL: The work for this item shall be measured per each and includes performing all mechanical and electrical system disconnects, removal of the bridge from the foundation, protection of the terminal gate openings, transport to an approved disposal site, and provision of all materials, labor, transport, handling, storage materials, disposal fees, and other associated items necessary to accomplish this work.

100-9.3 PASSENGER BOARDING BRIDGE REINSTALLATION WITH FIXED SECTION INSTALLATION: The work for this item shall be measured per each and includes transport from the storage area, installation of the bridge onto an existing foundation, performing all mechanical and electrical system connections, protection of PBB and terminal gate openings, fixed section installation, and other incidentals as shown on the plans. This item also includes electrical and communication capacity upgrades required for the bridges.

100-9.4 PASSENGER BOARDING BRIDGE REINSTALLATION WITHOUT FIXED SECTION INSTALLATION: The work for this item shall be measured per each and includes transport from the storage area, installation of the bridge onto an existing foundation, performing all mechanical and electrical system connections, protection of PBB and terminal gate openings, and other incidentals as shown on the plans. This item also includes electrical and communication capacity upgrades required for the bridges.

100-9.5 FURNISH AND INSTALL A NEW PASSENGER BOARDING BRIDGE: The work shall be measured per each and includes the purchase, delivery, and transport of the new bridge, storage and protection of the PBB as needed prior to installation, installation of the bridge onto an existing foundation, performing all mechanical and electrical system connections, protection of PBB and terminal gate openings,

furnishing of all materials (including the pantograph), labor, testing, certifying, handling, equipment, tools, and all associated effort required to accomplish this work. This item also includes provision of Operations and Maintenance Manuals to the Engineer and provision and coordination of Training for the users.

100-9.6 PASSENGER BOARDING BRIDGE FOUNDATION CONSTRUCTION: The work shall be measured per each and includes the furnishing of all materials, labor, design, testing, certifying, handling, equipment, tools, and all associated effort required to complete this item.

100-9.7 PASSENGER BOARDING BRIDGE FOUNDATION MODIFICATION: This work shall be measured per each and includes the furnishing of all materials, labor, design, testing, certifying, handling, equipment, tools, and all associated effort required to complete this item.

BASIS OF PAYMENT

****

DESIGNER SHALL SELECT THE PAY ITEMS BASED ON THE TYPE OF PROCUREMENT METHOD FOR THE BRIDGES. THE ITEMS SHALL BE DISCUSSED AND APPROVED BY THE TASK.

****

100-10 The accepted quantities for the items listed under Method of Measurement shall be paid for at the Contract unit price per each, complete and accepted in place.

Payment will be made under:

Item PBB 100-10.1	Passenger Boarding Bridge Removal and Storage – Per Each
Item PBB 100-10.2	Passenger Boarding Bridge Removal and Disposal – Per Each
Item PBB 100-10.3	Passenger Boarding Bridge Reinstallation with Fixed Section – Per Each
Item PBB 100-10.4	Passenger Boarding Bridge Reinstallation without Fixed Section – Per Each
Item PBB 100-10.5	Furnish and Install a New Passenger Boarding Bridge – Per Each
Item PBB 100-10.6	Passenger Boarding Bridge Foundation Construction – Per Each
Item PBB 100-10.7	Passenger Boarding Bridge Foundation Modification – Per Each

END OF ITEM PBB-100

APPENDIX E

SURVEY CONTROL MANUALS

MARTIN STATE AIRPORT

BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

MARTIN STATE AIRPORT
SURVEY CONTROL MANUAL

MARTIN STATE AIRPORT

BWI BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

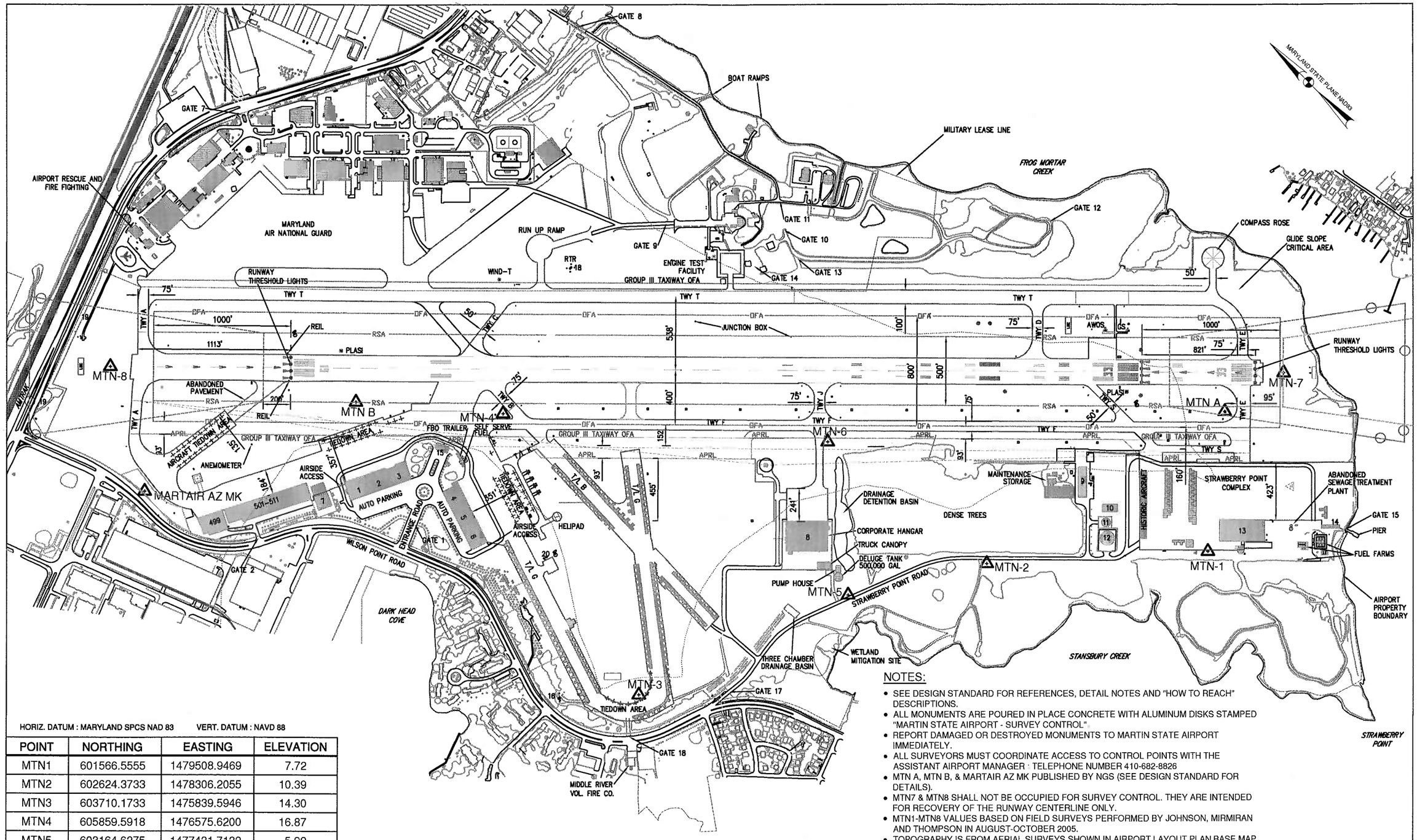
MARTIN STATE AIRPORT

Survey Control Manual

November 11, 2005

Important Note:

All Surveys Performed at Martin State Airport after November 11, 2005 are to Utilize this Manual and must be tied to the Martin State Airport Survey Control Network.



HORIZ. DATUM : MARYLAND SPCS NAD 83 VERT. DATUM : NAVD 88

POINT	NORTHING	EASTING	ELEVATION
MTN1	601566.5555	1479508.9469	7.72
MTN2	602624.3733	1478306.2055	10.39
MTN3	603710.1733	1475839.5946	14.30
MTN4	605859.5918	1476575.6200	16.87
MTN5	603164.6275	1477431.7132	5.92
MTN6	604064.3021	1478107.5955	12.90

UNITS : U.S. SURVEY FEET

NOTES:

- SEE DESIGN STANDARD FOR REFERENCES, DETAIL NOTES AND "HOW TO REACH" DESCRIPTIONS.
- ALL MONUMENTS ARE POURED IN PLACE CONCRETE WITH ALUMINUM DISKS STAMPED "MARTIN STATE AIRPORT - SURVEY CONTROL".
- REPORT DAMAGED OR DESTROYED MONUMENTS TO MARTIN STATE AIRPORT IMMEDIATELY.
- ALL SURVEYORS MUST COORDINATE ACCESS TO CONTROL POINTS WITH THE ASSISTANT AIRPORT MANAGER : TELEPHONE NUMBER 410-682-8826
- MTN A, MTN B, & MARTAIR AZ MK PUBLISHED BY NGS (SEE DESIGN STANDARD FOR DETAILS).
- MTN7 & MTN8 SHALL NOT BE OCCUPIED FOR SURVEY CONTROL. THEY ARE INTENDED FOR RECOVERY OF THE RUNWAY CENTERLINE ONLY.
- MTN1-MTN8 VALUES BASED ON FIELD SURVEYS PERFORMED BY JOHNSON, MIRMIRAN AND THOMPSON IN AUGUST-OCTOBER 2005.
- TOPOGRAPHY IS FROM AERIAL SURVEYS SHOWN IN AIRPORT LAYOUT PLAN BASE MAP DRAWING.

CONSULTANTS

DESIGNED:
DRAWN BY: BRH
CHECKED: DKS
APPROVED: DAL

REVISION NO.	REVISION DATE	REVISION DESCRIPTION

MARTIN STATE AIRPORT
MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
OFFICE OF PLANNING AND ENGINEERING

PROJECT TITLE:

SHEET TITLE: SURVEY CONTROL

CONTRACT NO.
SCALE: NOT TO SCALE
DATE:
SHEET NO.

MARTIN STATE AIRPORT (MTN) - SURVEY CONTROL DATA

NAME OF STATION: MTN-1 | **DATE ESTABLISHED:** August 2005

MARYLAND STATE PLANE COORDINATES (NAD 83):

NORTHING (Y):	601566.5555 US ft.	183357.853 m
EASTING (X):	1479508.9469 US ft.	450955.229 m
ORTHOMETRIC HEIGHT (NAVD 88):	7.72 US ft.	2.353 m
CONVERGENCE ANGLE:	0°22'15.1"	
SCALE FACTOR:	0.99997943	
COMBINED SCALE FACTOR:	0.99998425	

GEOGRAPHIC COORDINATES (NAD 83):

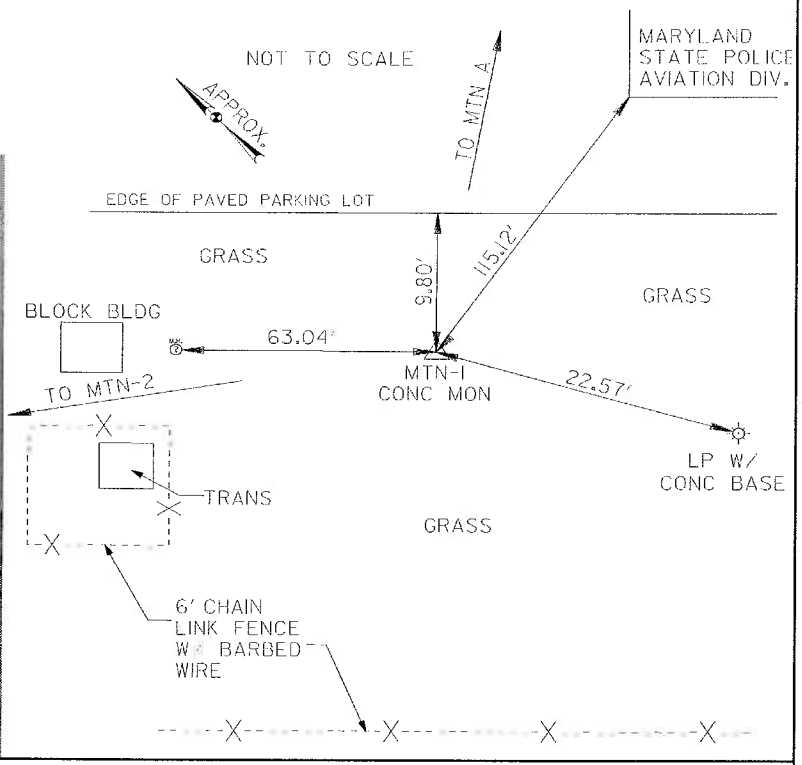
LATITUDE:	39°19'01.04312" (N)	
LONGITUDE:	76°24'32.83307" (W)	
ELLIPSOID HT:	-100.628 US ft.	-30.671 m

AVAILABLE CONVENTIONAL BACKSIGHT POINTS (FIELD DATA):

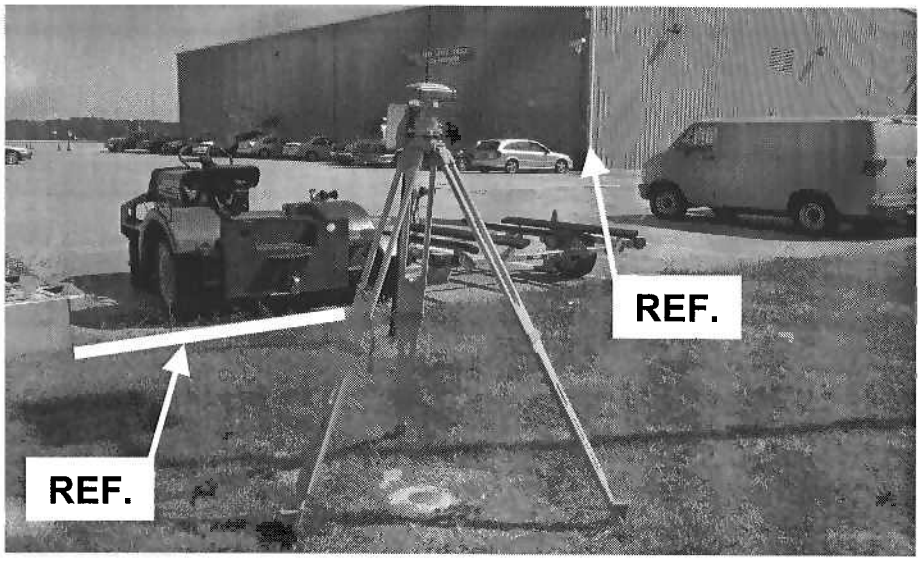
POINT	AZIMUTH	DISTANCE (US FT.)	DISTANCE (m)
MTN A	51° 15' 50"	1027.33	313.131
MTN-2	311° 19' 55"	1601.77	488.220

STATION DESCRIPTION:

To reach the monument from the traffic circle at MTN airport in front of the air traffic control tower, proceed S to Airside Access point by Hangars 4-6. After passing through the fence, proceed NE to the second Stop sign. Turn right and proceed SE past private plane hangars. Road will curve to the left, bearing North. At the intersection of T/L B and T/L G, turn right and proceed SE to Yield sign. Continue to Stop sign at Strawberry Point Road. Turn left on Strawberry Point Road. Continue past the entrance road to the maintenance shop and the salt dome. Road will turn to the left (North), passing along the back side of the historic aircraft display. Turn right (east) at the end of the road, continue to turn right, heading South along the front of the historic aircraft display. Monument is SW of the SW corner of the Strawberry Point Complex Maryland State Police hangar. Monument is 9.80' SW of the SW edge of paved parking lot, 63.04' SE of manhole in concrete, 22.57' NE of light pole with concrete base.



SURVEYED BY: JMT ENGINEERING — **SPARKS, MARYLAND**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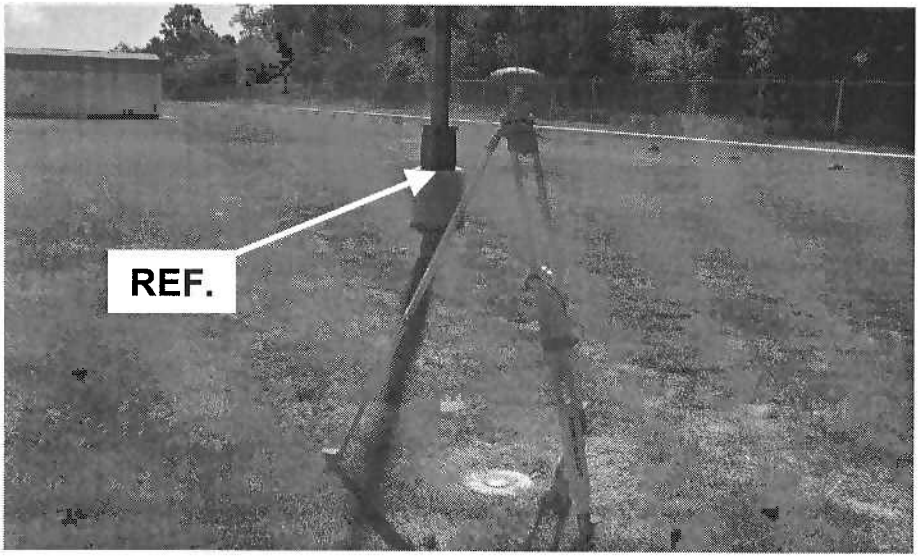
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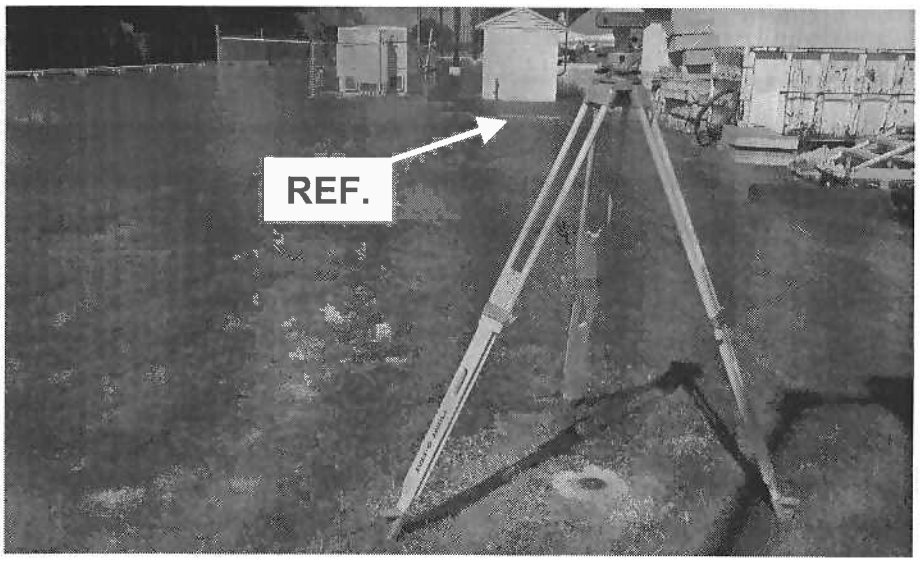

REF.

MARTIN STATE AIRPORT (MTN) - SURVEY CONTROL DATA

NAME OF STATION: MTN-2 | **DATE ESTABLISHED:** August 2005

MARYLAND STATE PLANE COORDINATES (NAD 83):

NORTHING (Y):	602624.3733 US ft.	183680.276 m
EASTING (X):	1478306.2055 US ft.	450588.633 m
ORTHOMETRIC HEIGHT (NAVD 88):	10.39 US ft.	3.167 m
CONVERGENCE ANGLE:	0°22'05.5"	
SCALE FACTOR:	0.99997983	
COMBINED SCALE FACTOR:	0.99998451	

GEOGRAPHIC COORDINATES (NAD 83):

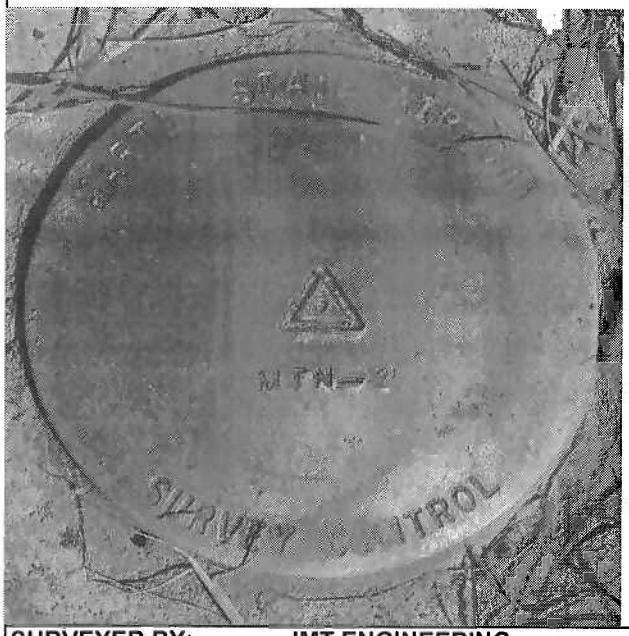
LATITUDE:	39°19'11.57473" (N)	
LONGITUDE:	76°24'48.05001" (W)	
ELLIPSOID HT:	-97.95 US ft.	-29.854 m

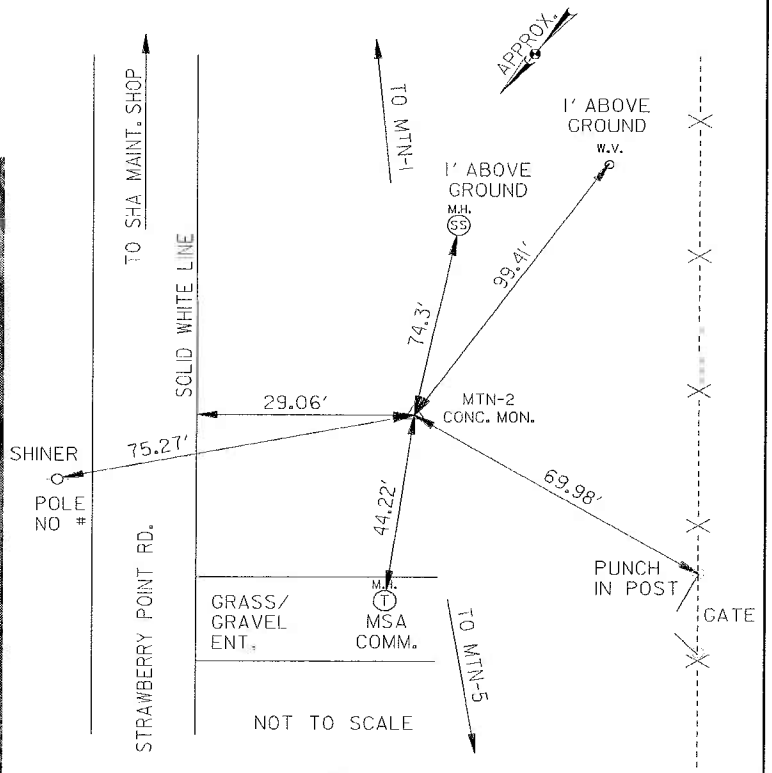
AVAILABLE CONVENTIONAL BACKSIGHT POINTS (FIELD DATA):

POINT	AZIMUTH	DISTANCE (US FT.)	DISTANCE (m)
MTN-1	131° 19' 55"	1601.78	488.224
MTN-5	301° 42' 27"	1027.94	313.317

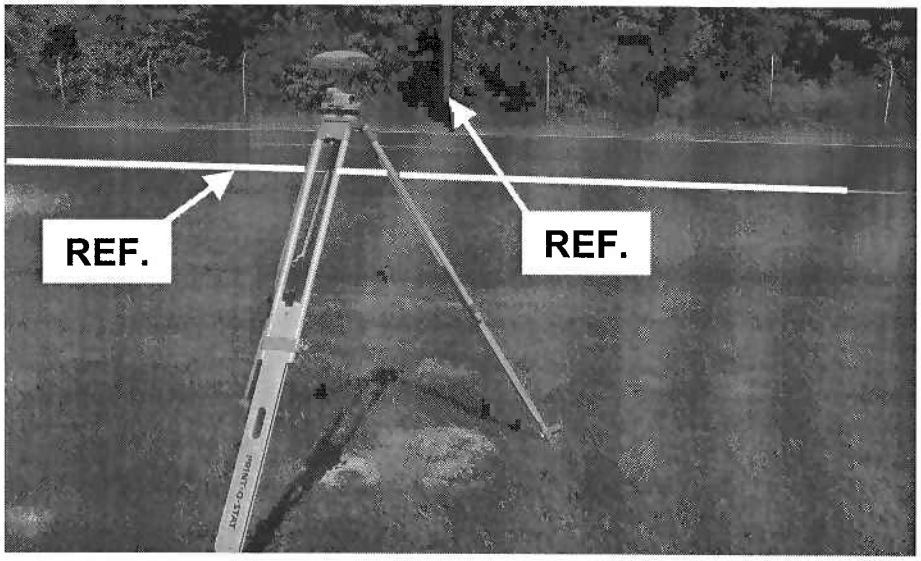
STATION DESCRIPTION:

To reach the monument from the traffic circle at MTN airport in front of the air traffic control tower, proceed S to Airside Access point by Hangars 4-6. After passing through the fence, proceed NE to the second Stop sign. Turn right and proceed SE past private plane hangars. Road will curve to the left, bearing North. At the intersection of T/L B and T/L G, turn right and proceed SE to Yield sign. Continue to Stop sign at Strawberry Point Road. Turn left on Strawberry Point Road. Proceed 1874 feet (0.35 mi.). Continue past the pump house and water tank to a gravel/grass lane and the station on the right. Monument is located 29.06' SW of SW edge of Strawberry Point Road, 74.3' N of Sanitary Sewer manhole 1' above ground, 99.41' N of water valve 1' above ground, 69.98' E of punch mark in southern gate post, 44.22' S of communications manhole in grass/gravel drive, 75.27' SW of nail and shiner in pole with no number.





SURVEYED BY: JMT ENGINEERING — **SPARKS, MARYLAND**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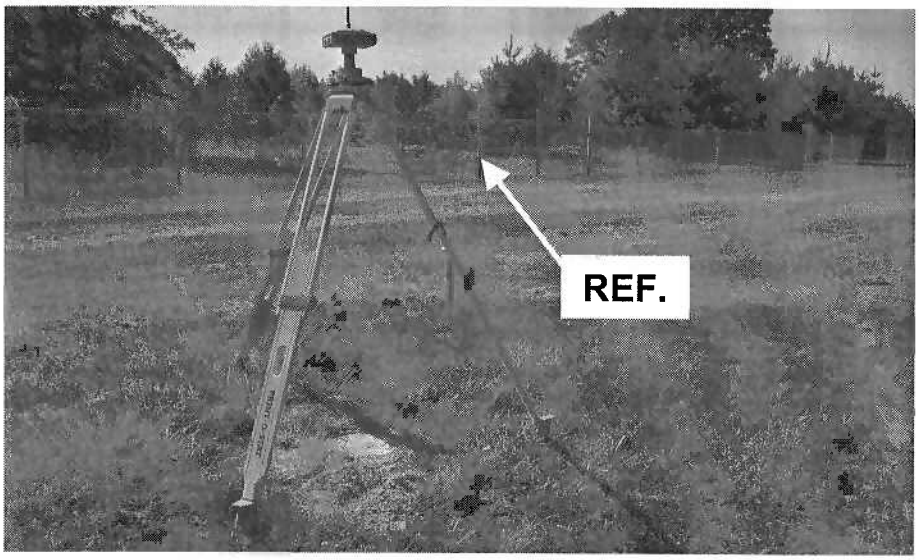
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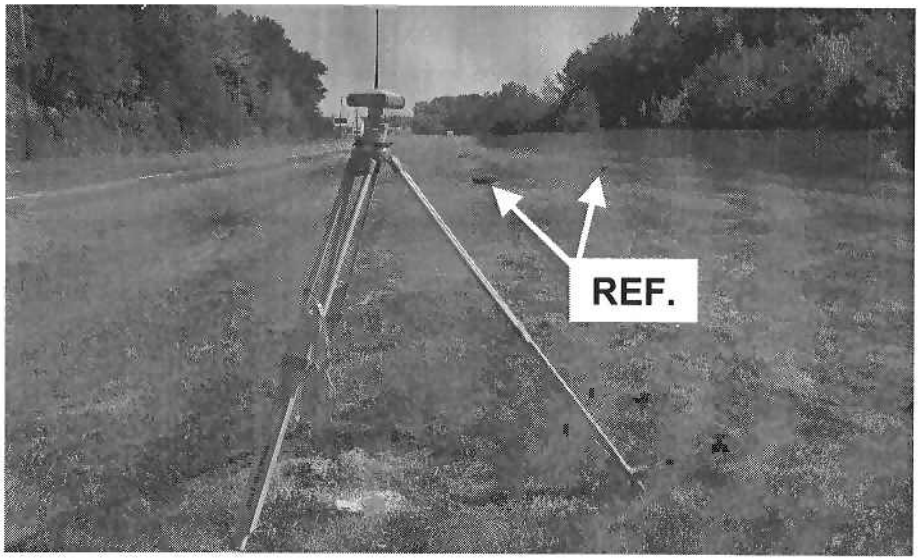
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MARTIN STATE AIRPORT (MTN) - SURVEY CONTROL DATA

NAME OF STATION: MTN-3 | **DATE ESTABLISHED:** August 2005

MARYLAND STATE PLANE COORDINATES (NAD 83):

NORTHING (Y):	603710.1733 US ft.	184011.229 m
EASTING (X):	1475839.5946 US ft.	449836.808 m
ORTHOMETRIC HEIGHT (NAVD 88):	14.30 US ft.	4.359 m
CONVERGENCE ANGLE:	0°21'45.9"	
SCALE FACTOR:	0.99998024	
COMBINED SCALE FACTOR:	0.99998473	

GEOGRAPHIC COORDINATES (NAD 83):

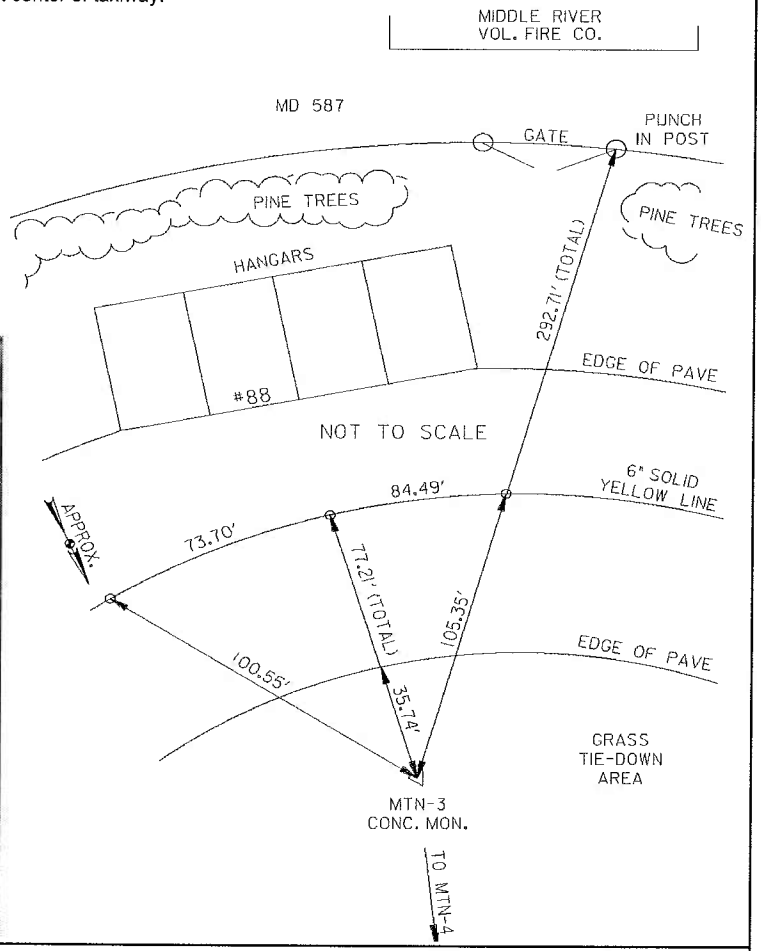
LATITUDE:	39°19'22.46174" (N)	
LONGITUDE:	76°25'19.34850" (W)	
ELLIPSOID HT:	-93.995 US ft.	-28.650 m

AVAILABLE CONVENTIONAL BACKSIGHT POINTS (FIELD DATA):

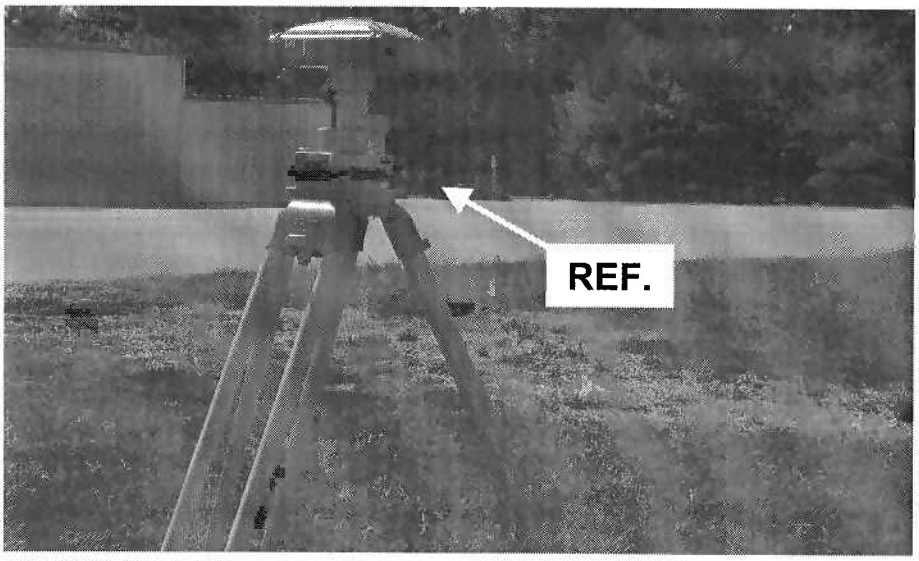
POINT	AZIMUTH	DISTANCE (US FT.)	DISTANCE (m)
MTN-4	18° 54' 10"	2272.00	692.507

STATION DESCRIPTION:

To reach the monument from the traffic circle at MTN airport in front of the air traffic control tower, proceed S to Airside Access point by Hangars 4-6. After passing through the fence, proceed NE to the second Stop sign. Turn right and proceed SE past private plane hangars. Where the road curves to the left, the station is on the left between aircraft tiedowns. Monument is 292.71' NE of punch mark in western gate post to MD 587, 105.35' NE of MAG Nail on same line, set in solid yellow line at center of taxiway, 77.21' N of MAG Nail set in solid yellow line at center of taxiway in line with Hanger #88, 35.74' N of N edge of taxiway on same line, 100.55' NW of MAG Nail set in solid yellow line at center of taxiway.



SURVEYED BY: JMT ENGINEERING — **SPARKS, MARYLAND**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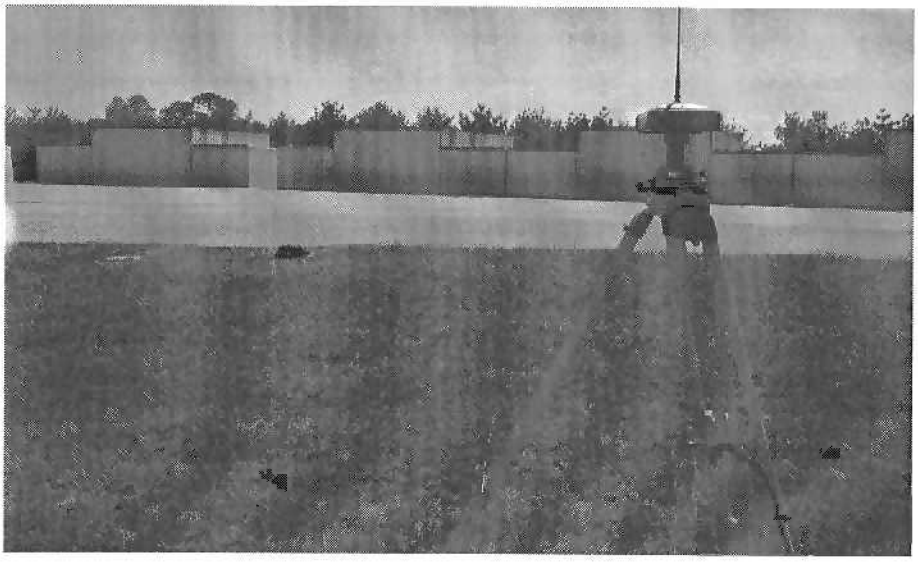


MARTIN STATE AIRPORT (MTN) - SURVEY CONTROL DATA

NAME OF STATION: MTN-4 | **DATE ESTABLISHED:** August 2005

MARYLAND STATE PLANE COORDINATES (NAD 83):

NORTHING (Y):	605859.5918 US ft.	184666.373 m
EASTING (X):	1476575.6200 US ft.	450061.149 m
ORTHOMETRIC HEIGHT (NAVD 88):	16.87 US ft.	5.142 m
CONVERGENCE ANGLE:	0°21'51.9"	
SCALE FACTOR:	0.99998104	
COMBINED SCALE FACTOR:	0.99998542	

GEOGRAPHIC COORDINATES (NAD 83):

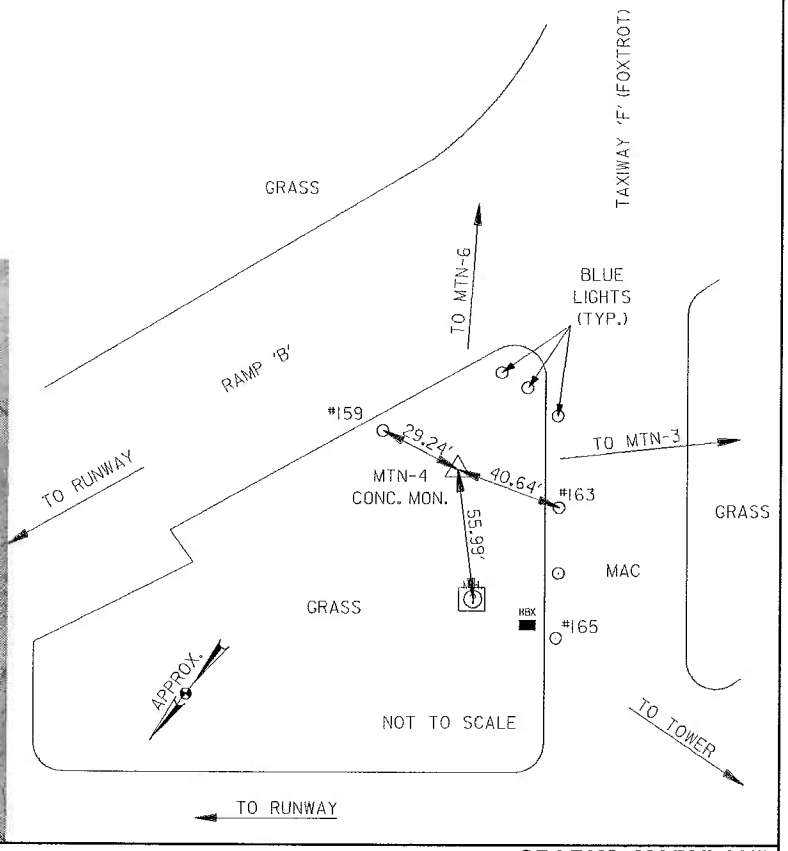
LATITUDE:	39°19'43.65932" (N)	
LONGITUDE:	76°25'09.80871" (W)	
ELLIPSOID HT:	-91.422 US ft.	-27.865 m

AVAILABLE CONVENTIONAL BACKSIGHT POINTS (FIELD DATA):

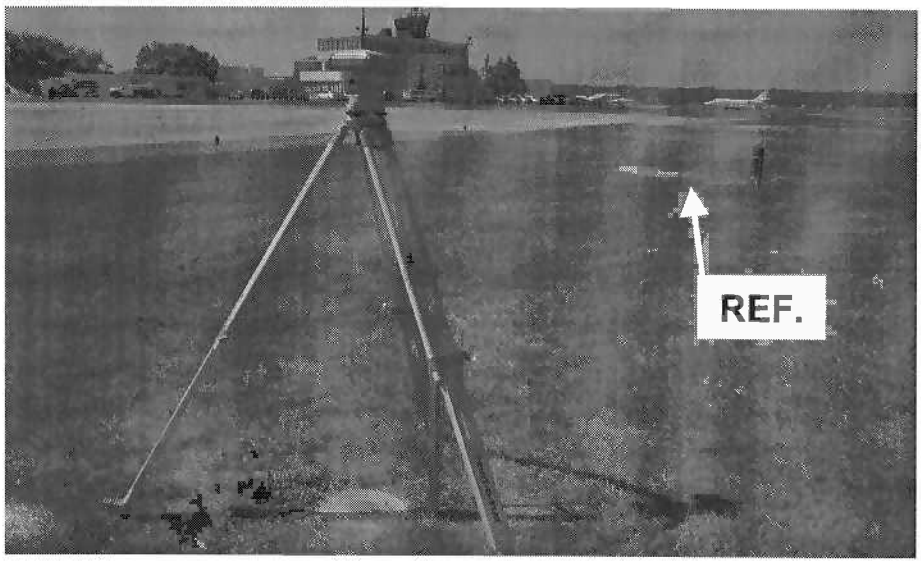
POINT	AZIMUTH	DISTANCE (US FT.)	DISTANCE (m)
MTN B	318° 58' 21"	1076.78	328.203
MTN-3	198° 54' 10"	2271.98	692.499
MTN-6	139° 31 29"	2360.13	719.369
MTN A	134° 20' 41"	5222.32	1591.765
MARTAIR AZ MK	302° 12' 00"	2675.15	815.387

STATION DESCRIPTION:

To reach the monument from the traffic circle at MTN airport in front of the air traffic control tower, proceed S to Airside Access point by Hangars 4-6. After passing through the fence, proceed NE to the second Stop sign.Turn left and pass in front of the helicopter hangar. Proceed to small triangular grass island next to Taxiway B in front of the air-traffic control tower and station on the right. Permission must be granted from Tower Control to cross Taxiway 'F' on foot (must park and walk out to MTN-4). Monument is 29.24' SW of ground light #159, 40.64' NE of ground light #163, and 55.99' from center of manhole in concrete.



SURVEYED BY: JMT ENGINEERING — **SPARKS, MARYLAND**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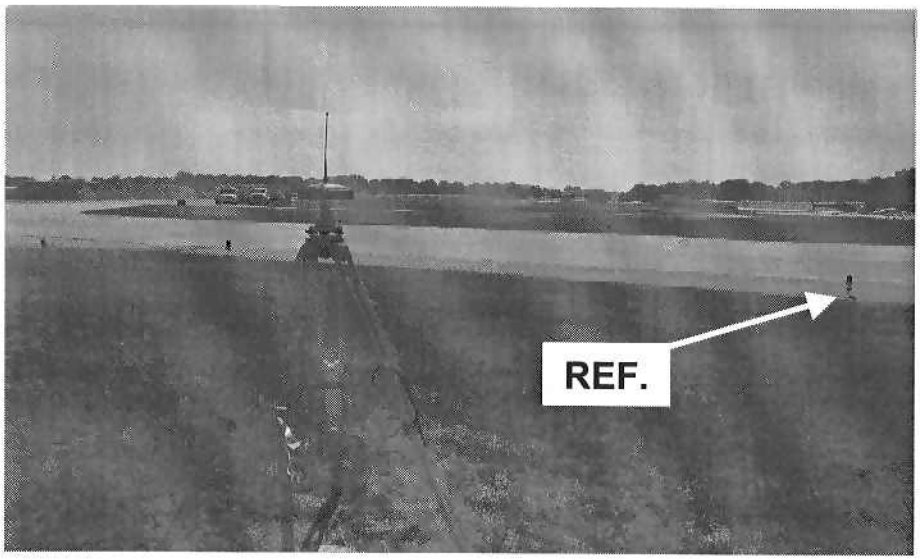
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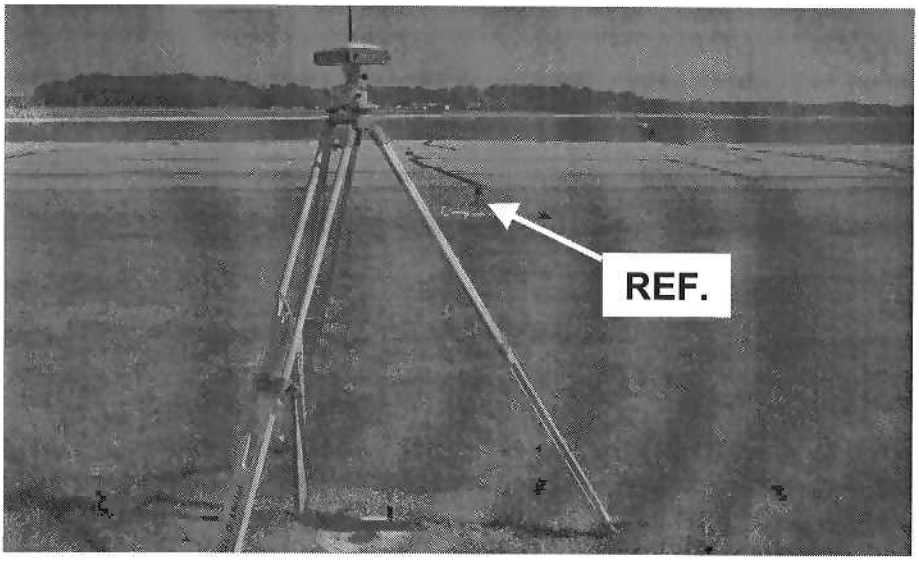
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MARTIN STATE AIRPORT (MTN) - SURVEY CONTROL DATA

NAME OF STATION: MTN-5 | **DATE ESTABLISHED:** August 2005

MARYLAND STATE PLANE COORDINATES (NAD 83):

NORTHING (Y):	603164.6275 US ft.	183844.946 m
EASTING (X):	1477431.7132 US ft.	450322.087 m
ORTHOMETRIC HEIGHT (NAVD 88)	5.92 US ft.	1.804 m
CONVERGENCE ANGLE:	0°21'58.6"	
SCALE FACTOR:	0.99998003	
COMBINED SCALE FACTOR:	0.99998493	

GEOGRAPHIC COORDINATES (NAD 83):

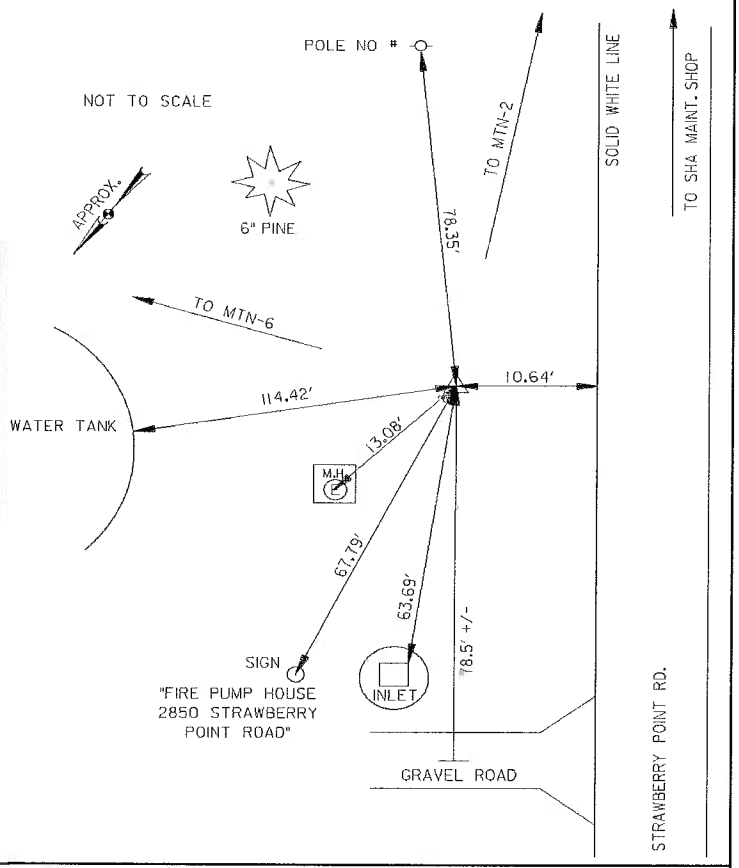
LATITUDE:	39°19'16.96973" (N)	
LONGITUDE:	76°24'59.13338" (W)	
ELLIPSOID HT:	-102.401 US ft.	-31.212 m

AVAILABLE CONVENTIONAL BACKSIGHT POINTS (FIELD DATA):

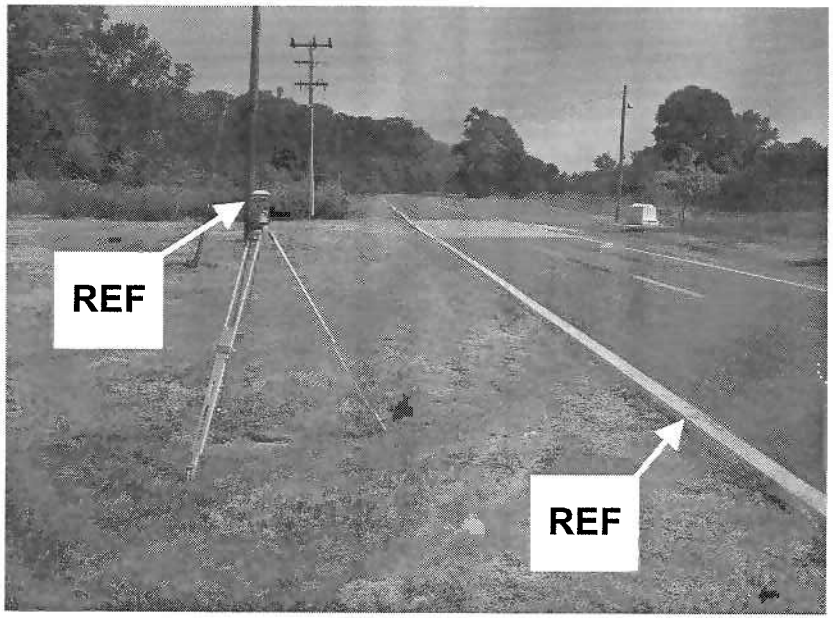
POINT	AZIMUTH	DISTANCE (US FT.)	DISTANCE (m)
MTN-6	36° 54' 57"	1125.30	342.991
MTN-2	121° 42' 27"	1027.93	313.314

STATION DESCRIPTION:

To reach the monument from the traffic circle at MTN airport in front of the air traffic control tower, proceed S to Airside Access point by Hangars 4-6. After passing through the fence, proceed NE to the second Stop sign. Turn right and proceed SE past private plane hangars. Road will curve to the left, bearing North. At the intersection of T/L B and T/L G, turn right and proceed SE to Yield sign. Continue to Stop sign at Strawberry Point Road. Turn left on Strawberry Point Road. Proceed 819 feet (0.16 mi.) to station the left. Station is located approximately 78.5 feet past the centerline of gravel/grass road (entrance to fire pump house/water tank). Monument is 63.69' SE of drop inlet in concrete near edge of gravel road, 67.79' SE of sign (Fire Pump House 2850 Strawberry Point Road), 114.42' S of face of water tower, 78.35' NW of guy pole with no number, and 10.64' NE of NE edge of Strawberry Point Road.



SURVEYED BY: JMT ENGINEERING — **SPARKS, MARYLAND**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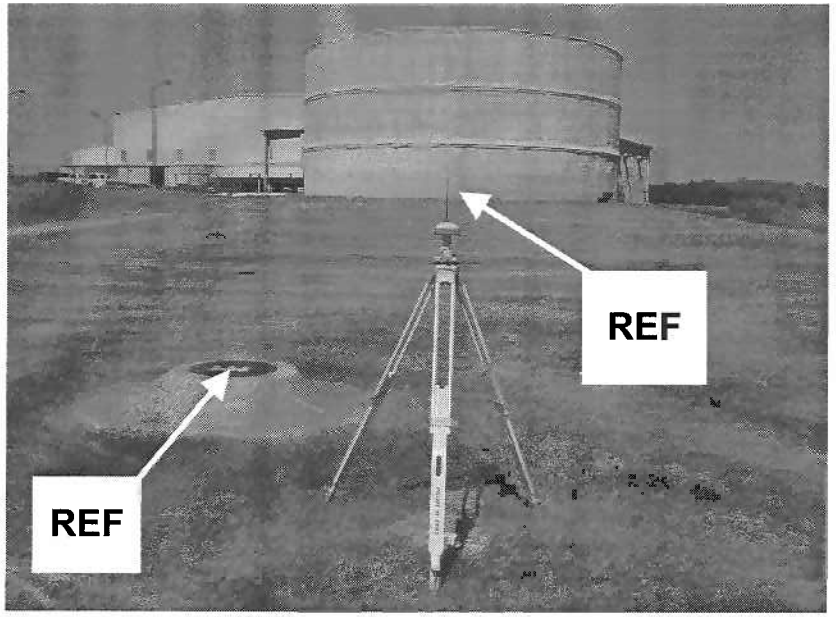
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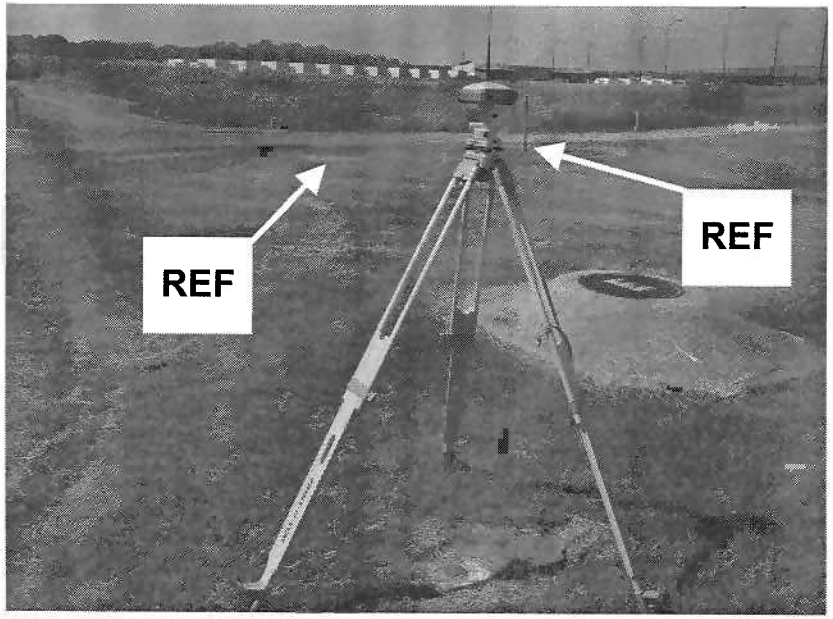
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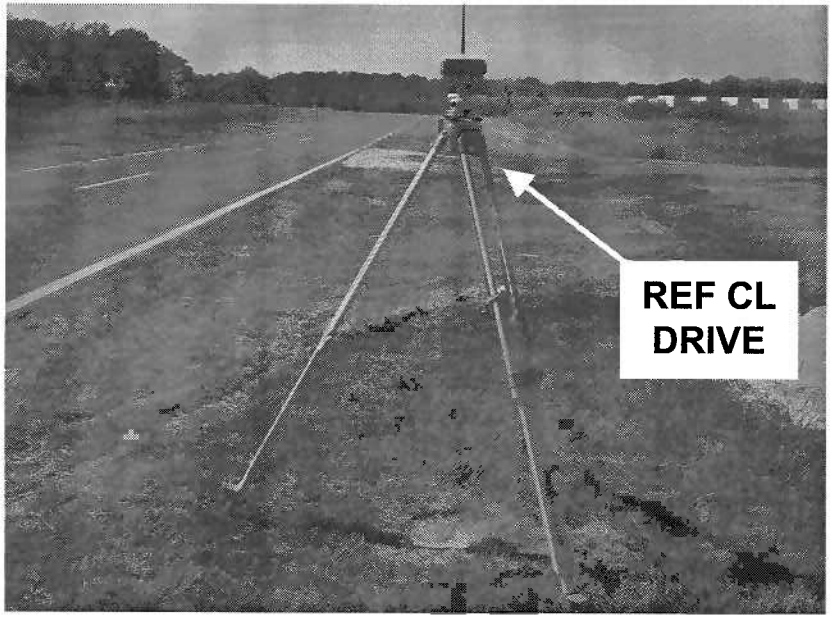
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MARTIN STATE AIRPORT (MTN) - SURVEY CONTROL DATA

NAME OF STATION: MTN-6 | **DATE ESTABLISHED:** August 2005

MARYLAND STATE PLANE COORDINATES (NAD 83):

NORTHING (Y):	604064.3021 US ft.	184119.168 m
EASTING (X):	1478107.5955 US ft.	450528.096 m
ORTHOMETRIC HEIGHT (NAVD 88)	12.90 US ft.	3.932 m
CONVERGENCE ANGLE:	0°22'04.0"	
SCALE FACTOR:	0.99998036	
COMBINED SCALE FACTOR:	0.99998493	

GEOGRAPHIC COORDINATES (NAD 83):

LATITUDE:	39°19'25.81887" (N)	
LONGITUDE:	76°24'50.45958" (W)	
ELLIPSOID HT:	-95.427 US ft.	-29.086 m

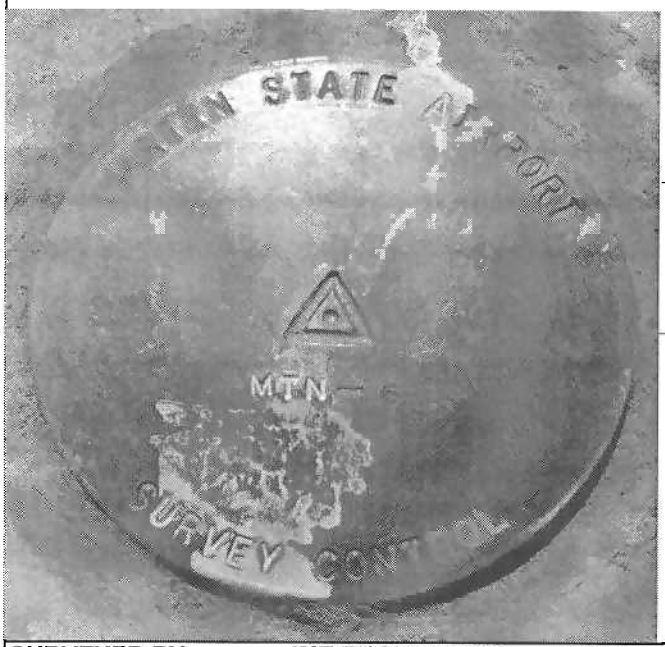
AVAILABLE CONVENTIONAL BACKSIGHT POINTS (FIELD DATA):

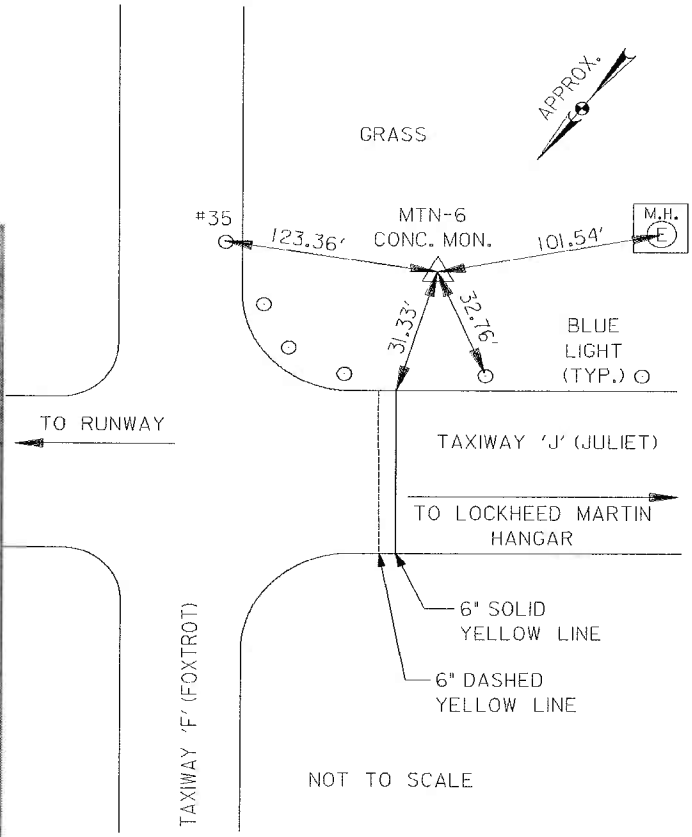
POINT	AZIMUTH	DISTANCE (US FT.)	DISTANCE (m)
MTN A	130° 06' 04"	2879.72	877.740
MTN-5	216° 54' 57"	1125.29	342.989
MTN-4	319° 31' 29"	2360.15	719.375
MTN-B	319° 21' 07"	3436.89	1047.566

STATION DESCRIPTION:

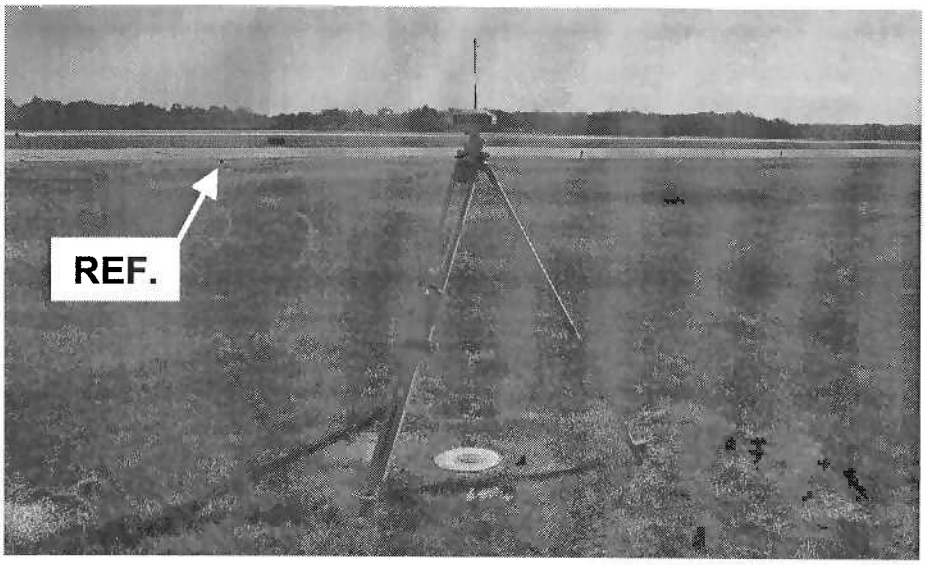
To reach the monument from the traffic circle at MTN airport in front of the air traffic control tower, proceed S to Airside Access point by Hangars 4-6. After passing through the fence, proceed NE to the second Stop sign. Turn right and proceed SE past private plane hangars. Road will curve to the left, bearing North. At the intersection of T/L B and T/L G, turn right and proceed SE to Yield sign. Continue to Stop sign at Strawberry Point Road. Turn left on Strawberry Point Road. Continue to the pump house and water tank on the left. Turn left into gravel lane. Park at pump house. Walk along fence and wetlands area to Taxiway F and the station on the right. Station is near the intersection of Taxiway F, Taxiway J, and the entrance road to Lockheed Martin's hangar/facility. Monument is 123.36' W of taxiway light #35, 101.54' NE of center of electric manhole 0.5' above ground, 32.76' SE of ground way light with no number, 31.33' S of S end 6" solid yellow line on Taxiway 'J'.

***Monument is outside the APRL. Access to this monument by way of Taxiway "F" requires airport tower permission.**





SURVEYED BY: JMT ENGINEERING — **SPARKS, MARYLAND**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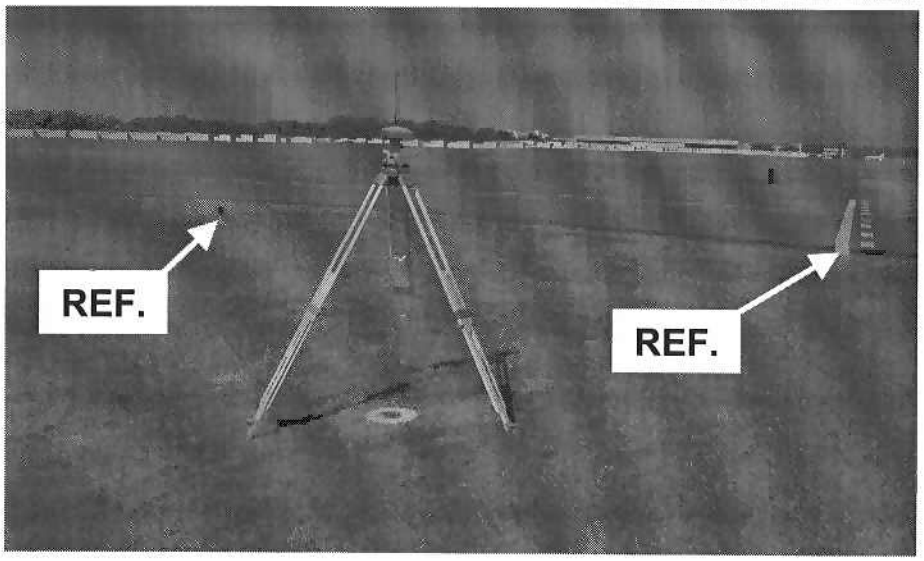
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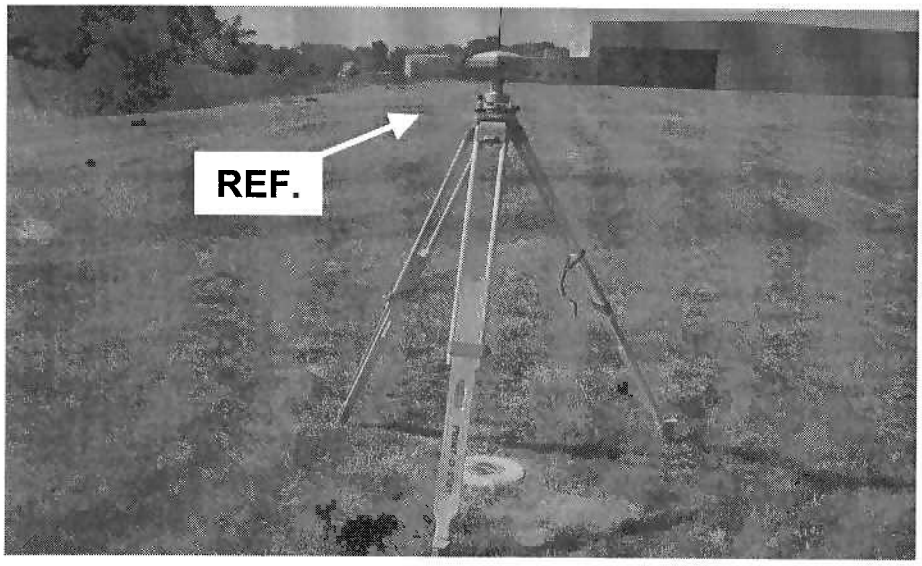
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MARTIN STATE AIRPORT (MTN) - SURVEY CONTROL DATA

NAME OF STATION: MTN-7 | **DATE ESTABLISHED:** August 2005

MARYLAND STATE PLANE COORDINATES (NAD 83):

NORTHING (Y):	US ft.	m
EASTING (X):	US ft.	m
ORTHOMETRIC HEIGHT (NAVD 88):	US ft.	m
CONVERGENCE ANGLE:		
SCALE FACTOR:		
COMBINED SCALE FACTOR:		

GEOGRAPHIC COORDINATES (NAD 83):

LATITUDE:	(N)	
LONGITUDE:	(W)	
ELLIPSOID HT:	US ft.	m

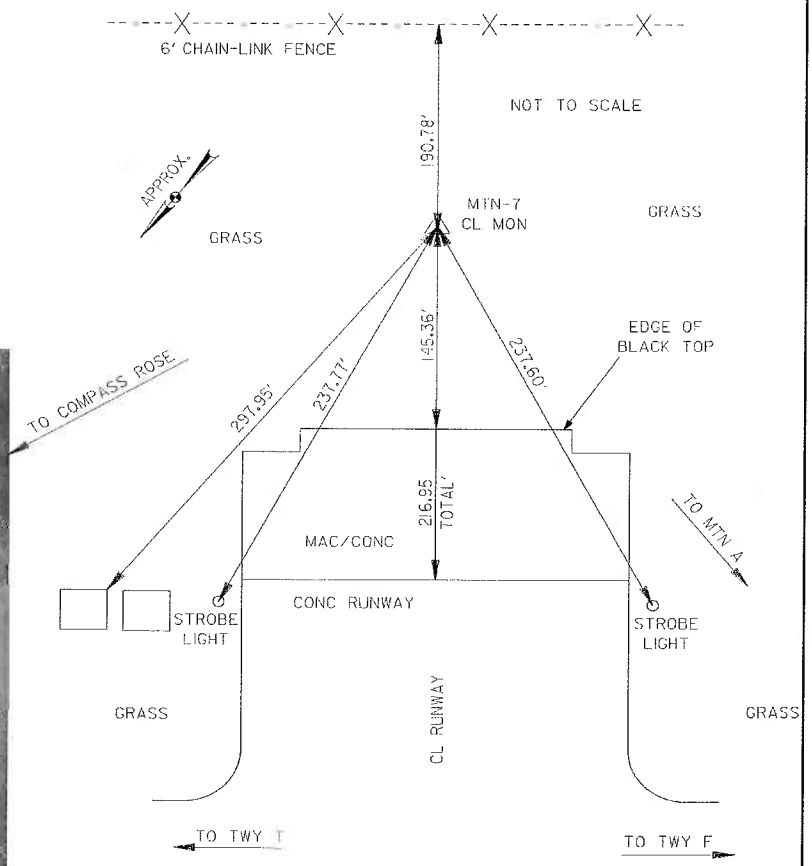
AVAILABLE CONVENTIONAL BACKSIGHT POINTS (FIELD DATA):

POINT	AZIMUTH	DISTANCE (US FT.)	DISTANCE (m)

STATION DESCRIPTION:

***SHALL NOT BE OCCUPIED FOR SURVEY CONTROL. THIS POINT IS INTENDED FOR RECOVERY OF THE RUNWAY CENTERLINE ONLY**

AT THE 33 END OF THE RUNWAY



SURVEYED BY: JMT ENGINEERING — SPARKS, MARYLAND

MARTIN STATE AIRPORT (MTN) - SURVEY CONTROL DATA

NAME OF STATION: MTN-8 | **DATE ESTABLISHED:** August 2005

MARYLAND STATE PLANE COORDINATES (NAD 83):

NORTHING (Y):	US ft.	m
EASTING (X):	US ft.	m
ORTHOMETRIC HEIGHT (NAVD 88)	US ft.	m
CONVERGENCE ANGLE:		
SCALE FACTOR:		
COMBINED SCALE FACTOR:		

GEOGRAPHIC COORDINATES (NAD 83):

LATITUDE:	(N)	
LONGITUDE:	(W)	
ELLIPSOID HT:	US ft.	m

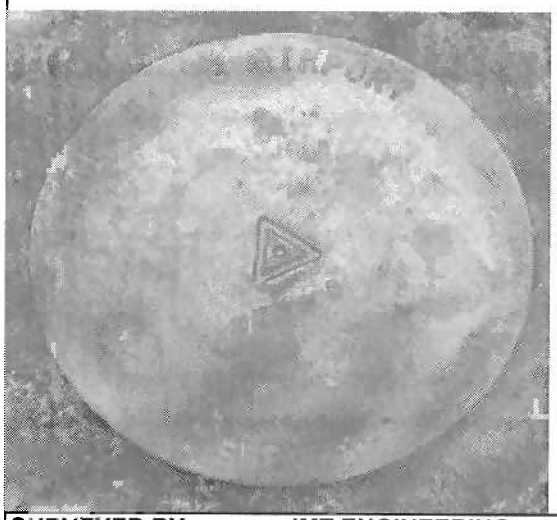
AVAILABLE CONVENTIONAL BACKSIGHT POINTS (FIELD DATA):

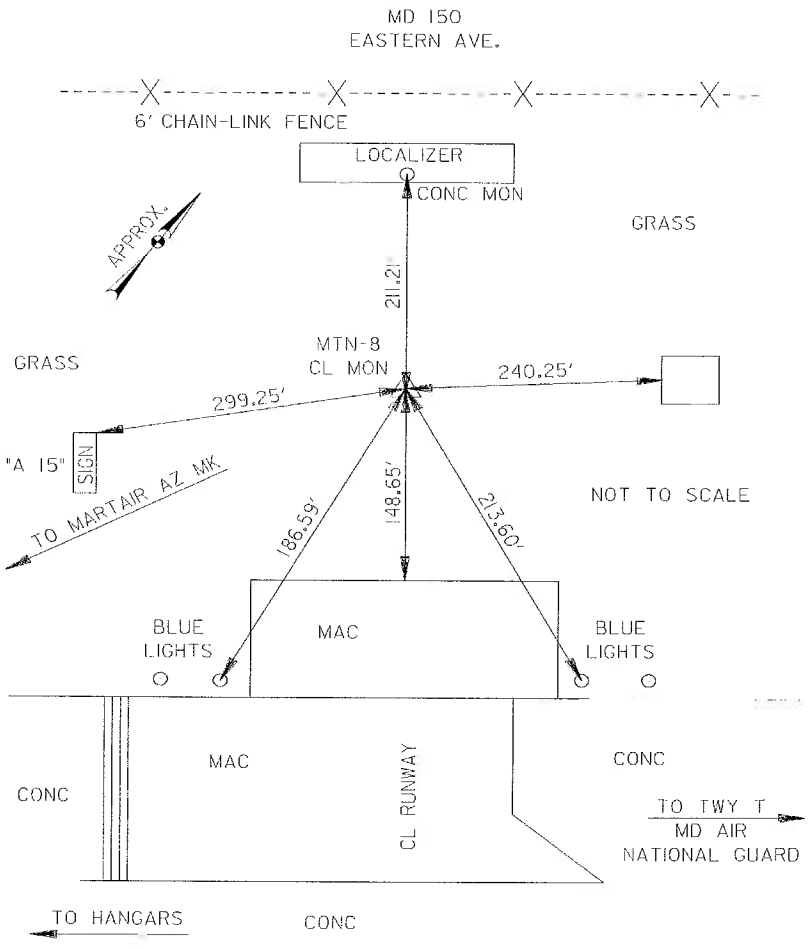
POINT	AZIMUTH	DISTANCE (US FT.)	DISTANCE (m)

STATION DESCRIPTION:

*SHALL NOT BE OCCUPIED FOR SURVEY CONTROL. THIS POINT IS INTENDED FOR RECOVERY OF THE RUNWAY CENTERLINE ONLY

AT THE 15 END OF THE RUNWAY





SURVEYED BY: JMT ENGINEERING — **SPARKS, MARYLAND**

MARTIN STATE AIRPORT (MTN) - SURVEY CONTROL DATA

NAME OF STATION: MARTAIR AZ MK
NGS PID: JV6476
DATE ESTABLISHED: 1985

MARYLAND STATE PLANE COORDINATES (NAD 83):

NORTHING (Y):	607285.0956 US ft.	185100.8676 m
EASTING (X):	1474311.9473 US ft.	449371.18 m
ORTHOMETRIC HEIGHT (NAVD 88):	20.71 US ft.	6.311 m
CONVERGENCE ANGLE:	0°21'33.9"	
SCALE FACTOR:	0.99998159	
COMBINED SCALE FACTOR:	0.99998578	

GEOGRAPHIC COORDINATES (NAD 83):

LATITUDE:	39 19 57.88957 (N)	
LONGITUDE:	076 25 38.50226 (W)	
ELLIPSOID HT:	-87.54 US ft.	-26.681 m

AVAILABLE CONVENTIONAL BACKSIGHT POINTS (FIELD DATA):

POINT	AZIMUTH	DISTANCE (US FT.)	DISTANCE (m)
MTN B	111° 29' 52"	1673.275	510.015
MTN-4	122° 12' 00"	2675.150	815.387

STATION DESCRIPTION:

SEE NGS DATASHEETS ATTACHED

HORZ ORDER - B
VERT ORDER - THIRD
ELLP ORDER - FOURTH CLASS II

SURVEYED BY: JMT ENGINEERING — SPARKS, MARYLAND

DATASHEETS

1 National Geodetic Survey, Retrieval Date = NOVEMBER 8, 2005
JV6476 **********
JV6476 PACS - This is a Primary Airport Control Station.
JV6476 DESIGNATION - MARTAIR AZ MK
JV6476 PID - JV6476
JV6476 STATE/COUNTY- MD/BALTIMORE
JV6476 USGS QUAD - MIDDLE RIVER (1985)
JV6476
JV6476 *CURRENT SURVEY CONTROL
JV6476 ---
JV6476* NAD 83(1991)- 39 19 57.88957(N) 076 25 38.50226(W) ADJUSTED
JV6476* NAVD 88 - 6.311 (meters) 20.71 (feet) ADJUSTED
JV6476 ---
JV6476 X - 1,159,303.234 (meters) COMP
JV6476 Y - -4,802,017.867 (meters) COMP
JV6476 Z - 4,020,941.106 (meters) COMP
JV6476 LAPLACE CORR- -2.64 (seconds) DEFLEC99
JV6476 ELLIP HEIGHT- -26.67 (meters) (08/09/02) GPS OBS
JV6476 GEOID HEIGHT- -32.99 (meters) GEOID03
JV6476 DYNAMIC HT - 6.308 (meters) 20.70 (feet) COMP
JV6476 MODELED GRAV- 980,107.4 (mgal) NAVD 88
JV6476
JV6476 HORZ ORDER - B
JV6476 VERT ORDER - THIRD
JV6476 ELLP ORDER - FOURTH CLASS II
JV6476
JV6476.This mark is at Martin State Airport (MTN)
JV6476
JV6476.The horizontal coordinates were established by GPS observations
JV6476.and adjusted by the National Geodetic Survey in March 1998.
JV6476
JV6476.The orthometric height was determined by differential leveling
JV6476.and adjusted by the National Geodetic Survey in February 1998.
JV6476
JV6476.The X, Y, and Z were computed from the position and the ellipsoidal ht.
JV6476
JV6476.The Laplace correction was computed from DEFLEC99 derived deflections.
JV6476
JV6476.The ellipsoidal height was determined by GPS observations
JV6476.and is referenced to NAD 83.
JV6476
JV6476.The geoid height was determined by GEOID03.
JV6476
JV6476.The dynamic height is computed by dividing the NAVD 88
JV6476.geopotential number by the normal gravity value computed on the
JV6476.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
JV6476.degrees latitude (g = 980.6199 gals.).
JV6476
JV6476.The modeled gravity was interpolated from observed gravity values.
JV6476
JV6476; North East Units Scale Factor Converg.

JV6476;SPC MD - 185,100.867 449,371.180 MT 0.99998159 +0 21 33.9
JV6476;SPC MD - 607,285.09 1,474,311.95 sFT 0.99998159 +0 21 33.9
JV6476;UTM 18 - 4,354,674.286 376,980.708 MT 0.99978633 -0 54 17.3
JV6476
JV6476! - Elev Factor x Scale Factor = Combined Factor
JV6476!SPC MD - 1.00000418 x 0.99998159 = 0.99998577
JV6476!UTM 18 - 1.00000418 x 0.99978633 = 0.99979051
JV6476
JV6476: Primary Azimuth Mark Grid Az
JV6476:SPC MD - MARTAIR 111 32 54.8
JV6476:UTM 18 - MARTAIR 112 48 46.0
JV6476
JV6476|--|
JV6476| PID Reference Object Distance Geod. Az |
JV6476| dddmmss.s |
JV6476| JV6144 MARTAIR 496.478 METERS 1115428.7 |
JV6476|--|
JV6476
JV6476 SUPERSEDED SURVEY CONTROL
JV6476
JV6476 ELLIP H (03/24/98) -26.61 (m) GP( ) 4 1
JV6476 NAD 83(1991)- 39 19 57.88953(N) 076 25 38.50223(W) AD( ) B
JV6476 ELLIP H (11/22/95) -26.61 (m) GP( ) 1 1
JV6476 NAD 83(1991)- 39 19 57.88854(N) 076 25 38.50294(W) AD( ) 1
JV6476 ELLIP H (01/27/92) -26.53 (m) GP( ) 4 1
JV6476 NAD 83(1986)- 39 19 57.88372(N) 076 25 38.51118(W) AD( ) 1
JV6476 NAD 27 - 39 19 57.49393(N) 076 25 39.65548(W) AD( ) 1
JV6476 NAVD 88 (03/24/98) 6.31 (m) 20.7 (f) LEVELING 3
JV6476 NGVD 29 (11/20/87) 6.3 (m) 21 (f) GPS OBS
JV6476
JV6476.Superseded values are not recommended for survey control.
JV6476.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
JV6476.See file dsdata.txt to determine how the superseded data were derived.
JV6476
JV6476_U.S. NATIONAL GRID SPATIAL ADDRESS: 18SUJ7698154674(NAD 83)
JV6476_MARKER: DZ = AZIMUTH MARK DISK
JV6476_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
JV6476_SP_SET: SET IN TOP OF CONCRETE MONUMENT
JV6476_STAMPING: MARTAIR 1985
JV6476_MARK LOGO: NGS
JV6476_MAGNETIC: N = NO MAGNETIC MATERIAL
JV6476_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
JV6476+STABILITY: SURFACE MOTION
JV6476_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
JV6476+SATELLITE: SATELLITE OBSERVATIONS - October 01, 2002
JV6476
JV6476 HISTORY - Date Condition Report By
JV6476 HISTORY - 1985 MONUMENTED NGS
JV6476 HISTORY - 19860123 GOOD
JV6476 HISTORY - 19911107 GOOD NGS
JV6476 HISTORY - 19940902 GOOD NGS
JV6476 HISTORY - 19950201 GOOD MCCRON
JV6476 HISTORY - 19961010 GOOD NGS

JV6476 HISTORY - 19970620 GOOD DMW
JV6476 HISTORY - 19980928 GOOD DMW
JV6476 HISTORY - 19990902 GOOD MDSHA
JV6476 HISTORY - 20020929 GOOD JCLS
JV6476 HISTORY - 20021001 GOOD JCLS
JV6476
JV6476 STATION DESCRIPTION
JV6476
JV6476'DESCRIBED BY NATIONAL GEODETIC SURVEY 1985 (RGP)
JV6476'THE STATION IS LOCATED ABOUT 16 KM (10 MI) EAST FROM THE APPROXIMATE
JV6476'CENTER OF BALTIMORE, 5-1/2 KM (3-1/2 MI) SOUTH FROM WHITE MARSH
JV6476'AND 1 KM (1/2 MI) EAST FROM THE APPROXIMATE CENTER OF MIDDLE
JV6476'RIVER.
JV6476'
JV6476'OWNERSHIP--STATE OWNED PROPERTY.
JV6476'
JV6476'NO TO REACH NECESSARY.
JV6476'
JV6476'THE STATION SURFACE MARK IS A STANDARD NGS AZIMUTH MARK DISK
JV6476'STAMPED--MARTAIR--1985 SET IN THE TOP OF A 25 CM (10 INCH)
JV6476'ROUND CONCRETE POST WHICH IS FLUSH WITH THE SURFACE. THE SUB
JV6476'SURFACE DISK IS IDENTICAL TO THE SURFACE MARK AND IT IS SET IN
JV6476'A MASS OF CONCRETE 114 CM (45 INCHES) BELOW THE SURFACE.
JV6476'
JV6476'THE MARK IS LOCATED 67.9 METERS (222.9 FT) EAST FROM THE EAST
JV6476'CORNER OF THE MIDDLE RIVER POST OFFICE, 16.7 METERS (54.7 FT) EAST
JV6476'NORTHEAST FROM THE NORTHEAST CURB OF THE STATE HIGHWAY 587,
JV6476'23.0 METERS (75.6 FT) SOUTHWEST FROM THE EDGE OF A TAXI STRIP AND
JV6476'0.5 METER (1.8 FT) SOUTHEAST FROM A CARSONITE WITNESS POST.
JV6476
JV6476 STATION RECOVERY (1986)
JV6476
JV6476'RECOVERED 1986
JV6476'RECOVERED IN GOOD CONDITION.
JV6476
JV6476 STATION RECOVERY (1991)
JV6476
JV6476'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1991
JV6476'THE STATION IS LOCATED AT THE NW END OF THE INNER TAXIWAY NEAR THE
JV6476'INTERSECTION WITH TAXIWAY A WEST. THE STATION IS 45 FT (13.7 M) SW OF
JV6476'THE CENTERLINE EXTENSION OF THE RAMP AREA TO THE EAST, 74.9 FT (22.8
JV6476'M) WEST OF THE WEST EDGE OF THE TAXIWAY, 135 FT (41.1 M) SW OF THE NW
JV6476'CORNER OF ASPHALT, 180.4 FT (55.0 M) NW OF THE W CORNER OF A SIGN A,
JV6476'AND 18.5 FT (5.6 M) EAST OF A FENCE. THE STATION IS A STANDARD NGS
JV6476'DISK SET IN THE TOP OF A CONCRETE POST FLUSH WITH THE GROUND STAMPED
JV6476'MARTAIR 1985.
JV6476
JV6476 STATION RECOVERY (1994)
JV6476
JV6476'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1994 (RAH)
JV6476'RECOVERED IN GOOD CONDITION.
JV6476'
JV6476'CONTACT MR. JAKE WEST, AIRPORT MANAGER, MARTIN STATE AIRPORT, BOX 20,

JV6476'701 WILSON POINT ROAD, BALTIMORE, MD 21220, PHONE (410) 682-8810.
JV6476'
JV6476'TO REACH THE STATION FROM THE CONTROL TOWER, GO NORTHWESTERLY FOR
JV6476'0.42 KM (0.25 MI) ALONG AN APRON AND TAXIWAY TO THE STATION ON THE RIGHT.
JV6476'
JV6476'THE STATION IS LOCATED 55.0 M (180.4 FT) NORTHEAST OF THE WEST CORNER
JV6476'OF A SIGN A, 41.1 M (134.8 FT) SOUTHWEST OF THE NORTHWEST CORNER OF
JV6476'ASPHALT PAVEMENT, 22.8 M (74.8 FT) WEST IF THE WEST EDGE OF THE
JV6476'TAXIWAY, 5.6 M (18.4 FT) EAST OF A CHAIN LINK FENCE, AND THE MONUMENT
JV6476'IS FLUSH WITH THE GROUND.
JV6476'
JV6476'DESCRIBED BY KLF.
JV6476
JV6476 STATION RECOVERY (1995)
JV6476
JV6476'RECOVERY NOTE BY J R MCCRONE JR INCORPORATED 1995 (HAS)
JV6476'RECOVERED AS DESCRIBED.
JV6476
JV6476 STATION RECOVERY (1996)
JV6476
JV6476'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1996 (AJL)
JV6476'RECOVERED AS DESCRIBED.
JV6476
JV6476 STATION RECOVERY (1997)
JV6476
JV6476'RECOVERY NOTE BY DAFT MCCUNE WALKER INCORPORATED 1997 (DMM)
JV6476'RECOVERED AS DESCRIBED.
JV6476
JV6476 STATION RECOVERY (1998)
JV6476
JV6476'RECOVERY NOTE BY DAFT MCCUNE WALKER INCORPORATED 1998 (JMS)
JV6476'RECOVERED IN GOOD CONDITION.
JV6476
JV6476 STATION RECOVERY (1999)
JV6476
JV6476'RECOVERY NOTE BY MARYLAND DOT HIGHWAY ADMINISTRATION 1999 (DMM)
JV6476'RECOVERED AS DESCRIBED
JV6476
JV6476 STATION RECOVERY (2002)
JV6476
JV6476'RECOVERY NOTE BY JOHN CHANCE LAND SURVEYS INC 2002 (MRY)
JV6476'RECOVERED IN GOOD CONDITION.
JV6476
JV6476 STATION RECOVERY (2002)
JV6476
JV6476'RECOVERY NOTE BY JOHN CHANCE LAND SURVEYS INC 2002
JV6476'RECOVERED IN GOOD CONDITION.

*** retrieval complete.
Elapsed Time = 00:00:00

MARTIN STATE AIRPORT (MTN) - SURVEY CONTROL DATA

NAME OF STATION: MTN A
NGS PID: AA9279
DATE ESTABLISHED: 1989

MARYLAND STATE PLANE COORDINATES (NAD 83):

NORTHING (Y):	602209.3862 US ft.	183553.788 m
EASTING (X):	1480310.2956 US ft.	451199.481 m
ORTHOMETRIC HEIGHT (NAVD 88):	5.4 US ft.	1.64 m
CONVERGENCE ANGLE:	0°22'21.5"	
SCALE FACTOR:	0.99997967	
COMBINED SCALE FACTOR:	0.99998459	

GEOGRAPHIC COORDINATES (NAD 83):

LATITUDE:	39 19 07.34515 (N)	
LONGITUDE:	076 24 22.58368 (W)	
ELLIPSOID HT:	-102.92 US ft.	-31.370 m

AVAILABLE CONVENTIONAL BACKSIGHT POINTS (FIELD DATA):

POINT	AZIMUTH	DISTANCE (US FT.)	DISTANCE (m)
MTN B	315° 08' 07"	6296.22	1919.092
MTN-6	310° 06' 04"	2879.73	877.743
MTN-4	314° 20' 41"	5222.33	1591.769
MTN-1	231° 15' 50"	1027.35	313.137

STATION DESCRIPTION:

SEE NGS DATASHEETS ATTACHED

HORZ ORDER - FIRST
ELLP ORDER - FOURTH CLASS II

SURVEYED BY: JMT ENGINEERING — SPARKS, MARYLAND

DATASHEETS

1 National Geodetic Survey, Retrieval Date = NOVEMBER 8, 2005
AA9279 **********
AA9279 SACS - This is a Secondary Airport Control Station.
AA9279 DESIGNATION - MTN A
AA9279 PID - AA9279
AA9279 STATE/COUNTY- MD/BALTIMORE
AA9279 USGS QUAD - MIDDLE RIVER (1985)
AA9279
AA9279 *CURRENT SURVEY CONTROL
AA9279 ---
AA9279* NAD 83(1991)- 39 19 07.34515(N) 076 24 22.58368(W) ADJUSTED
AA9279* NAVD 88 - 1.64 (meters) 5.4 (feet) GPS OBS
AA9279 ---
AA9279 X - 1,161,301.923 (meters) COMP
AA9279 Y - -4,802,547.463 (meters) COMP
AA9279 Z - 4,019,732.347 (meters) COMP
AA9279 LAPLACE CORR- -2.19 (seconds) DEFLEC99
AA9279 ELLIP HEIGHT- -31.37 (meters) (08/19/02) GPS OBS
AA9279 GEOID HEIGHT- -33.03 (meters) GEOID03
AA9279
AA9279 HORZ ORDER - FIRST
AA9279 ELLP ORDER - FOURTH CLASS II
AA9279
AA9279.This mark is at Martin State Airport (MTN)
AA9279
AA9279.The horizontal coordinates were established by GPS observations
AA9279.and adjusted by the National Geodetic Survey in April 1998.
AA9279
AA9279.The orthometric height was determined by GPS observations and a
AA9279.high-resolution geoid model.
AA9279
AA9279.GPS derived orthometric heights for airport stations designated as
AA9279.PACS or SACS are published to 2 decimal places. This maintains
AA9279.centimeter relative accuracy between the PACS and SACS. It does
AA9279.not indicate centimeter accuracy relative to other marks which are
AA9279.part of the NAVD 88 network.
AA9279
AA9279.The X, Y, and Z were computed from the position and the ellipsoidal ht.
AA9279
AA9279.The Laplace correction was computed from DEFLEC99 derived deflections.
AA9279
AA9279.The ellipsoidal height was determined by GPS observations
AA9279.and is referenced to NAD 83.
AA9279
AA9279.The geoid height was determined by GEOID03.
AA9279
AA9279; North East Units Scale Factor Converg.
AA9279;SPC MD - 183,553.788 451,199.481 MT 0.99997967 +0 22 21.5
AA9279;SPC MD - 602,209.39 1,480,310.30 sFT 0.99997967 +0 22 21.5
AA9279;UTM 18 - 4,353,087.565 378,774.082 MT 0.99978094 -0 53 28.2
AA9279

AA9279! - Elev Factor x Scale Factor = Combined Factor
AA9279!SPC MD - 1.00000492 x 0.99997967 = 0.99998459
AA9279!UTM 18 - 1.00000492 x 0.99978094 = 0.99978586
AA9279
AA9279 SUPERSEDED SURVEY CONTROL
AA9279
AA9279 ELLIP H (04/02/98) -31.31 (m) GP( ) 4 2
AA9279 NAD 83(1991)- 39 19 07.34511(N) 076 24 22.58365(W) AD( ) 1
AA9279 ELLIP H (11/30/95) -31.31 (m) GP( ) 4 2
AA9279
AA9279.Superseded values are not recommended for survey control.
AA9279.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
AA9279.See file dsdata.txt to determine how the superseded data were derived.
AA9279
AA9279_U.S. NATIONAL GRID SPATIAL ADDRESS: 18SUJ7877453088(NAD 83)
AA9279_MARKER: DD = SURVEY DISK
AA9279_SETTING: 30 = SET IN A LIGHT STRUCTURE
AA9279_SP_SET: SET IN A LIGHT STRUCTURE
AA9279_STAMPING: MTN A 1989
AA9279_MARK LOGO: NOS
AA9279_MAGNETIC: O = OTHER; SEE DESCRIPTION
AA9279_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
AA9279+STABILITY: SURFACE MOTION
AA9279_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
AA9279+SATELLITE: SATELLITE OBSERVATIONS - September 02, 1999
AA9279
AA9279 HISTORY - Date Condition Report By
AA9279 HISTORY - 1989 MONUMENTED NOS
AA9279 HISTORY - 19911107 GOOD NOS
AA9279 HISTORY - 19940902 GOOD NGS
AA9279 HISTORY - 19961010 GOOD NGS
AA9279 HISTORY - 19990902 GOOD MDSHA
AA9279
AA9279 STATION DESCRIPTION
AA9279
AA9279'DESCRIBED BY NATIONAL OCEAN SERVICE 1991
AA9279'THE STATION IS LOCATED AT THE MARTIN STATE AIRPORT SOUTHWEST OF RUNWAY
AA9279'END 32, AND NORTH OF THE PARALLEL TAXIWAY. THE STATION IS A STANDARD
AA9279'NOS DISK SET IN THE NE CORNER OF THE INNER CONCRETE SECTION OF A STORM
AA9279'DRAIN. THE STATION IS 126.6 FT (38.6 M) NW OF THE CENTERLINE OF A
AA9279'TAXIWAY, 70.7 FT (21.5 M) NNE OF TAXIWAY LIGHT 81, 118.0 FT (36.0 M)
AA9279'NE OF THE CENTERLINE OF THE PARALLEL TAXIWAY, AND 55.5 FT (16.9 M) SE
AA9279'OF THE SE CORNER OF A SIGN E. THE DISK IS STAMPED MTN A 1989.
AA9279
AA9279 STATION RECOVERY (1994)
AA9279
AA9279'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1994 (RAH)
AA9279'THE STATION IS LOCATED ABOUT 6.4 KM (3.95 MI) SOUTH-SOUTHEAST OF WHITE
AA9279'MARSH, 5.3 KM (3.30 MI) NORTHEAST OF ESSEX, AND 4.8 KM (3.00 MI)
AA9279'SOUTHWEST OF CHASE, NEAR THE NORTHEAST CORNEROF THE INNER CONCRETE
AA9279'SECTION OF A STORM DRAIN NEAR THE SOUTHEAST END OF THE ACTIVE RUNWAY
AA9279'14-32. OWNERSHIP- STATE OF MARYLAND. CONTACT MR. JAKE WEST, AIRPORT
AA9279'MANAGER, MARTIN STATE AIRPORT, BOX 20, 701 WILSON POINT ROAD,

AA9279'BALTIMORE, MD 21220, PHONE (410) 682-8810.
AA9279'
AA9279'TO REACH THE STATION FROM THE CONTROL TOWER, GO SOUTHEAST FOR 1.12 KM
AA9279'(0.70 MI) ALONG AN APRON AND THE SOUTHERN PARALLEL TAXIWAY TO RUNWAY
AA9279'14-32 AND THE STATION ON THE LEFT.
AA9279'
AA9279'THE STATION IS LOCATED 38.6 M (126.6 FT) NORTHWEST OF THE CENTERLINE
AA9279'OF A CONNECTING TAXIWAY, 36.0 M (118.1 FT) NORTHEAST OF THE PARALLEL
AA9279'TAXIWAY, 21.5 M (70.5 FT) NORTH-NORTHEAST OF A TAXIWAY LIGHT NUMBER
AA9279'81, AND 16.9 M (55.4 FT) SOUTHEAST OF THE SOUTHEAST CORNER OF A SIGN
AA9279'E.
AA9279'
AA9279'DESCRIBED BY KLF
AA9279
AA9279 STATION RECOVERY (1996)
AA9279
AA9279'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1996 (AJL)
AA9279'RECOVERED AS DESCRIBED.
AA9279
AA9279 STATION RECOVERY (1999)
AA9279
AA9279'RECOVERY NOTE BY MARYLAND DOT HIGHWAY ADMINISTRATION 1999 (DMM)
AA9279'RECOVERED AS DESCRIBED

*** retrieval complete.
Elapsed Time = 00:00:00

MARTIN STATE AIRPORT (MTN) - SURVEY CONTROL DATA

NAME OF STATION: MTN B
NGS PID: AI4374
DATE ESTABLISHED: 1998

MARYLAND STATE PLANE COORDINATES (NAD 83):

NORTHING (Y):	606671.9075 US ft.	184913.9672 m
EASTING (X):	1475868.8004 US ft.	449845.7101 m
ORTHOMETRIC HEIGHT (NAVD 88):	16.8 US ft.	5.12 m
CONVERGENCE ANGLE:	0°21'46.3"	
SCALE FACTOR:	0.99998135	
COMBINED SCALE FACTOR:	0.99998573	

GEOGRAPHIC COORDINATES (NAD 83):

LATITUDE:	39 19 51.73216 (N)	
LONGITUDE:	076 25 18.73818 (W)	
ELLIPSOID HT:	-91.417 US ft.	-27.864 m

AVAILABLE CONVENTIONAL BACKSIGHT POINTS (FIELD DATA):

POINT	AZIMUTH	DISTANCE (US FT.)	DISTANCE (m)
MARTAIR AZ MK	291° 29' 52"	1673.30	510.023
MTN-4	138° 58' 21"	1076.79	328.206
MTN-6	139° 21' 07"	3436.91	1047.572
MTN A	135° 08' 07"	6296.23	1919.095

STATION DESCRIPTION:

SEE NGS DATASHEETS ATTACHED

HORZ ORDER - FIRST
ELLP ORDER - FOURTH CLASS I

SURVEYED BY: JMT ENGINEERING — **SPARKS, MARYLAND**

DATASHEETS

1 National Geodetic Survey, Retrieval Date = NOVEMBER 8, 2005
AI4374 **********
AI4374 SACS - This is a Secondary Airport Control Station.
AI4374 DESIGNATION - MTN B
AI4374 PID - AI4374
AI4374 STATE/COUNTY- MD/BALTIMORE
AI4374 USGS QUAD - MIDDLE RIVER (1985)
AI4374
AI4374 *CURRENT SURVEY CONTROL
AI4374 ---
AI4374* NAD 83(1991)- 39 19 51.73216(N) 076 25 18.73818(W) ADJUSTED
AI4374* NAVD 88 - 5.12 (meters) 16.8 (feet) GPS OBS
AI4374 ---
AI4374 X - 1,159,791.391 (meters) COMP
AI4374 Y - -4,802,022.850 (meters) COMP
AI4374 Z - 4,020,793.468 (meters) COMP
AI4374 LAPLACE CORR- -2.55 (seconds) DEFLEC99
AI4374 ELLIP HEIGHT- -27.87 (meters) (10/28/02) GPS OBS
AI4374 GEOID HEIGHT- -33.00 (meters) GEOID03
AI4374
AI4374 HORZ ORDER - FIRST
AI4374 ELLP ORDER - FOURTH CLASS I
AI4374
AI4374.This mark is at Martin State Airport (MTN)
AI4374
AI4374.The horizontal coordinates were established by GPS observations
AI4374.and adjusted by the National Geodetic Survey in March 2000.
AI4374
AI4374.The orthometric height was determined by GPS observations and a
AI4374.high-resolution geoid model.
AI4374
AI4374.GPS derived orthometric heights for airport stations designated as
AI4374.PACS or SACS are published to 2 decimal places. This maintains
AI4374.centimeter relative accuracy between the PACS and SACS. It does
AI4374.not indicate centimeter accuracy relative to other marks which are
AI4374.part of the NAVD 88 network.
AI4374
AI4374.The X, Y, and Z were computed from the position and the ellipsoidal ht.
AI4374
AI4374.The Laplace correction was computed from DEFLEC99 derived deflections.
AI4374
AI4374.The ellipsoidal height was determined by GPS observations
AI4374.and is referenced to NAD 83.
AI4374
AI4374.The geoid height was determined by GEOID03.
AI4374
AI4374; North East Units Scale Factor Converg.
AI4374;SPC MD - 184,913.967 449,845.710 MT 0.99998135 +0 21 46.3
AI4374;SPC MD - 606,671.91 1,475,868.80 sFT 0.99998135 +0 21 46.3
AI4374;UTM 18 - 4,354,477.001 377,450.907 MT 0.99978491 -0 54 04.7
AI4374

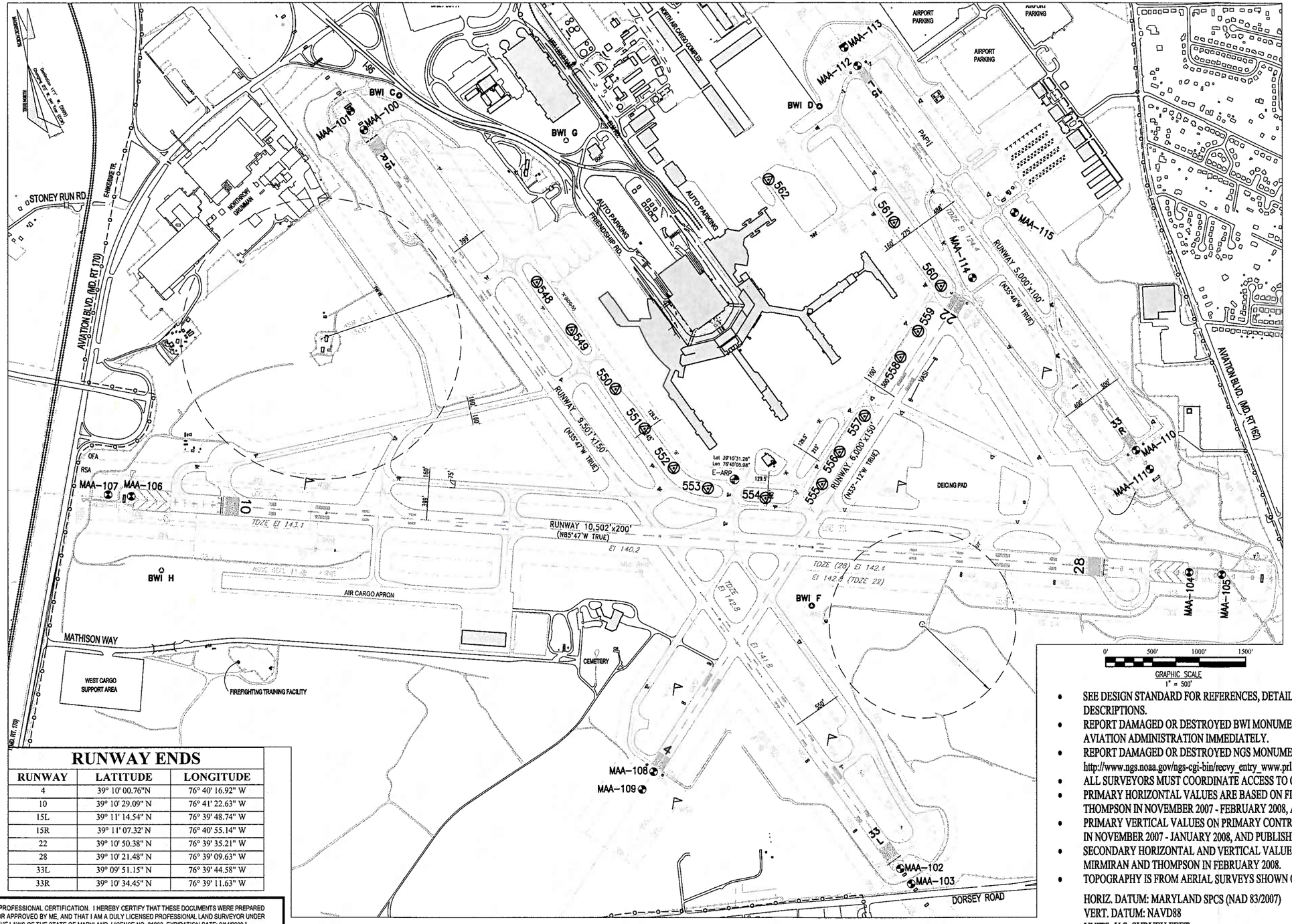
AI4374! - Elev Factor x Scale Factor = Combined Factor
AI4374!SPC MD - 1.00000437 x 0.99998135 = 0.99998572
AI4374!UTM 18 - 1.00000437 x 0.99978491 = 0.99978928
AI4374
AI4374 SUPERSEDED SURVEY CONTROL
AI4374
AI4374 ELLIP H (03/31/00) -27.86 (m) GP( ) 4 1
AI4374
AI4374.Superseded values are not recommended for survey control.
AI4374.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
AI4374.See file dsdata.txt to determine how the superseded data were derived.
AI4374
AI4374_U.S. NATIONAL GRID SPATIAL ADDRESS: 18SUJ7745154477(NAD 83)
AI4374_MARKER: DD = SURVEY DISK
AI4374_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
AI4374_SP_SET: SET IN TOP OF CONCRETE MONUMENT
AI4374_STAMPING: MTN B 1998
AI4374_MARK LOGO: MDSHA
AI4374_MAGNETIC: N = NO MAGNETIC MATERIAL
AI4374_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
AI4374+STABILITY: SURFACE MOTION
AI4374_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
AI4374+SATELLITE: SATELLITE OBSERVATIONS - 1998
AI4374
AI4374 HISTORY - Date Condition Report By
AI4374 HISTORY - 1998 MONUMENTED MDSHA
AI4374
AI4374 STATION DESCRIPTION
AI4374
AI4374'DESCRIBED BY MARYLAND DOT HIGHWAY ADMINISTRATION 1998 (DMM)
AI4374'STATION IS LOCATED ON THE MARTIN STATE AIRPORT BETWEEN RUNWAY 15-33
AI4374'AND AN AIRCRAFT TIE-DOWN AREA NEAR HANGAR 2. IT IS 199.8 FT (60.9 M)
AI4374'SSW OF RUNWAY LIGHT 2, 169.2 FT (51.6 M) NE OF THE NE EDGE OF THE
AI4374'TIE-DOWN AREA, 156.0 FT (47.5 M) SW OF THE SW EDGE OF THE RUNWAY,
AI4374'152.7 FT (46.5 M) W OF RUNWAY LIGHT 3, 35.5 FT (10.8 M) N OF A
AI4374'DRAINAGE INLET AND 2.7 FT (0.8 M) SW OF A CARSONITE WITNESS POST.
AI4374'MONUMENT IS A MARYLAND STATE HIGHWAY ADMINISTRATION DISK SET IN THE
AI4374'TOP OF A 12 IN ROUND CONCRETE POST WHICH IS FLUSH WITH THE GROUND.

*** retrieval complete.
Elapsed Time = 00:00:00

BALTIMORE/WASHINGTON INTERNATIONAL THURGOOD MARSHALL AIRPORT SURVEY CONTROL MANUAL

MARTIN STATE AIRPORT

BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT



SURVEY CONTROL

POINT	NORTHING	EASTING	ELEV.
BWI D	553596.51	1407273.55	154.41
BWI F	548273.30	1407184.15	156.48
BWI G	553233.77	1404563.51	166.38
BWI H	548646.39	1400229.31	132.74
MON-548	551723.79	1404244.74	132.26*
MON-549	551216.07	1404616.37	130.39*
MON-550	550585.40	1405086.90	137.82*
MON-551	550161.65	1405397.56	141.64*
MON-552	549741.23	1405708.65	144.14*
MON-553	549523.67	1406074.10	143.97*
MON-554	549421.87	1406688.43	140.26*
MON-555	549571.87	1407298.32	139.74*
MON-556	549914.33	1407485.58	137.64*
MON-557	550297.17	1407753.38	140.42*
MON-558	550925.72	1408139.87	137.49
MON-559	551200.22	1408328.30	137.08
MON-560	551682.95	1408572.65	137.03
MON-561	552359.49	1408073.44	140.58
MON-562	552817.81	1406723.85	153.92

* ELEVATIONS ARE DERIVIED FROM GPS OBSERVATIONS. (NOT PART OF DIFFERENTIAL LEVELING BY J.A.RICE)

RUNWAY CENTERLINE MONUMENTS

POINT	DESC.
MAA-100	OFFSET 10' RT.
MAA-101	OFFSET 10' RT.
MAA-102	CENTERLINE
MAA-103	CENTERLINE
MAA-104	OFFSET 10' RT.
MAA-105	OFFSET 10' RT.
MAA-106	OFFSET 32' LT.
MAA-107	OFFSET 32' LT.
MAA-108	CENTERLINE
MAA-109	CENTERLINE
MAA-110	CENTERLINE
MAA-111	CENTERLINE
MAA-112	CENTERLINE
MAA-113	CENTERLINE
MAA-114	CENTERLINE
MAA-115	CENTERLINE

RUNWAY CENTERLINE MONUMENTS ARE INTENDED FOR RECOVERY OF THE RUNWAY CENTERLINE ONLY AND SHALL NOT BE USED FOR SURVEY CONTROL. SEE BWI SURVEY CONTROL MANUAL FOR MONUMENT SKETCHES & RECOVERY COORDINATES.

RUNWAY ENDS

RUNWAY	LATITUDE	LONGITUDE
4	39° 10' 00.76"N	76° 40' 16.92" W
10	39° 10' 29.09" N	76° 41' 22.63" W
15L	39° 11' 14.54" N	76° 39' 48.74" W
15R	39° 11' 07.32' N	76° 40' 55.14" W
22	39° 10' 50.38" N	76° 39' 35.21" W
28	39° 10' 21.48" N	76° 39' 09.63" W
33L	39° 09' 51.15" N	76° 39' 44.58" W
33R	39° 10' 34.45" N	76° 39' 11.63" W

- SEE DESIGN STANDARD FOR REFERENCES, DETAIL NOTES, MONUMENT TYPES, AND "HOW TO REACH" DESCRIPTIONS.
- REPORT DAMAGED OR DESTROYED BWI MONUMENTS TO THE MANAGER OF FACILITIES DESIGN, MARYLAND AVIATION ADMINISTRATION IMMEDIATELY.
- REPORT DAMAGED OR DESTROYED NGS MONUMENTS TO NGS VIA THEIR WEB PAGE AT http://www.ngs.noaa.gov/ngs-cgi-bin/recvy_entry_www.prl
- ALL SURVEYORS MUST COORDINATE ACCESS TO CONTROL POINTS WITH AIRPORT OPERATIONS AT 410-859-7018.
- PRIMARY HORIZONTAL VALUES ARE BASED ON FIELD SURVEYS PERFORMED BY JOHNSON, MIRMIRAN AND THOMPSON IN NOVEMBER 2007 - FEBRUARY 2008, AND PUBLISHED BY NGS.
- PRIMARY VERTICAL VALUES ON PRIMARY CONTROL ARE BASED ON FIELD SURVEYS PERFORMED BY J. A. RICE IN NOVEMBER 2007 - JANUARY 2008, AND PUBLISHED BY NGS.
- SECONDARY HORIZONTAL AND VERTICAL VALUES ARE BASED ON FIELD SURVEYS PERFORMED BY JOHNSON, MIRMIRAN AND THOMPSON IN FEBRUARY 2008.
- TOPOGRAPHY IS FROM AERIAL SURVEYS SHOWN ON THE AIRPORT LAYOUT PLAN BASE MAP DRAWING.

HORIZ. DATUM: MARYLAND SPCS (NAD 83/2007)
VERT. DATUM: NAVD88
UNITS: U.S. SURVEY FEET

BWI D — PRIMARY CONTROL STATIONS (NGS 'B' ORDER)
548 — SECONDARY CONTROL (NGS 1st ORDER)
MAA-100 — RUNWAY MONUMENTS (RECOVERY ONLY)

"PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL LAND SURVEYOR UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NO. 21263, EXPIRATION DATE: 6/14/2009."

JMT WSA
JOHNSON, MIRMIRAN & THOMPSON | WILBUR SMITH ASSOCIATES
A JOINT VENTURE
72 Loveton Circle
Sparks, MD 21152

DESIGNED	BRH / JAF
DRAWN	BRH / JAF
CHECKED	DKS
APPROVED	DAL

REVISION NO.	REVISION DATE	DESCRIPTIONS

BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
OFFICE OF ENGINEERING & CONSTRUCTION MANAGEMENT
DIVISION OF FACILITES DESIGN

PROJECT TITLE
SHEET TITLE
SURVEY CONTROL SHEET
SCALE 1" = 500'
DATE SEPTEMBER 25, 2008
PROJECT NO.
SHEET NO.

File: Q:\AGY\BWI\ALL CAD\BWIControl_SS\Dwgs\Survey\SVY\SURVEY CONTROL SHEET.dwg

Immediately report any damaged or destroyed monumentation.

Please notify
NGS
and the
Manager of Facilities Design,
Maryland Aviation Administration

BWI THURGOOD MARSHALL AIRPORT-PRIMARY SURVEY CONTROL DATA

NAME OF STATION: BWI D
NGS PID: AB6219
DATE ESTABLISHED: 1991
READJUSTED FEBRUARY 2007

MARYLAND STATE PLANE COORDINATES (NAD 83):

*	**NORTHING (Y):**	553596.506 US ft.	168736.553 m
*	**EASTING (X):**	1407273.545 US ft.	428937.834 m
*	**ORTHOMETRIC HEIGHT (NAVD 88):**	154.406 US ft.	47.063 m
	CONVERGENCE ANGLE:	0° 12' 36.8"	
	SCALE FACTOR:	0.99996449	
	COMBINED SCALE FACTOR:	0.99996224	

GEOGRAPHIC COORDINATES (NAD 83):

LATITUDE:	39° 11' 10.53800" (N)	
LONGITUDE:	76° 39' 54.19499" (W)	
ELLIPSOID HT:	47.12 US ft.	14.363 m

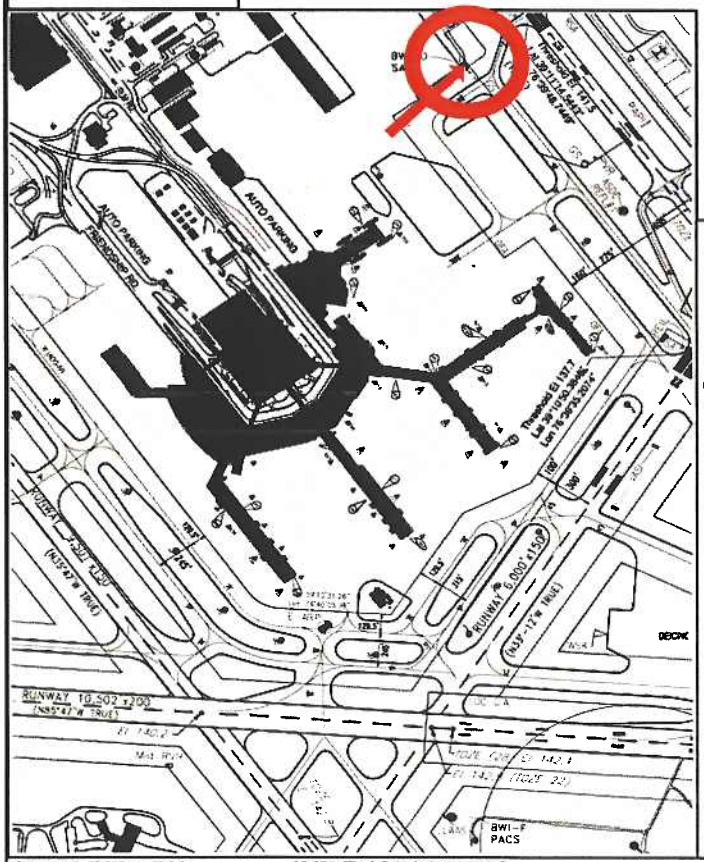
AVAILABLE CONVENTIONAL BACKSIGHT POINTS (COMPUTED DATA):

POINT	GEODETIC AZIMUTH	DISTANCE (US FT.)	DISTANCE (m)
MON-561	147°19'19.2'	1473.10	449.003
MON-562	215°25'44.0'	953.17	290.527

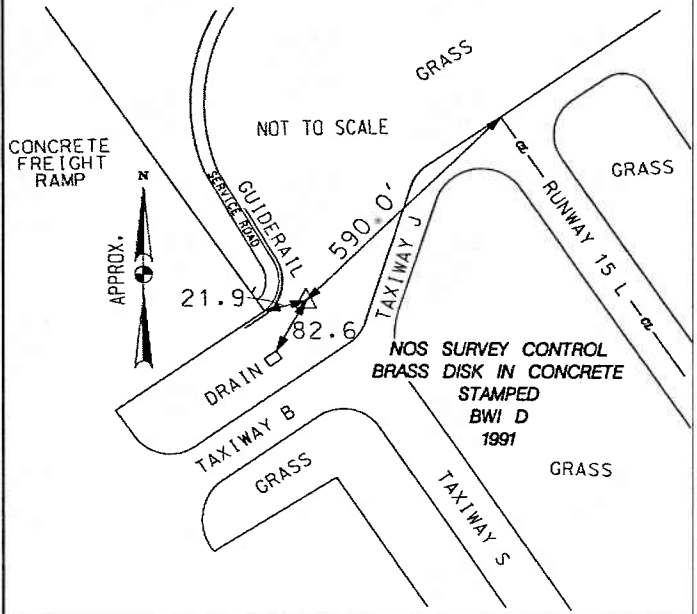
STATION DESCRIPTION:

* SEE ATTACHED NGS DATASHEETS

LOCATION PLAN



DETAIL MAP



SURVEYED BY: JMT ENGINEERING — SPARKS, MARYLAND

BWI THURGOOD MARSHALL AIRPORT-PRIMARY SURVEY CONTROL DATA

NAME OF STATION:	BWI D	**DATE ESTABLISHED:**	1991
NGS PID:	AB6219		READJUSTED FEBRUARY 2007

SURVEYED BY:	**JMT ENGINEERING**	**SPARKS, MARYLAND**

BWI THURGOOD MARSHALL AIRPORT-PRIMARY SURVEY CONTROL DATA

NAME OF STATION: BWI D	**DATE ESTABLISHED:** 1991
NGS PID: AB6219	READJUSTED FEBRUARY 2007

```
1        National Geodetic Survey,   Retrieval Date = JUNE 25, 2008
 AB6219 ***********************************************************************
 AB6219  SACS         -  This is a Secondary Airport Control Station.
 AB6219  DESIGNATION -  BWI D
 AB6219  PID          -  AB6219
 AB6219  STATE/COUNTY-  MD/ANNE ARUNDEL
 AB6219  USGS QUAD    -  RELAY (1974)
 AB6219
 AB6219                          *CURRENT SURVEY CONTROL
 AB6219
 AB6219* NAD 83(2007)-  39 11 10.53800(N)     076 39 54.19499(W)      ADJUSTED
 AB6219* NAVD 88      -        47.063   (meters)      154.41   (feet)  ADJUSTED
 AB6219
 AB6219  EPOCH DATE  -        2002.00
 AB6219  X           -   1,141,753.123  (meters)                       COMP
 AB6219  Y           -  -4,816,831.114  (meters)                       COMP
 AB6219  Z           -   4,008,374.848  (meters)                       COMP
 AB6219  LAPLACE CORR-          -5.39   (seconds)                      DEFLEC99
 AB6219  ELLIP HEIGHT-          14.363  (meters)          (02/10/07)   ADJUSTED
 AB6219  GEOID HEIGHT-         -32.67   (meters)                       GEOID03
 AB6219  DYNAMIC HT  -          47.038  (meters)      154.32   (feet)  COMP
 AB6219
 AB6219  ------- Accuracy Estimates (at 95% Confidence Level in cm) --------
 AB6219  Type    PID    Designation                        North   East  Ellip
 AB6219  ----------------------------------------------------------------------
 AB6219  NETWORK AB6219 BWI D                               1.08   0.78   2.10
 AB6219  ----------------------------------------------------------------------
 AB6219  MODELED GRAV-     980,094.8    (mgal)                        NAVD 88
 AB6219
 AB6219  VERT ORDER  -  FIRST     CLASS II
 AB6219
 AB6219.This mark is at Baltimore-Washington Int'l Airport (BWI)
 AB6219
 AB6219.The horizontal coordinates were established by GPS observations
 AB6219.and adjusted by the National Geodetic Survey in February 2007.
 AB6219
 AB6219.The datum tag of NAD 83(2007) is equivalent to NAD 83(NSRS2007).
 AB6219.See National Readjustment for more information.
 AB6219.The horizontal coordinates are valid at the epoch date displayed above.
 AB6219.The epoch date for horizontal control is a decimal equivalence
 AB6219.of Year/Month/Day.
 AB6219
 AB6219.The orthometric height was determined by differential leveling
 AB6219.and adjusted in June 2008.
 AB6219.No vertical observational check was made to the station.
 AB6219
 AB6219.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 AB6219
 AB6219.The Laplace correction was computed from DEFLEC99 derived deflections.
 AB6219
 AB6219.The ellipsoidal height was determined by GPS observations
 AB6219.and is referenced to NAD 83.
 AB6219
 AB6219.The geoid height was determined by GEOID03.
```

SURVEYED BY:	**JMT ENGINEERING**	**SPARKS, MARYLAND**

BWI THURGOOD MARSHALL AIRPORT-PRIMARY SURVEY CONTROL DATA

NAME OF STATION: BWI D	**DATE ESTABLISHED:** 1991
NGS PID: AB6219	READJUSTED FEBRUARY 2007

```
AB6219
AB6219.The dynamic height is computed by dividing the NAVD 88
AB6219.geopotential number by the normal gravity value computed on the
AB6219.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
AB6219.degrees latitude (g = 980.6199 gals.).
AB6219
AB6219.The modeled gravity was interpolated from observed gravity values.
AB6219
AB6219;                    North          East      Units Scale Factor Converg.
AB6219;SPC MD       -   168,736.553   428,937.834    MT  0.99996449   +0 12 36.8
AB6219;SPC MD       -   553,596.51  1,407,273.54   sFT  0.99996449   +0 12 36.8
AB6219;UTM  18      - 4,338,766.916   356,194.692    MT  0.99985463   -1 03 08.0
AB6219
AB6219!             -  Elev Factor  x  Scale Factor =   Combined Factor
AB6219!SPC MD       -   0.99999775  x   0.99996449  =   0.99996224
AB6219!UTM  18      -   0.99999775  x   0.99985463  =   0.99985238
AB6219
AB6219                            SUPERSEDED SURVEY CONTROL
AB6219
AB6219  ELLIP H (10/28/02)    14.378  (m)                          GP(        ) 4 2
AB6219  NAD 83(1991)-  39 11 10.53909(N)     076 39 54.19473(W) AD(        ) 1
AB6219  ELLIP H (05/31/01)    14.449  (m)                          GP(        ) 4 2
AB6219
AB6219.Superseded values are not recommended for survey control.
AB6219.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
AB6219.See file dsdata.txt to determine how the superseded data were derived.
AB6219
AB6219_U.S. NATIONAL GRID SPATIAL ADDRESS: 18SUJ5619538767(NAD 83)
AB6219_MARKER: DD = SURVEY DISK
AB6219_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
AB6219_STAMPING: BWI D 1991
AB6219_MARK LOGO: NOS
AB6219_PROJECTION: RECESSED 5 CENTIMETERS
AB6219_MAGNETIC: N = NO MAGNETIC MATERIAL
AB6219_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
AB6219+STABILITY: SURFACE MOTION
AB6219_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
AB6219+SATELLITE: SATELLITE OBSERVATIONS - November 07, 2007
AB6219
AB6219  HISTORY     - Date     Condition        Report By
AB6219  HISTORY     - 1991     MONUMENTED       NOS
AB6219  HISTORY     - 20001130 GOOD             NGS
AB6219  HISTORY     - 20071107 GOOD             JARICE
AB6219
```

SURVEYED BY:	**JMT ENGINEERING**	**SPARKS, MARYLAND**

BWI THURGOOD MARSHALL AIRPORT-PRIMARY SURVEY CONTROL DATA

NAME OF STATION:	BWI D	**DATE ESTABLISHED:**	1991
NGS PID:	AB6219		READJUSTED FEBRUARY 2007

AB6219 STATION DESCRIPTION
AB6219
AB6219'DESCRIBED BY NATIONAL OCEAN SERVICE 1991 (DAH)
AB6219'THE STATION IS LOCATED IN THE NORTH PART OF THE AIRPORT AT THE EAST
AB6219'CORNER OF A LARGE CONCRETE FREIGHT RAMP. IT IS 590 FT (179.8 M) SW OF
AB6219'THE CL END OF RWY 15L, NW OF THE INTERSECTION OF A TAXIWAY CL AND AN
AB6219'ILS HOLD LINE AND ON RANGE WITH THE HOLD LINE. IT IS 82.6 FT (25.2 M)
AB6219'NORTH OF THE CENTER OF A 3 FT (0.9 M) X 4 FT (1.2 M) STEEL DRAIN AND
AB6219'21.9 FT (6.7 M) EAST OF THE EAST CORNER OF THE RAMP (V-4-91 CHSQ). IT
AB6219'IS AT THE TOP OF A SLOPE AND JUST OUTSIDE A STEEL QUARDRAIL FOR A
AB6219'SERVICE ROAD. IT AN NOS DISK STAMPED BWI D 1991 AND SET IN THE TOP OF
AB6219'A CONCRETE POST FLUSH WITH THE GROUND.
AB6219
AB6219 STATION RECOVERY (2000)
AB6219
AB6219'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 2000 (APF)
AB6219'THE STATION IS LOCATED ON THE BALTIMORE-WASHINGTON
AB6219'INTERNATIONAL AIRPORT AT THE EAST CORNER OF A LARGE CONCRETE
AB6219'FREIGHT RAMP.
AB6219'TO REACH THE STATION FROM GATE L, KEEP PROCEEDING STRAIGHT IN A
AB6219'SOUTHWEST DIRECTION FOR 0.1 MI TO A PERIMETER ROAD, TURN RIGHT,
AB6219'HEADING NORTH, AND FOLLOW PERIMETER ROAD FOR 0.65 MI TO THE
AB6219'STATION ON THE LEFT AT THE TOP OF A SLOPE AND JUST OUTSIDE A STEEL
AB6219'GUARDRAIL FOR THE PERIMETER ROAD.
AB6219'THE STATION IS 590.0 FT SOUTHWEST FROM THE CENTERLINE END OF
AB6219'RUNWAY END 15L, 21.9 FT EAST OF THE EAST CORNER OF A CONCRETE
AB6219'MAINTENANCE AND FREIGHT RAMP, 82.6 FT NORTH OF THE CENTER OF A 3
AB6219'BY 4-FOOT STEEL DRAIN, AND THE MONUMENT IS FLUSH WITH THE GROUND
AB6219'SURFACE. NOTE--THIS STATION HAS BEEN DESIGNATED A SACS.
AB6219'
AB6219
AB6219 STATION RECOVERY (2007)
AB6219
AB6219'RECOVERY NOTE BY J A RICE INC 2007 (MRA)
AB6219'RECOVERED AS DESCRIBED.

SURVEYED BY:	**JMT ENGINEERING**	**SPARKS, MARYLAND**

BWI THURGOOD MARSHALL AIRPORT-PRIMARY SURVEY CONTROL DATA

NAME OF STATION: BWI F
NGS PID: AA9297
DATE ESTABLISHED: 1991
READJUSTED FEBRUARY 2007

MARYLAND STATE PLANE COORDINATES (NAD 83):

*	**NORTHING (Y):**	548273.296 US ft.	167114.035 m
*	**EASTING (X):**	1407184.150 US ft.	428910.587 m
*	**ORTHOMETRIC HEIGHT (NAVD 88):**	156.483 US ft.	47.696 m
	CONVERGENCE ANGLE:	0° 12' 35.9"	
	SCALE FACTOR:	0.99996314	
	COMBINED SCALE FACTOR:	0.99996079	

GEOGRAPHIC COORDINATES (NAD 83):

LATITUDE:	39° 10' 17.92645" (N)	
LONGITUDE:	76° 39' 55.57814" (W)	
ELLIPSOID HT:	49.13 US ft.	14.975 m

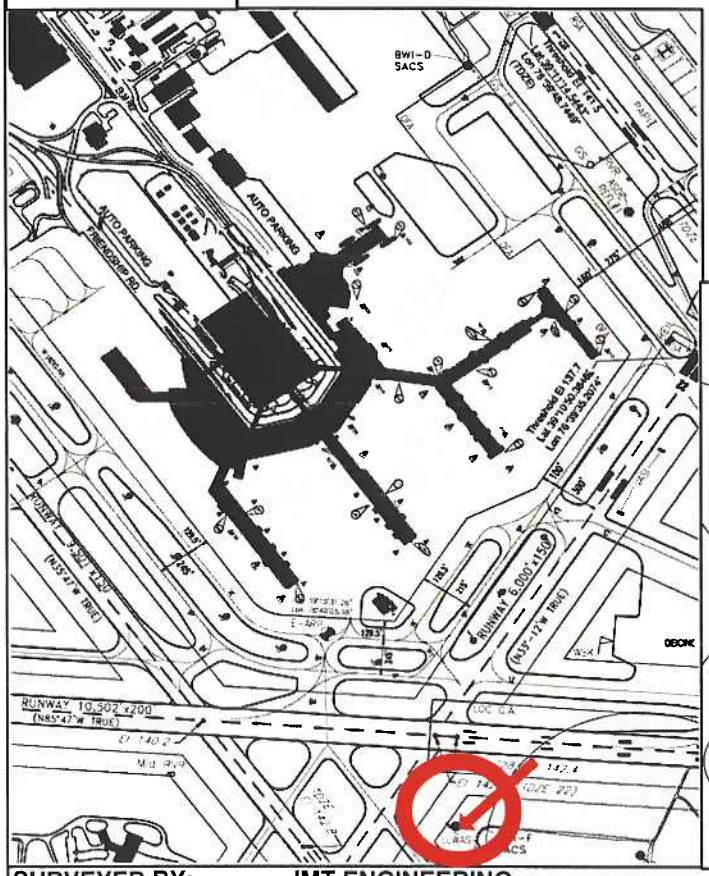
AVAILABLE CONVENTIONAL BACKSIGHT POINTS (COMPUTED DATA):

POINT	GEODETIC AZIMUTH	DISTANCE (US FT.)	DISTANCE (m)
MON-554	336°51'54.6'	1250.99	381.301
MON-555	5°14'03.7"	1303.58	397.332
MON-556	10°37'05.6"	1668.49	508.558

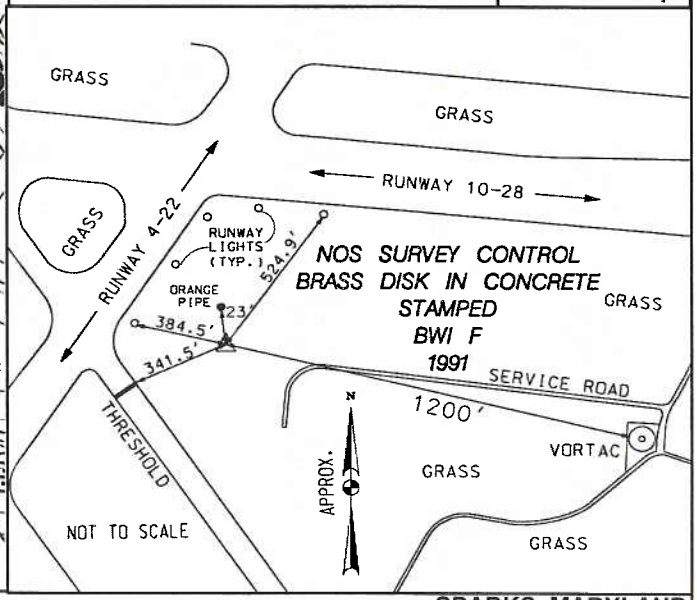
STATION DESCRIPTION:

* SEE ATTACHED NGS DATASHEETS

LOCATION PLAN



DETAIL MAP



SURVEYED BY: JMT ENGINEERING — SPARKS, MARYLAND

BWI THURGOOD MARSHALL AIRPORT-PRIMARY SURVEY CONTROL DATA

NAME OF STATION:	BWI F	**DATE ESTABLISHED:**	1991
NGS PID:	AA9297		READJUSTED FEBRUARY 2007

SURVEYED BY: **JMT ENGINEERING** **SPARKS, MARYLAND**

BWI THURGOOD MARSHALL AIRPORT-PRIMARY SURVEY CONTROL DATA

NAME OF STATION: BWI F	**DATE ESTABLISHED:** 1991
NGS PID: AA9297	READJUSTED FEBRUARY 2007

```
1        National Geodetic Survey,   Retrieval Date = JUNE 25, 2008
AA9297 ***********************************************************************
AA9297  PACS        -  This is a Primary Airport Control Station.
AA9297  DESIGNATION -  BWI F
AA9297  PID         -  AA9297
AA9297  STATE/COUNTY-  MD/ANNE ARUNDEL
AA9297  USGS QUAD   -  RELAY (1974)
AA9297
AA9297                          *CURRENT SURVEY CONTROL
AA9297
AA9297* NAD 83(2007)-  39 10 17.92645(N)     076 39 55.57814(W)      ADJUSTED
AA9297* NAVD 88     -        47.696  (meters)      156.48   (feet)   ADJUSTED
AA9297
AA9297  EPOCH DATE  -         2002.00
AA9297  X           -   1,141,957.332 (meters)                       COMP
AA9297  Y           -  -4,817,836.584 (meters)                       COMP
AA9297  Z           -   4,007,117.534 (meters)                       COMP
AA9297  LAPLACE CORR-          -5.43  (seconds)                      DEFLEC99
AA9297  ELLIP HEIGHT-          14.975 (meters)          (02/10/07)  ADJUSTED
AA9297  GEOID HEIGHT-         -32.68  (meters)                       GEOID03
AA9297  DYNAMIC HT  -          47.671 (meters)      156.40   (feet)  COMP
AA9297
AA9297  ------- Accuracy Estimates (at 95% Confidence Level in cm) --------
AA9297  Type    PID    Designation                        North   East   Ellip
AA9297  ----------------------------------------------------------------------
AA9297  NETWORK AA9297 BWI F                               1.02   0.73   2.08
AA9297  ----------------------------------------------------------------------
AA9297  MODELED GRAV-     980,092.5    (mgal)                        NAVD 88
AA9297
AA9297  VERT ORDER  -  FIRST     CLASS II
AA9297
AA9297.This mark is at Baltimore-Washington Int'l Airport (BWI)
AA9297
AA9297.The horizontal coordinates were established by GPS observations
AA9297.and adjusted by the National Geodetic Survey in February 2007.
AA9297
AA9297.The datum tag of NAD 83(2007) is equivalent to NAD 83(NSRS2007).
AA9297.See National Readjustment for more information.
AA9297.The horizontal coordinates are valid at the epoch date displayed above.
AA9297.The epoch date for horizontal control is a decimal equivalence
AA9297.of Year/Month/Day.
AA9297
AA9297.The orthometric height was determined by differential leveling
AA9297.and adjusted in June 2008.
AA9297.No vertical observational check was made to the station.
AA9297
AA9297.The X, Y, and Z were computed from the position and the ellipsoidal ht.
AA9297
AA9297.The Laplace correction was computed from DEFLEC99 derived deflections.
AA9297
AA9297.The ellipsoidal height was determined by GPS observations
AA9297.and is referenced to NAD 83.
AA9297
AA9297.The geoid height was determined by GEOID03.
```

SURVEYED BY:	**JMT ENGINEERING**	**SPARKS, MARYLAND**

BWI THURGOOD MARSHALL AIRPORT-PRIMARY SURVEY CONTROL DATA

NAME OF STATION: BWI F	**DATE ESTABLISHED:** 1991
NGS PID: AA9297	READJUSTED FEBRUARY 2007

```
AA9297
AA9297.The dynamic height is computed by dividing the NAVD 88
AA9297.geopotential number by the normal gravity value computed on the
AA9297.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
AA9297.degrees latitude (g = 980.6199 gals.).
AA9297
AA9297.The modeled gravity was interpolated from observed gravity values.
AA9297
AA9297;                      North         East      Units Scale Factor Converg.
AA9297;SPC MD       -   167,114.035   428,910.587   MT  0.99996314   +0 12 35.9
AA9297;SPC MD       -   548,273.30  1,407,184.15   sFT  0.99996314   +0 12 35.9
AA9297;UTM  18      - 4,337,145.570   356,131.715   MT  0.99985486   -1 03 07.7
AA9297
AA9297!             -  Elev Factor  x  Scale Factor =   Combined Factor
AA9297!SPC MD       -   0.99999765  x   0.99996314  =   0.99996079
AA9297!UTM  18      -   0.99999765  x   0.99985486  =   0.99985251
AA9297
AA9297                            SUPERSEDED SURVEY CONTROL
AA9297
AA9297  ELLIP H (08/09/02)    14.986  (m)                          GP(        ) 4 2
AA9297  NAD 83(1991)-  39 10 17.92754(N)    076 39 55.57787(W) AD(        ) B
AA9297  ELLIP H (03/24/98)    15.057  (m)                          GP(        ) 4 1
AA9297  NAD 83(1991)-  39 10 17.92754(N)    076 39 55.57783(W) AD(        ) B
AA9297  ELLIP H (11/22/95)    15.057  (m)                          GP(        ) 1 1
AA9297
AA9297.Superseded values are not recommended for survey control.
AA9297.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
AA9297.See file dsdata.txt to determine how the superseded data were derived.
AA9297
AA9297_U.S. NATIONAL GRID SPATIAL ADDRESS: 18SUJ5613237146(NAD 83)
AA9297_MARKER: DD = SURVEY DISK
AA9297_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
AA9297_STAMPING: BWI F 1991
AA9297_MARK LOGO: NOS
AA9297_PROJECTION: PROJECTING 5 CENTIMETERS
AA9297_MAGNETIC: N = NO MAGNETIC MATERIAL
AA9297_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
AA9297+STABILITY: SURFACE MOTION
AA9297_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
AA9297+SATELLITE: SATELLITE OBSERVATIONS - November 01, 2007
AA9297  HISTORY     - Date     Condition        Report By
AA9297  HISTORY     - 1991     MONUMENTED       NOS
AA9297  HISTORY     - 19911107 GOOD             NOS
AA9297  HISTORY     - 19941030 GOOD             NGS
AA9297  HISTORY     - 19961009 GOOD             NGS
AA9297  HISTORY     - 20001130 GOOD             NGS
AA9297  HISTORY     - 20071101 GOOD             JARICE
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SURVEYED BY:	**JMT ENGINEERING**	**SPARKS, MARYLAND**

BWI THURGOOD MARSHALL AIRPORT-PRIMARY SURVEY CONTROL DATA

NAME OF STATION:	BWI F	**DATE ESTABLISHED:**	1991
NGS PID:	AA9297		READJUSTED FEBRUARY 2007

AA9297 STATION DESCRIPTION
AA9297'DESCRIBED BY NATIONAL OCEAN SERVICE 1991
AA9297'THE STATION IS LOCATED NEAR THE CENTER OF THE AIRPORT JUST SOUTH OF
AA9297'THE INTERSECTION OF RUNWAYS 4-22 AND 10-28. IT IS ON THE NORTHWEST
AA9297'POINT OF A LOW HILL AND ABOUT 1200 FT (365.8 M) WEST OF THE VORTAC. IT
AA9297'IS 524.9 FT (160.0 M) SSW OF THE SECOND RUNWAY LIGHT EAST OF THE
AA9297'INTERSECTION ALONG THE SOUTH EDGE OF RWY 10-28, 384.5 FT (117.2 M)
AA9297'EAST OF THE THIRD RUNWAY LIGHT SOUTHWEST OF THE INTERSECTION ALONG THE
AA9297'SOUTHEAST EDGE OF RWY 4-22, AND 341.5 FT (104.1 M) NORTHEAST OF THE
AA9297'INTERSECTION OF THE CL OF A NW/SE TAXIWAY AND ITS HOLD BAR. IT IS 2.3
AA9297'FT (0.7 M) SOUTH OF A 3 FT (0.9 M) HIGH SECTION OF 2 INCH ORANGE
AA9297'PLASTIC PIPE DRIVEN INTO THE GROUND AS A WITNESS POST. THE STATION IS
AA9297'AN NOS DISK STAMPED BWI F 1991 AND SET IN THE TOP OF A CONCRETE POST
AA9297'WHICH PROJECTS 2 INCHES ABOVE THE GROUND.
AA9297 STATION RECOVERY (1994)
AA9297'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1994 (JDR)
AA9297'THE STATION IS LOCATED ABOUT 8 MI (12.9 KM) SOUTH-SOUTHWEST OF
AA9297'DOWNTOWN BALTIMORE, MD. AT THE BALTIMORE-WASHINGTON INTERNATIONAL
AA9297'AIRPORT JUST SOUTH OF THE INTERSECTION OF RUNWAYS 4-22 AND 10-28. IT
AA9297'IS ON THE NORTHWEST POINT OF A LOW HILL ABOUT 1200 FT (365.8 M) WEST
AA9297'OF THE VORTAC. CONTACT BILL ABEL, AIRPORT OPERATIONS, AT (410)
AA9297'859-7018.
AA9297'IT IS 524.9 FT (160.0 M) SOUTH-SOUTHWEST OF THE OF THE SECOND RUNWAY
AA9297'LIGHT EAST OF THE INTERSECTION ALONG THE SOUTH EDGE OF RUNWAY 10-28.
AA9297'384.5 FT (117.2 M) EAST OF THE THIRD RUNWAY LIGHT SOUTHWEST OF THE
AA9297'INTERSECTION ALONG THE SOUTHEAST EDGE OF RUNWAY 4-22, AND 341.5 FT
AA9297'(104.1 M) NORTHEAST OF THE INTERSECTION OF THE CENTERLINE OF A
AA9297'NORTHWEST-SOUTHEAST TAXIWAY AND ITS HOLD BAR. THE STATION IS A
AA9297'STANDARD NOS DISK STAMPED ---BWI F 1991--- AND SET IN THE TOP OF A
AA9297'CONCRETE MONUMENT WHICH PROJECTS 2 INCHES ABOVE THE GROUND.
AA9297 STATION RECOVERY (1996)
AA9297'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1996 (AJL)
AA9297'RECOVERED AS DESCRIBED.
AA9297 STATION RECOVERY (2000)
AA9297'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 2000 (APF)
AA9297'RECOVERED AS DESCRIBED.
AA9297 STATION RECOVERY (2007)
AA9297'RECOVERY NOTE BY J A RICE INC 2007 (MRA)
AA9297'RECOVERED AS DESCRIBED.

SURVEYED BY:	**JMT ENGINEERING**	**SPARKS, MARYLAND**

BWI THURGOOD MARSHALL AIRPORT-PRIMARY SURVEY CONTROL DATA

NAME OF STATION: BWI G
NGS PID: DJ9002
DATE ESTABLISHED: OCTOBER 2007
READJUSTED FEBRUARY 2008

MARYLAND STATE PLANE COORDINATES (NAD 83):

*	**NORTHING (Y):**	553233.769 US ft.	168625.990 m
*	**EASTING (X):**	1404563.506 US ft.	428111.813 m
*	**ORTHOMETRIC HEIGHT (NAVD 88):**	166.384 US ft.	50.714 m
	CONVERGENCE ANGLE:	0° 12' 15.2"	
	SCALE FACTOR:	0.99996440	
	COMBINED SCALE FACTOR:	0.99996157	

GEOGRAPHIC COORDINATES (NAD 83):

LATITUDE:	39° 11' 07.04959" (N)	
LONGITUDE:	76° 40' 28.63045" (W)	
ELLIPSOID HT:	59.26 US ft.	18.061 m

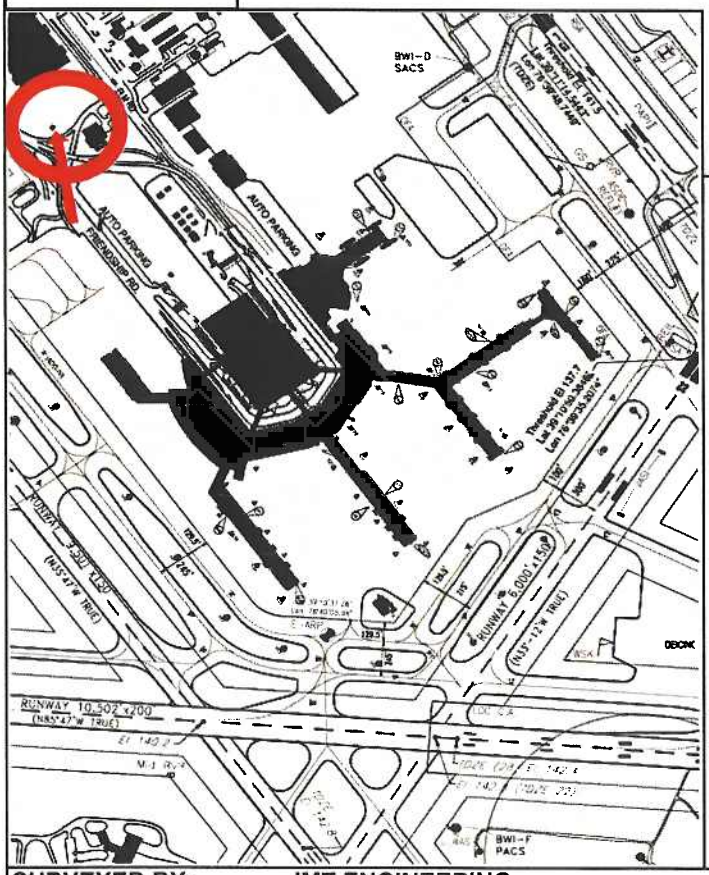
AVAILABLE CONVENTIONAL BACKSIGHT POINTS (COMPUTED DATA):

POINT	GEODETIC AZIMUTH	DISTANCE (US FT.)	DISTANCE (m)

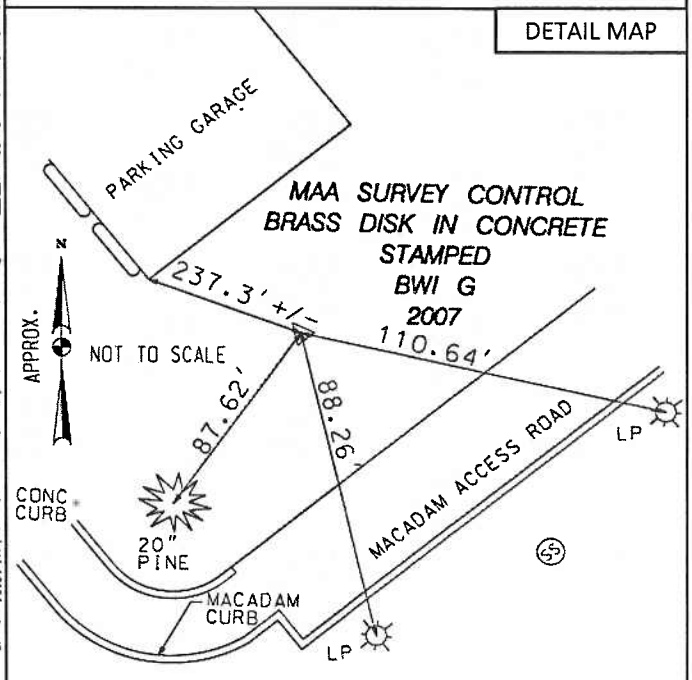
STATION DESCRIPTION:

* SEE ATTACHED NGS DATASHEETS

LOCATION PLAN



DETAIL MAP



SURVEYED BY: JMT ENGINEERING — SPARKS, MARYLAND

BWI THURGOOD MARSHALL AIRPORT-PRIMARY SURVEY CONTROL DATA

NAME OF STATION:	BWI G	**DATE ESTABLISHED:**	OCTOBER 2007
NGS PID:	DJ9002		

SURVEYED BY:	**JMT ENGINEERING**	**SPARKS, MARYLAND**

BWI THURGOOD MARSHALL AIRPORT-PRIMARY SURVEY CONTROL DATA

NAME OF STATION: BWI G	**DATE ESTABLISHED:** OCTOBER 2007
NGS PID: DJ9002	READJUSTED FEBRUARY 2008

```
1         National Geodetic Survey,   Retrieval Date = JUNE 25, 2008
DJ9002 ***********************************************************************
DJ9002  DESIGNATION -  BWI G
DJ9002  PID         -  DJ9002
DJ9002  STATE/COUNTY-  MD/ANNE ARUNDEL
DJ9002  USGS QUAD   -  RELAY (1974)
DJ9002
DJ9002                          *CURRENT SURVEY CONTROL
DJ9002 ______________________________________________________________________
DJ9002* NAD 83(2007)-  39 11 07.04959(N)     076 40 28.63045(W)      ADJUSTED
DJ9002* NAVD 88     -        50.714  (meters)      166.38   (feet)   ADJUSTED
DJ9002 ______________________________________________________________________
DJ9002  EPOCH DATE  -        2002.00
DJ9002  X           -  1,140,965.275 (meters)                        COMP
DJ9002  Y           -  -4,817,090.591 (meters)                       COMP
DJ9002  Z           -  4,008,293.800 (meters)                        COMP
DJ9002  LAPLACE CORR-         -5.39  (seconds)                       DEFLEC99
DJ9002  ELLIP HEIGHT-         18.061 (meters)          (02/29/08)    ADJUSTED
DJ9002  GEOID HEIGHT-        -32.65  (meters)                        GEOID03
DJ9002  DYNAMIC HT  -         50.687 (meters)      166.30   (feet)   COMP
DJ9002  MODELED GRAV-     980,095.4  (mgal)                          NAVD 88
DJ9002
DJ9002  HORZ ORDER  -  FIRST
DJ9002  VERT ORDER  -  FIRST     CLASS II
DJ9002  ELLP ORDER  -  SECOND    CLASS II
DJ9002
DJ9002.The horizontal coordinates were established by GPS observations
DJ9002.and adjusted by the JMT ENGINEERING in February 2008.
DJ9002
DJ9002.The datum tag of NAD 83(2007) is equivalent to NAD 83(NSRS2007).
DJ9002.See National Readjustment for more information.
DJ9002.The horizontal coordinates are valid at the epoch date displayed above.
DJ9002.The epoch date for horizontal control is a decimal equivalence
DJ9002.of Year/Month/Day.
DJ9002
DJ9002.The orthometric height was determined by differential leveling
DJ9002.and adjusted in June 2008.
DJ9002.No vertical observational check was made to the station.
DJ9002
DJ9002.The X, Y, and Z were computed from the position and the ellipsoidal ht.
DJ9002
DJ9002.The Laplace correction was computed from DEFLEC99 derived deflections.
DJ9002
DJ9002.The ellipsoidal height was determined by GPS observations
DJ9002.and is referenced to NAD 83.
DJ9002
DJ9002.The geoid height was determined by GEOID03.
DJ9002
DJ9002.The dynamic height is computed by dividing the NAVD 88
DJ9002.geopotential number by the normal gravity value computed on the
DJ9002.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
DJ9002.degrees latitude (g = 980.6199 gals.).
DJ9002
DJ9002.The modeled gravity was interpolated from observed gravity values.
```

SURVEYED BY:	**JMT ENGINEERING**	**SPARKS, MARYLAND**

BWI THURGOOD MARSHALL AIRPORT-PRIMARY SURVEY CONTROL DATA

NAME OF STATION:	BWI G	**DATE ESTABLISHED:**	OCTOBER 2007
NGS PID:	DJ9002		READJUSTED FEBRUARY 2008

```
DJ9002
DJ9002;                      North          East      Units Scale Factor Converg.
DJ9002;SPC MD       -   168,625.990   428,111.813    MT  0.99996440   +0 12 15.2
DJ9002;SPC MD       -   553,233.77  1,404,563.51    sFT  0.99996440   +0 12 15.2
DJ9002;UTM  18      - 4,338,674.590   355,366.525    MT  0.99985758   -1 03 29.7
DJ9002
DJ9002!             -  Elev Factor  x  Scale Factor =   Combined Factor
DJ9002!SPC MD       -   0.99999717  x   0.99996440  =   0.99996157
DJ9002!UTM  18      -   0.99999717  x   0.99985758  =   0.99985475
DJ9002
DJ9002                          SUPERSEDED SURVEY CONTROL
DJ9002
DJ9002.No superseded survey control is available for this station.
DJ9002
DJ9002_U.S. NATIONAL GRID SPATIAL ADDRESS: 18SUJ5536738675(NAD 83)
DJ9002_MARKER: DD = SURVEY DISK
DJ9002_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
DJ9002_STAMPING: BWI G 2007
DJ9002_MARK LOGO: MDAVIA
DJ9002_PROJECTION: RECESSED 5 CENTIMETERS
DJ9002_MAGNETIC: M = MARKER EQUIPPED WITH BAR MAGNET
DJ9002_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
DJ9002+STABILITY: SURFACE MOTION
DJ9002_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
DJ9002+SATELLITE: SATELLITE OBSERVATIONS - November 27, 2007
DJ9002
DJ9002  HISTORY     - Date     Condition        Report By
DJ9002  HISTORY     - 20071127 MONUMENTED       JMTMD
DJ9002
DJ9002                          STATION DESCRIPTION
DJ9002
DJ9002'DESCRIBED BY JMT ENGINEERING 2007
DJ9002'THE MARK IS LOCATED ABOUT 3.3 MI (5.3 KM) SOUTH-SOUTHEAST OF RELAY,
DJ9002'2.8 MI (4.5 KM) SOUTHEAST OF ELKRIDGE AND 2.7 MI (4.3 KM) EAST OF
DJ9002'HANOVER.  OWNERSHIP--BALTIMORE WASHINGTON INTERNATIONAL AIRPORT.
DJ9002'
DJ9002'TO REACH FROM THE JUNCTION OF I-97 AND MD 176, GO WEST-SOUTHWEST ON MD
DJ9002'176 FOR 0.24 MI (0.39 KM) TO AN INTERSECTION.  TURN RIGHT AND GO NORTH
DJ9002'ON MD 162 FOR 2.32 MI (3.74 KM) TO A INTERSECTION.  CONTINUE STRAIGHT
DJ9002'AHEAD FOR 0.74 MI (1.20 KM) TO A INTERSECTION.  TURN LEFT AND GO SOUTH
DJ9002'ON SCOTT DRIVE FOR 0.10 MI (0.17 KM) TO A SIDE ROAD LEFT.  TURN LEFT
DJ9002'AND GO SOUTHEAST ON ELM ROAD FOR 0.25 MI (0.40 KM) TO A RAMP ON THE
DJ9002'RIGHT.  TURN RIGHT AND GO SOUTHWEST ON THE RAMP FOR 0.09 MI (0.15 KM)
DJ9002'TO THE MARK ON THE RIGHT.
DJ9002'
DJ9002'IT IS 192.8 FT (58.8 M) EAST OF A METAL SIGN SHAPED LIKE A HOT-AIR
DJ9002'BALLOON, 89.0 FT (27.1 M) NORTHEAST OF A 30-IN (76 CM) SPRUCE TREE,
DJ9002'88.5 FT (27.0 M) NORTH-NORTHWEST OF A STREET LIGHT POLE, 62.2 FT (19.0
DJ9002'M) NORTHEAST OF A WATER VALVE NUMBERED 118, 57.0 FT (17.4 M) NORTHWEST
DJ9002'OF THE CENTERLINE OF A PAVED PARKING LOT AND SET IN THE TOP OF A
DJ9002'12-INCH (30 CM) ROUND CONCRETE POST.
```

SURVEYED BY:	**JMT ENGINEERING**	**SPARKS, MARYLAND**

BWI THURGOOD MARSHALL AIRPORT-PRIMARY SURVEY CONTROL DATA

NAME OF STATION: BWI H
NGS PID: DJ9003
DATE ESTABLISHED: OCTOBER 2007
READJUSTED FEBRUARY 2008

MARYLAND STATE PLANE COORDINATES (NAD 83):

*	**NORTHING (Y):**	548646.392 US ft.	167227.755 m
*	**EASTING (X):**	1400229.308 US ft.	426790.747 m
*	**ORTHOMETRIC HEIGHT (NAVD 88):**	132.739 US ft.	40.459 m
	CONVERGENCE ANGLE:	0° 11' 40.5"	
	SCALE FACTOR:	0.99996324	
	COMBINED SCALE FACTOR:	0.99996202	

GEOGRAPHIC COORDINATES (NAD 83):

LATITUDE:	39° 10' 21.85685" (N)	
LONGITUDE:	76° 41' 23.87437" (W)	
ELLIPSOID HT:	25.52 US ft.	7.778 m

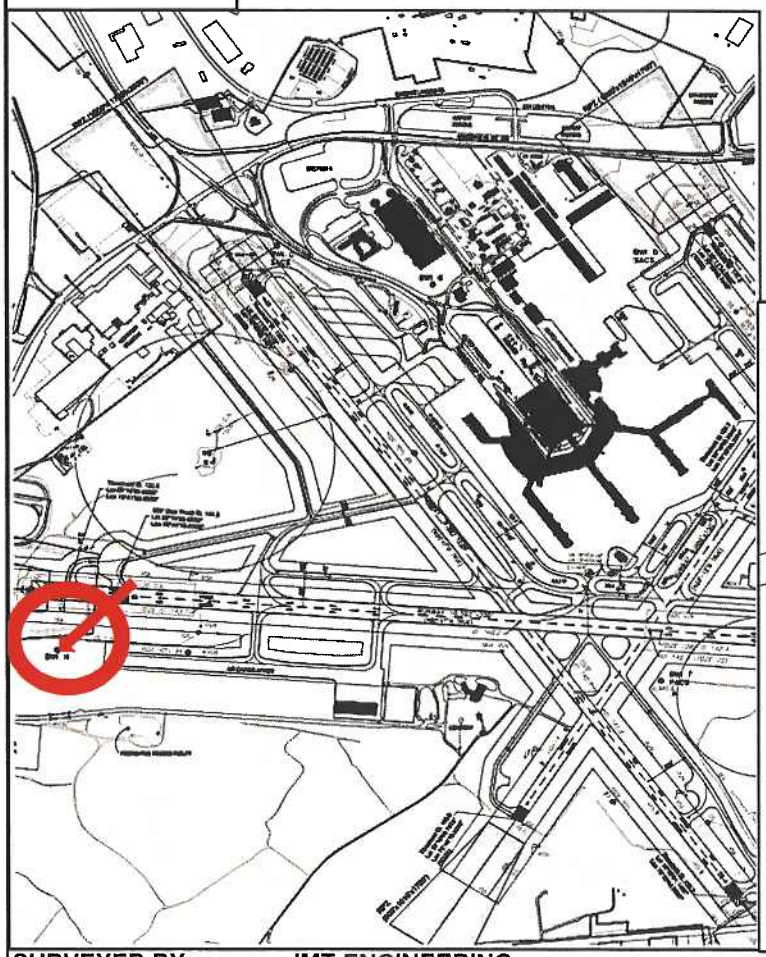
AVAILABLE CONVENTIONAL BACKSIGHT POINTS (COMPUTED DATA):

POINT	GEODETIC AZIMUTH	DISTANCE (US FT.)	DISTANCE (m)

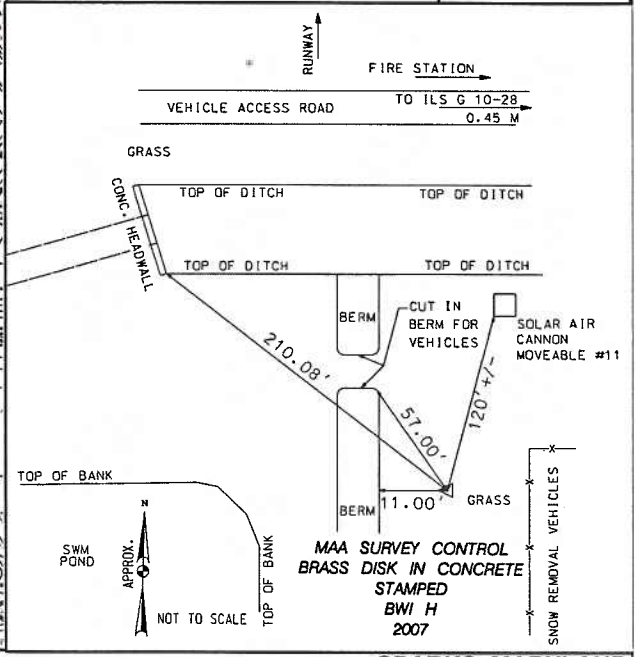
STATION DESCRIPTION:

* SEE ATTACHED NGS DATASHEETS

LOCATION PLAN



DETAIL MAP



SURVEYED BY: JMT ENGINEERING — SPARKS, MARYLAND

BWI THURGOOD MARSHALL AIRPORT-PRIMARY SURVEY CONTROL DATA

NAME OF STATION:	BWI H	**DATE ESTABLISHED:**	OCTOBER 2007
NGS PID:	DJ9003		

SURVEYED BY:	**JMT ENGINEERING**	**SPARKS, MARYLAND**

BWI THURGOOD MARSHALL AIRPORT-PRIMARY SURVEY CONTROL DATA

NAME OF STATION: BWI H	**DATE ESTABLISHED:** OCTOBER 2007
NGS PID: DJ9003	READJUSTED FEBRUARY 2008

```
1        National Geodetic Survey,   Retrieval Date = JUNE 25, 2008
DJ9003 ***********************************************************************
DJ9003  DESIGNATION -  BWI H
DJ9003  PID         -  DJ9003
DJ9003  STATE/COUNTY-  MD/ANNE ARUNDEL
DJ9003  USGS QUAD   -  RELAY (1974)
DJ9003
DJ9003                          *CURRENT SURVEY CONTROL
DJ9003
DJ9003* NAD 83(2007)-  39 10 21.85685(N)     076 41 23.87437(W)      ADJUSTED
DJ9003* NAVD 88     -        40.459  (meters)      132.74   (feet)   ADJUSTED
DJ9003
DJ9003  EPOCH DATE  -        2002.00
DJ9003  X           -   1,139,875.935 (meters)                       COMP
DJ9003  Y           -  -4,818,245.049 (meters)                       COMP
DJ9003  Z           -   4,007,206.955 (meters)                       COMP
DJ9003  LAPLACE CORR-          -5.46  (seconds)                      DEFLEC99
DJ9003  ELLIP HEIGHT-           7.778 (meters)          (02/29/08)  ADJUSTED
DJ9003  GEOID HEIGHT-         -32.61  (meters)                       GEOID03
DJ9003  DYNAMIC HT  -          40.437 (meters)      132.67  (feet)   COMP
DJ9003  MODELED GRAV-     980,093.9   (mgal)                         NAVD 88
DJ9003
DJ9003  HORZ ORDER  -  FIRST
DJ9003  VERT ORDER  -  FIRST     CLASS II
DJ9003  ELLP ORDER  -  SECOND    CLASS II
DJ9003
DJ9003.The horizontal coordinates were established by GPS observations
DJ9003.and adjusted by the JMT ENGINEERING in February 2008.
DJ9003
DJ9003.The datum tag of NAD 83(2007) is equivalent to NAD 83(NSRS2007).
DJ9003.See National Readjustment for more information.
DJ9003.The horizontal coordinates are valid at the epoch date displayed above.
DJ9003.The epoch date for horizontal control is a decimal equivalence
DJ9003.of Year/Month/Day.
DJ9003
DJ9003.The orthometric height was determined by differential leveling
DJ9003.and adjusted in June 2008.
DJ9003.No vertical observational check was made to the station.
DJ9003
DJ9003.The X, Y, and Z were computed from the position and the ellipsoidal ht.
DJ9003
DJ9003.The Laplace correction was computed from DEFLEC99 derived deflections.
DJ9003
DJ9003.The ellipsoidal height was determined by GPS observations
DJ9003.and is referenced to NAD 83.
DJ9003
DJ9003.The geoid height was determined by GEOID03.
DJ9003
DJ9003.The dynamic height is computed by dividing the NAVD 88
DJ9003.geopotential number by the normal gravity value computed on the
DJ9003.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
DJ9003.degrees latitude (g = 980.6199 gals.).
DJ9003
DJ9003.The modeled gravity was interpolated from observed gravity values.
```

SURVEYED BY:	**JMT ENGINEERING**	**SPARKS, MARYLAND**

BWI THURGOOD MARSHALL AIRPORT-PRIMARY SURVEY CONTROL DATA

NAME OF STATION:	BWI H	**DATE ESTABLISHED:**	OCTOBER 2007
NGS PID:	DJ9003		READJUSTED FEBRUARY 2008

```
DJ9003
DJ9003.The dynamic height is computed by dividing the NAVD 88
DJ9003.geopotential number by the normal gravity value computed on the
DJ9003.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
DJ9003.degrees latitude (g = 980.6199 gals.).
DJ9003
DJ9003.The modeled gravity was interpolated from observed gravity values.
DJ9003
DJ9003;                    North          East      Units Scale Factor Converg.
DJ9003;SPC MD       -   167,227.755   426,790.747    MT  0.99996324   +0 11 40.5
DJ9003;SPC MD       -   548,646.39  1,400,229.31    sFT  0.99996324   +0 11 40.5
DJ9003;UTM  18      - 4,337,305.940   354,015.116    MT  0.99986241   -1 04 03.6
DJ9003
DJ9003!             -  Elev Factor  x  Scale Factor =   Combined Factor
DJ9003!SPC MD       -   0.99999878  x   0.99996324  =   0.99996202
DJ9003!UTM  18      -   0.99999878  x   0.99986241  =   0.99986119
DJ9003
DJ9003                          SUPERSEDED SURVEY CONTROL
DJ9003
DJ9003.No superseded survey control is available for this station.
DJ9003
DJ9003_U.S. NATIONAL GRID SPATIAL ADDRESS: 18SUJ5401537306(NAD 83)
DJ9003_MARKER: DD = SURVEY DISK
DJ9003_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
DJ9003_STAMPING: BWI H 2007
DJ9003_MARK LOGO: MDAVIA
DJ9003_PROJECTION: RECESSED 10 CENTIMETERS
DJ9003_MAGNETIC: M = MARKER EQUIPPED WITH BAR MAGNET
DJ9003_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
DJ9003+STABILITY: SURFACE MOTION
DJ9003_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
DJ9003+SATELLITE: SATELLITE OBSERVATIONS - November 27, 2007
DJ9003
DJ9003  HISTORY     - Date     Condition        Report By
DJ9003  HISTORY     - 20071127 MONUMENTED       JMTMD
DJ9003
DJ9003                          STATION DESCRIPTION
DJ9003
DJ9003'DESCRIBED BY JMT ENGINEERING 2007
DJ9003'THE MARK IS LOCATED ABOUT 3.9 MI (6.2 KM) SOUTH OF RELAY, 3.0 MI (4.9
DJ9003'KM) SOUTH-SOUTHEAST OF ELKRIDGE AND 2.3 MI (3.7 KM) SOUTHEAST OF
DJ9003'HANOVER AT BALTIMORE WASHINGTON INTERNATIONAL AIRPORT.  CONTACT
DJ9003'AIRPORT OPERATIONS AT 410-859-7018 FOR ACCESS TO THE MARK.
DJ9003'
DJ9003'IT IS 601.7 FT (183.4 M) WEST OF THE NORTHWEST CORNER OF A CHAIN LINK
DJ9003'FENCE, 409.8 FT (124.9 M) WEST-NORTHWEST OF THE NORTHWEST END OF A
DJ9003'36-INCH (91 CM) CONCRETE PIPE AND HEADWALL, 217.6 FT (66.3 M)
DJ9003'EAST-SOUTHEAST OF THE EAST END OF A CONCRETE PIPE AND HEADWALL, 121.4
DJ9003'FT (37.0 M) SOUTHWEST OF A PROPANE CANNON 115.5 FT (35.2 M) SOUTH OF
DJ9003'THE CENTERLINE OF AN EAST-WEST DITCH AND SET IN THE TOP OF A 12-INCH
DJ9003'(30 CM) ROUND CONCRETE POST.
```

SURVEYED BY:	**JMT ENGINEERING**	**SPARKS, MARYLAND**

BWI THURGOOD MARSHALL AIRPORT-SECONDARY SURVEY CONTROL DATA

NAME OF STATION: MON-548
NGS PID:

DATE ESTABLISHED: APRIL 2005
READJUSTED JUNE 2008

MARYLAND STATE PLANE COORDINATES (NAD 83):

NORTHING (Y):	551723.788 US ft.	168165.747 m
EASTING (X):	1404244.744 US ft.	428014.654 m
ORTHOMETRIC HEIGHT (NAVD 88):	132.257 US ft.	40.312 m
CONVERGENCE ANGLE:	00°12'12.61"	
COMBINED SCALE FACTOR:	0.99996914	

GEOGRAPHIC COORDINATES (NAD 83):

LATITUDE:	39°10'52.13611" (N)	
LONGITUDE:	76°40'32.74698" (W)	
ELLIPSOID HT:	25.15 US ft.	7.666 m

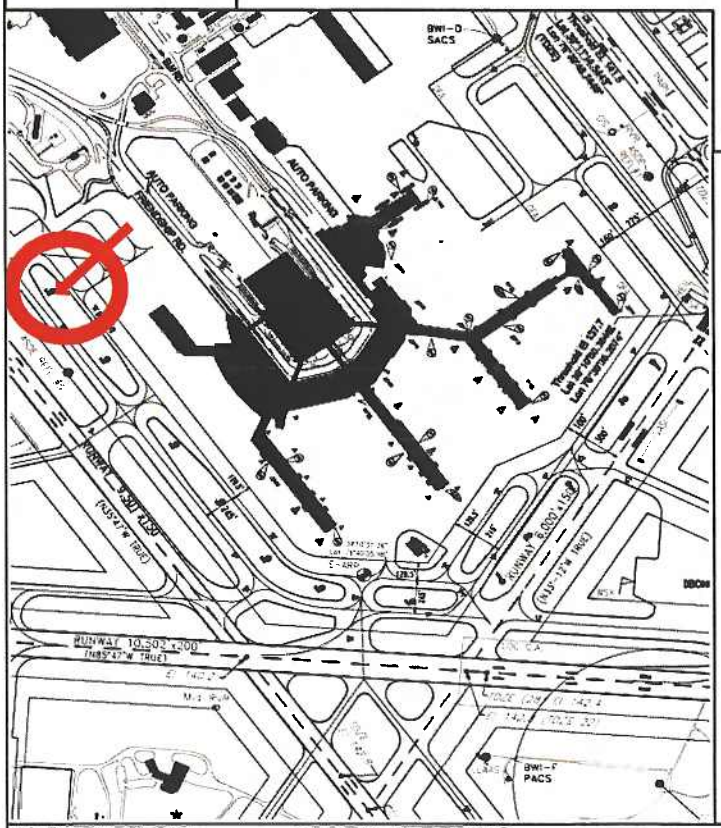
AVAILABLE CONVENTIONAL BACKSIGHT POINTS (COMPUTED DATA):

POINT	GEODETIC AZIMUTH	DISTANCE (US FT.)	DISTANCE (m)
MON-549	144°00'03.2'	629.19	191.778

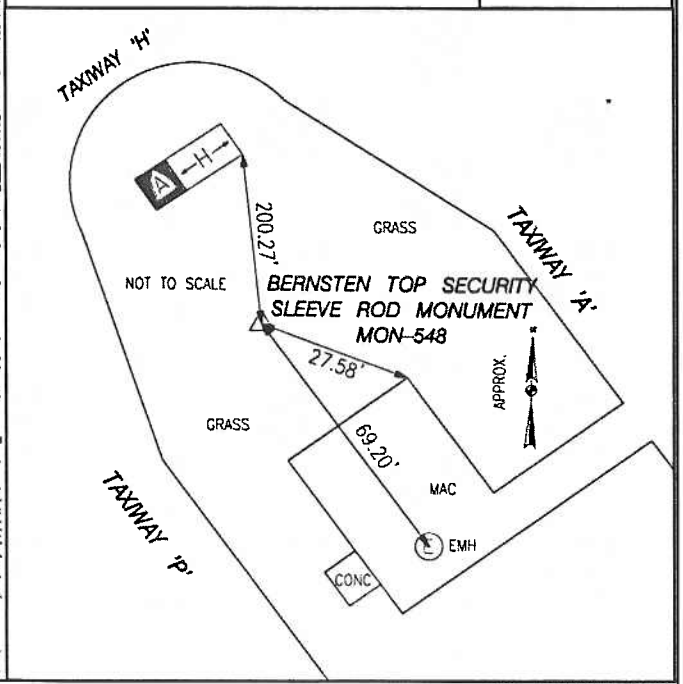
STATION DESCRIPTION:

DRIVEN TO REFUSAL ROD MONUMENT
WITH BERSTEN TOP SECURITY SLEEVE & LID

LOCATION PLAN



DETAIL MAP



SURVEYED BY: JMT ENGINEERING — **SPARKS, MARYLAND**

BWI THURGOOD MARSHALL AIRPORT-PRIMARY SURVEY CONTROL DATA

NAME OF STATION: MON-548	**DATE ESTABLISHED:** APRIL 2005
NGS PID:	

SURVEYED BY: JMT ENGINEERING SPARKS, MARYLAND

BWI THURGOOD MARSHALL AIRPORT-SECONDARY SURVEY CONTROL DATA

NAME OF STATION: MON-549
NGS PID:

DATE ESTABLISHED: APRIL 2005
READJUSTED JUNE 2008

MARYLAND STATE PLANE COORDINATES (NAD 83):

NORTHING (Y):	551216.073 US ft.	168010.995 m
EASTING (X):	1404616.371 US ft.	428127.926 m
ORTHOMETRIC HEIGHT (NAVD 88):	130.387 US ft.	39.742 m
CONVERGENCE ANGLE:	00°12'15.56"	
COMBINED SCALE FACTOR:	0.99996901	

GEOGRAPHIC COORDINATES (NAD 83):

LATITUDE:	39°10'47.10475" (N)	
LONGITUDE:	76°40'28.05043" (W)	
ELLIPSOID HT:	23.27 US ft.	7.091 m

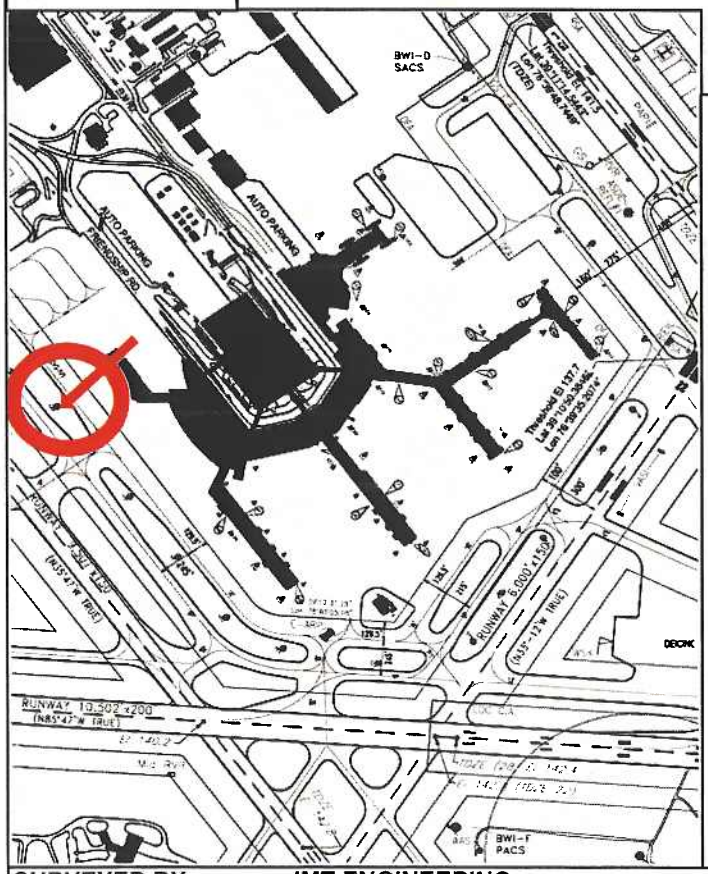
AVAILABLE CONVENTIONAL BACKSIGHT POINTS (COMPUTED DATA):

POINT	GEODETIC AZIMUTH	DISTANCE (US FT.)	DISTANCE (m)
MON-548	324°00'06.2'	629.19	191.778
MON-550	143°28'44.4'	786.86	239.835

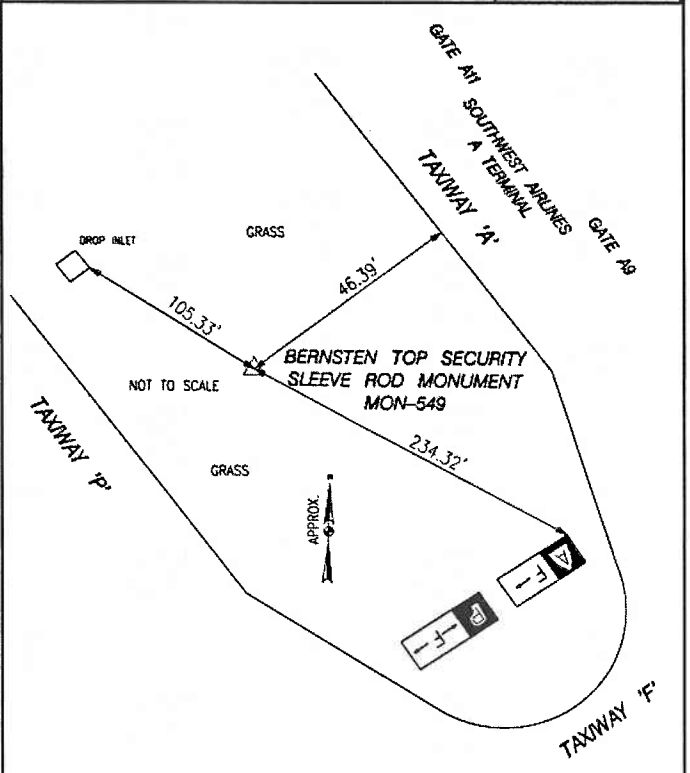
STATION DESCRIPTION:

DRIVEN TO REFUSAL ROD MONUMENT
WITH BERSTEN TOP SECURITY SLEEVE & LID

LOCATION PLAN



DETAIL MAP



SURVEYED BY: JMT ENGINEERING — SPARKS, MARYLAND

BWI THURGOOD MARSHALL AIRPORT-PRIMARY SURVEY CONTROL DATA

NAME OF STATION: MON-549	**DATE ESTABLISHED:** APRIL 2005
NGS PID:	

SURVEYED BY: JMT ENGINEERING SPARKS, MARYLAND

BWI THURGOOD MARSHALL AIRPORT-SECONDARY SURVEY CONTROL DATA

NAME OF STATION: MON-550
NGS PID:

DATE ESTABLISHED: APRIL 2005
READJUSTED JUNE 2008

MARYLAND STATE PLANE COORDINATES (NAD 83):

NORTHING (Y):	550585.396 US ft.	167818.764 m
EASTING (X):	1405086.897 US ft.	428271.343 m
ORTHOMETRIC HEIGHT (NAVD 88):	137.815 US ft.	42.006 m
CONVERGENCE ANGLE:	00°12'19.29"	
COMBINED SCALE FACTOR:	0.99996885	

GEOGRAPHIC COORDINATES (NAD 83):

LATITUDE:	39°10'40.85449" (N)	
LONGITUDE:	76°40'22.10373" (W)	
ELLIPSOID HT:	30.68 US ft.	9.350 m

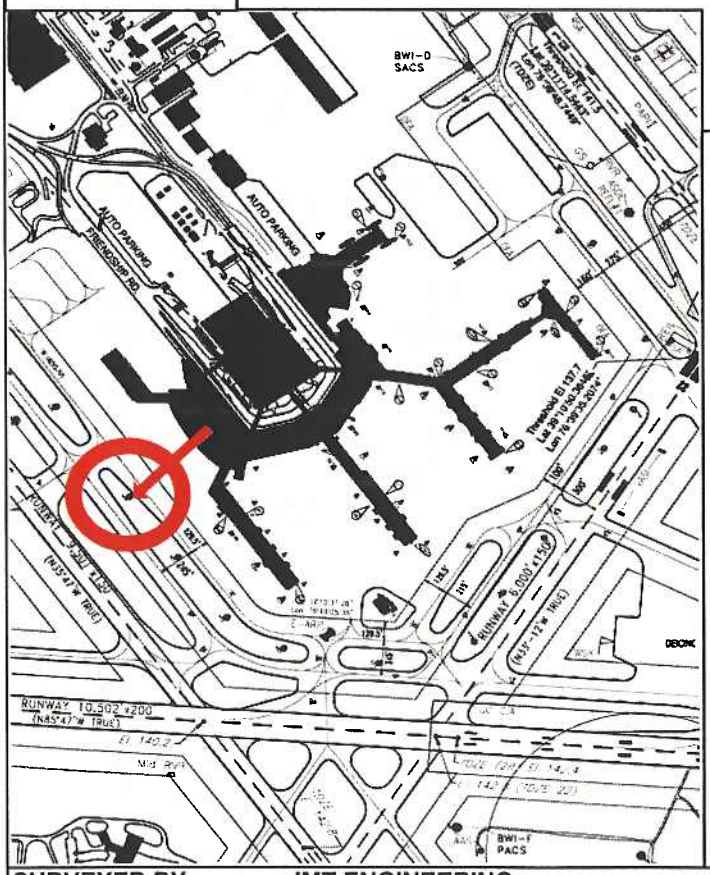
AVAILABLE CONVENTIONAL BACKSIGHT POINTS (COMPUTED DATA):

POINT	GEODETIC AZIMUTH	DISTANCE (US FT.)	DISTANCE (m)
MON-549	323°28'48.2'	786.86	239.835
MON-551	143°57'32.8'	525.42	160.149

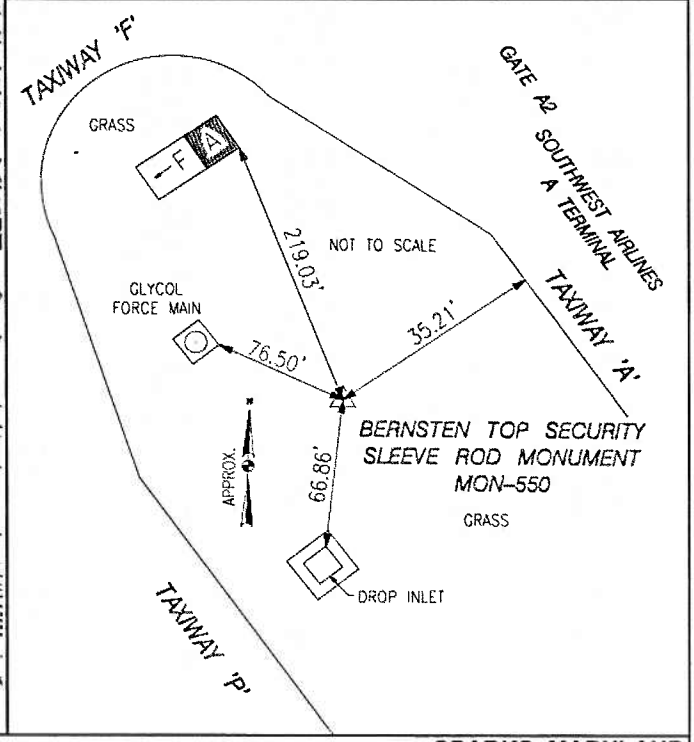
STATION DESCRIPTION:

DRIVEN TO REFUSAL ROD MONUMENT
WITH BERSTEN TOP SECURITY SLEEVE & LID

LOCATION PLAN



DETAIL MAP



SURVEYED BY: JMT ENGINEERING — SPARKS, MARYLAND

BWI THURGOOD MARSHALL AIRPORT-PRIMARY SURVEY CONTROL DATA

NAME OF STATION: MON-550
NGS PID:

DATE ESTABLISHED: APRIL 2005

SURVEYED BY: JMT ENGINEERING — SPARKS, MARYLAND

BWI THURGOOD MARSHALL AIRPORT-SECONDARY SURVEY CONTROL DATA

NAME OF STATION: MON-551
NGS PID:

DATE ESTABLISHED: APRIL 2005
READJUSTED JUNE 2008

MARYLAND STATE PLANE COORDINATES (NAD 83):

NORTHING (Y):	550161.652 US ft.	167689.607 m
EASTING (X):	1405397.556 US ft.	428366.032 m
ORTHOMETRIC HEIGHT (NAVD 88):	141.643 US ft.	43.173 m
CONVERGENCE ANGLE:	00°12'21.75"	
COMBINED SCALE FACTOR:	0.99996874	

GEOGRAPHIC COORDINATES (NAD 83):

LATITUDE:	39°10'36.65516" (N)	
LONGITUDE:	76°40'18.17799" (W)	
ELLIPSOID HT:	34.49 US ft.	10.513 m

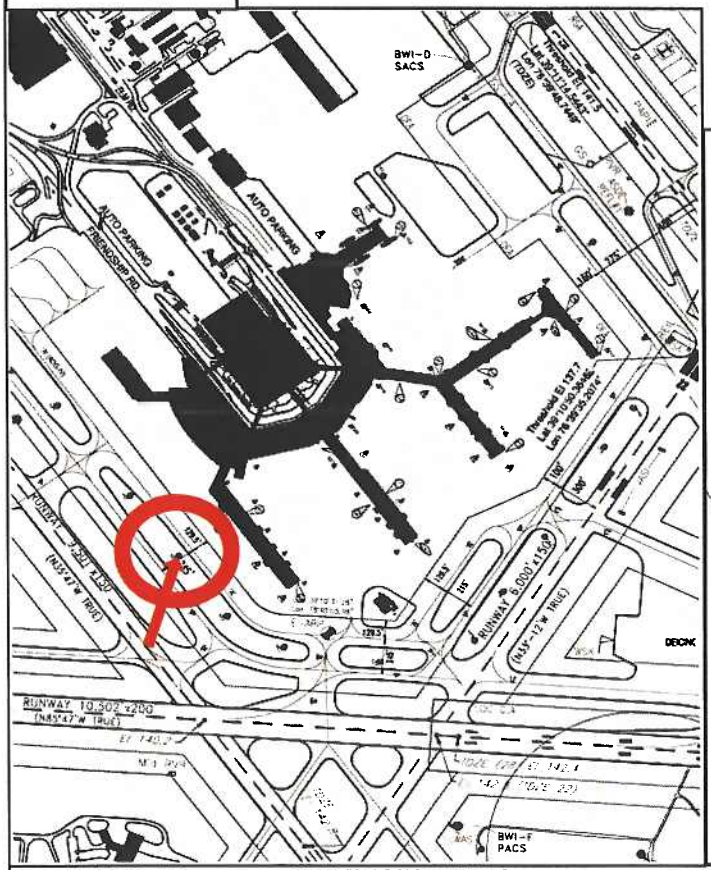
AVAILABLE CONVENTIONAL BACKSIGHT POINTS (COMPUTED DATA):

POINT	GEODETIC AZIMUTH	DISTANCE (US FT.)	DISTANCE (m)
MON-550	323°57'35.2'	525.42	160.149
MON-552	143°42'22.6'	523.01	159.413

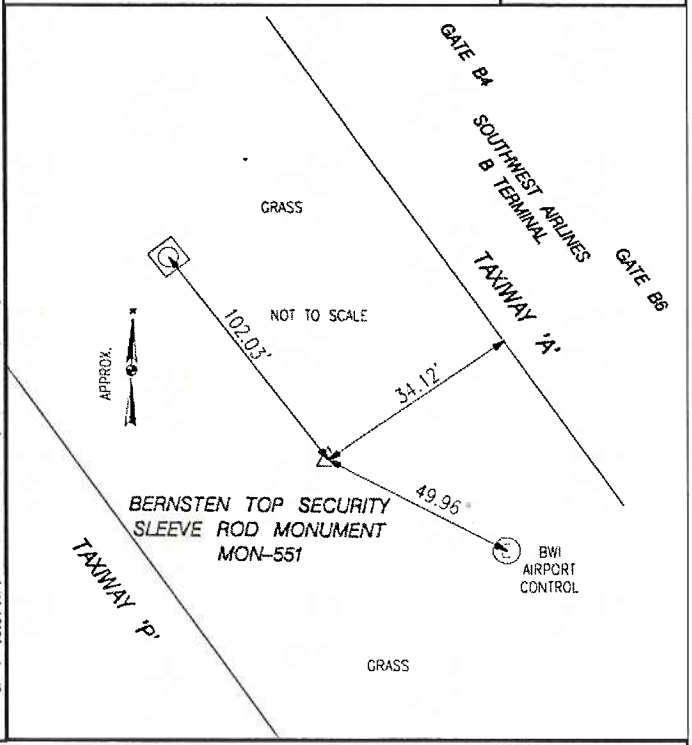
STATION DESCRIPTION:

DRIVEN TO REFUSAL ROD MONUMENT
WITH BERSTEN TOP SECURITY SLEEVE & LID

LOCATION PLAN



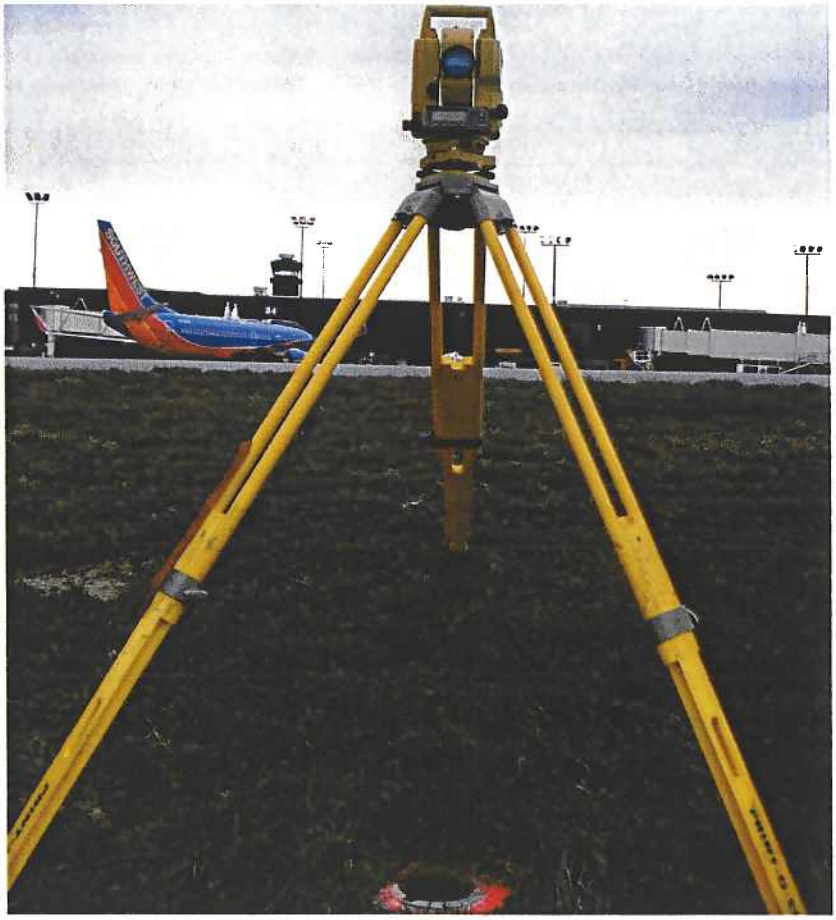
DETAIL MAP



SURVEYED BY: JMT ENGINEERING — **SPARKS, MARYLAND**

BWI THURGOOD MARSHALL AIRPORT-PRIMARY SURVEY CONTROL DATA

NAME OF STATION: MON-551	**DATE ESTABLISHED:** APRIL 2005
NGS PID:	



SURVEYED BY: JMT ENGINEERING SPARKS, MARYLAND

BWI THURGOOD MARSHALL AIRPORT-SECONDARY SURVEY CONTROL DATA

NAME OF STATION: MON-552
NGS PID:

DATE ESTABLISHED: APRIL 2005
READJUSTED JUNE 2008

MARYLAND STATE PLANE COORDINATES (NAD 83):

NORTHING (Y):	549741.229 US ft.	167561.462 m
EASTING (X):	1405708.650 US ft.	428460.854 m
ORTHOMETRIC HEIGHT (NAVD 88):	144.140 US ft.	43.934 m
CONVERGENCE ANGLE:	00°12'24.22"	
COMBINED SCALE FACTOR:	0.99996864	

GEOGRAPHIC COORDINATES (NAD 83):

LATITUDE:	39°10'32.48860" (N)	
LONGITUDE:	76°40'14.24671" (W)	
ELLIPSOID HT:	36.97 US ft.	11.270 m

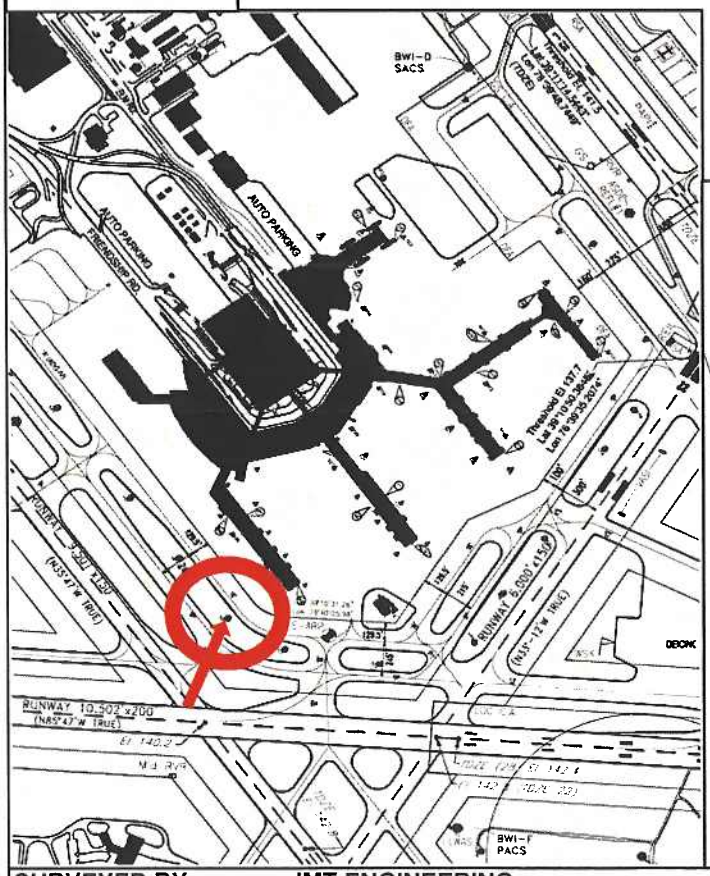
AVAILABLE CONVENTIONAL BACKSIGHT POINTS (COMPUTED DATA):

POINT	GEODETIC AZIMUTH	DISTANCE (US FT.)	DISTANCE (m)
MON-551	323°42'25.1'	523.01	159.413
MON-553	120°58'24.6'	425.31	129.634

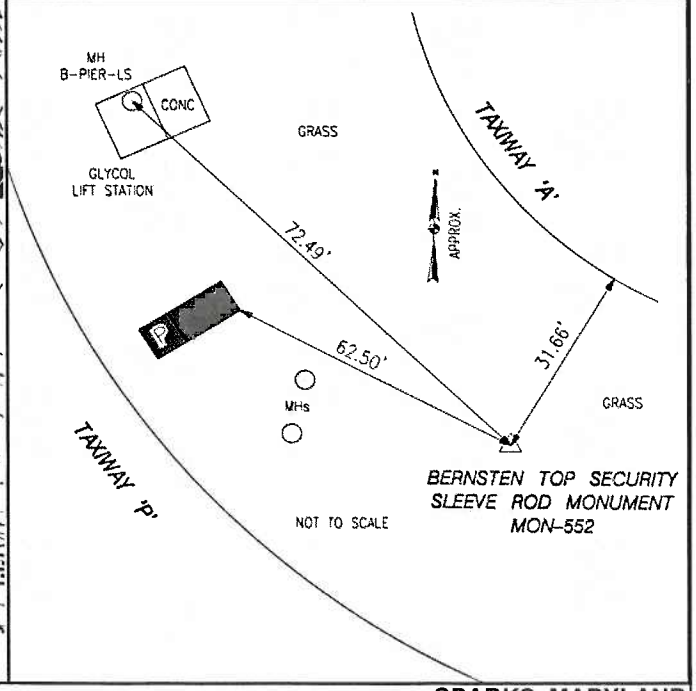
STATION DESCRIPTION:

DRIVEN TO REFUSAL ROD MONUMENT
WITH BERSTEN TOP SECURITY SLEEVE & LID

LOCATION PLAN



DETAIL MAP



SURVEYED BY: JMT ENGINEERING — SPARKS, MARYLAND

BWI THURGOOD MARSHALL AIRPORT-PRIMARY SURVEY CONTROL DATA

NAME OF STATION: MON-552	**DATE ESTABLISHED:** APRIL 2005
NGS PID:	

SURVEYED BY: JMT ENGINEERING — SPARKS, MARYLAND

BWI THURGOOD MARSHALL AIRPORT-SECONDARY SURVEY CONTROL DATA

NAME OF STATION: MON-553
NGS PID:

DATE ESTABLISHED: APRIL 2005
READJUSTED JUNE 2008

MARYLAND STATE PLANE COORDINATES (NAD 83):

NORTHING (Y):	549523.665 US ft.	167495.148 m
EASTING (X):	1406074.097 US ft.	428572.242 m
ORTHOMETRIC HEIGHT (NAVD 88):	143.973 US ft.	43.883 m
CONVERGENCE ANGLE:	00°12'27.13"	
COMBINED SCALE FACTOR:	0.99996858	

GEOGRAPHIC COORDINATES (NAD 83):

LATITUDE:	39°10'30.32514" (N)	
LONGITUDE:	76°40'09.61602" (W)	
ELLIPSOID HT:	36.80 US ft.	11.215 m

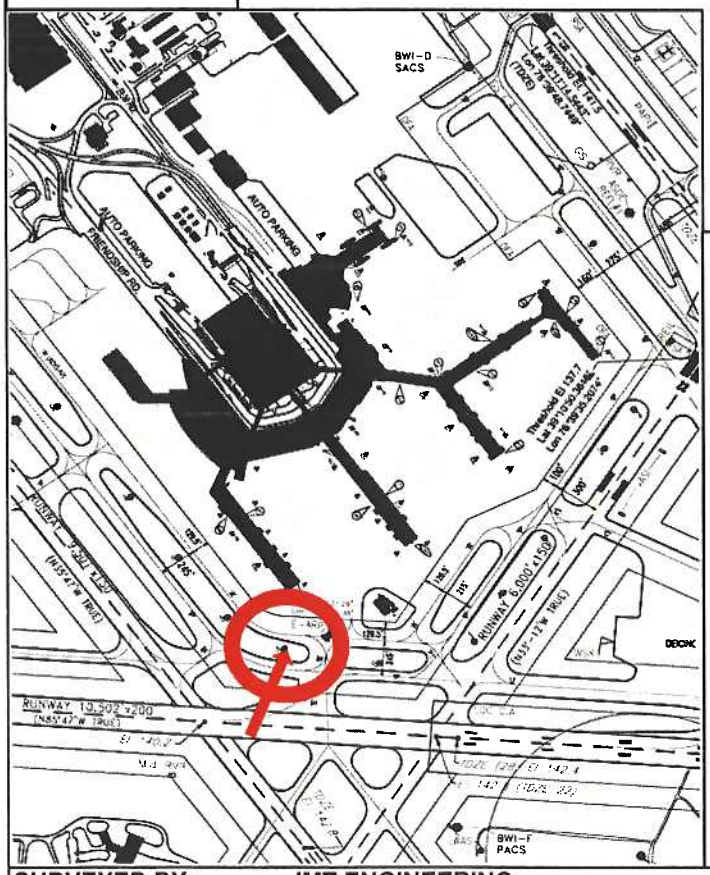
AVAILABLE CONVENTIONAL BACKSIGHT POINTS (COMPUTED DATA):

POINT	GEODETIC AZIMUTH	DISTANCE (US FT.)	DISTANCE (m)
MON-552	300°58'27.6'	425.31	129.634
MON-554	99°36'56.9"	622.71	189.802

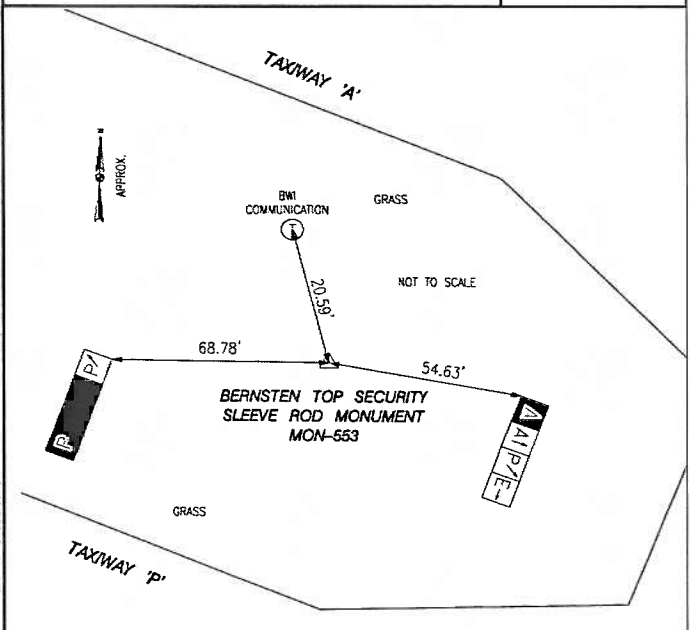
STATION DESCRIPTION:

DRIVEN TO REFUSAL ROD MONUMENT
WITH BERSTEN TOP SECURITY SLEEVE & LID

LOCATION PLAN



DETAIL MAP



SURVEYED BY: JMT ENGINEERING — **SPARKS, MARYLAND**

BWI THURGOOD MARSHALL AIRPORT-PRIMARY SURVEY CONTROL DATA

NAME OF STATION: MON-553	**DATE ESTABLISHED:** APRIL 2005
NGS PID:	

SURVEYED BY: JMT ENGINEERING — SPARKS, MARYLAND

BWI THURGOOD MARSHALL AIRPORT-SECONDARY SURVEY CONTROL DATA

NAME OF STATION: MON-554
NGS PID:

DATE ESTABLISHED: MAY 2003
READJUSTED JUNE 2008

MARYLAND STATE PLANE COORDINATES (NAD 83):

NORTHING (Y):	549421.872 US ft.	167464.122 m
EASTING (X):	1406688.429 US ft.	428759.491 m
ORTHOMETRIC HEIGHT (NAVD 88):	140.259 US ft.	42.751 m
CONVERGENCE ANGLE:	00°12'32.02"	
COMBINED SCALE FACTOR:	0.99996184	

GEOGRAPHIC COORDINATES (NAD 83):

LATITUDE:	39°10'29.29695" (N)		
LONGITUDE:	76°40'01.81960" (W)		
ELLIPSOID HT:	33.06 US ft.	10.077 m	

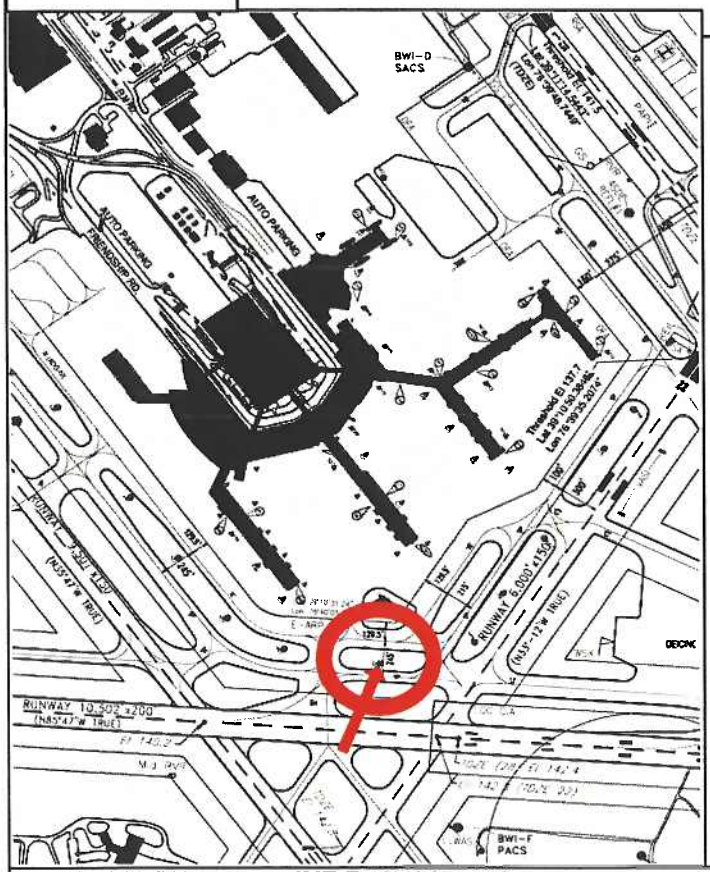
AVAILABLE CONVENTIONAL BACKSIGHT POINTS (COMPUTED DATA):

POINT	GEODETIC AZIMUTH	DISTANCE (US FT.)	DISTANCE (m)
MON-553	279°37'01.8'	622.71	189.802
MON-555	76°23'30.4"	628.06	191.434
MON-556	58°30'07.3"	937.00	285.598
BWI F	156°51'50.7'	1250.99	381.301

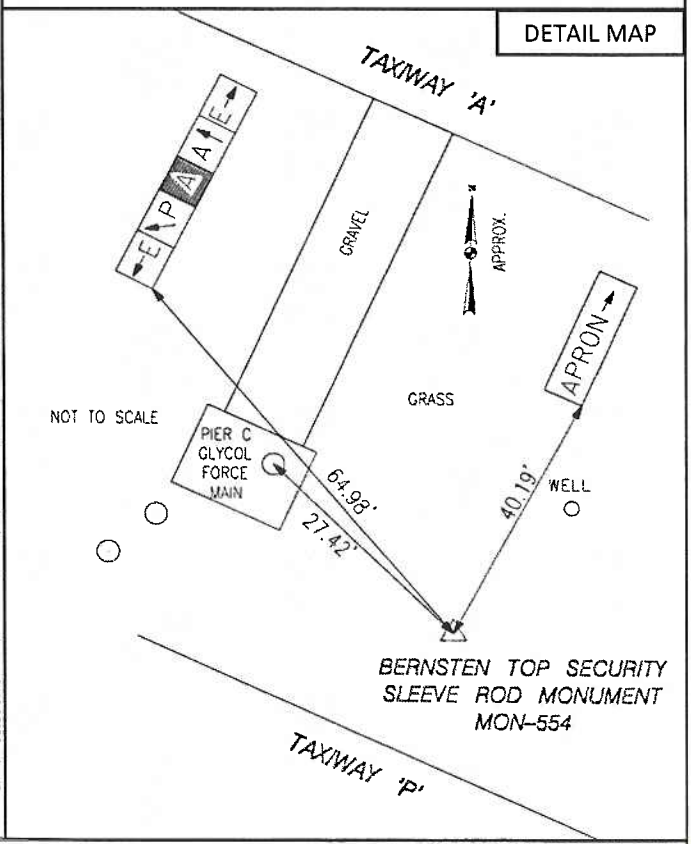
STATION DESCRIPTION:

DRIVEN TO REFUSAL ROD MONUMENT
WITH BERSTEN TOP SECURITY SLEEVE & LID

LOCATION PLAN



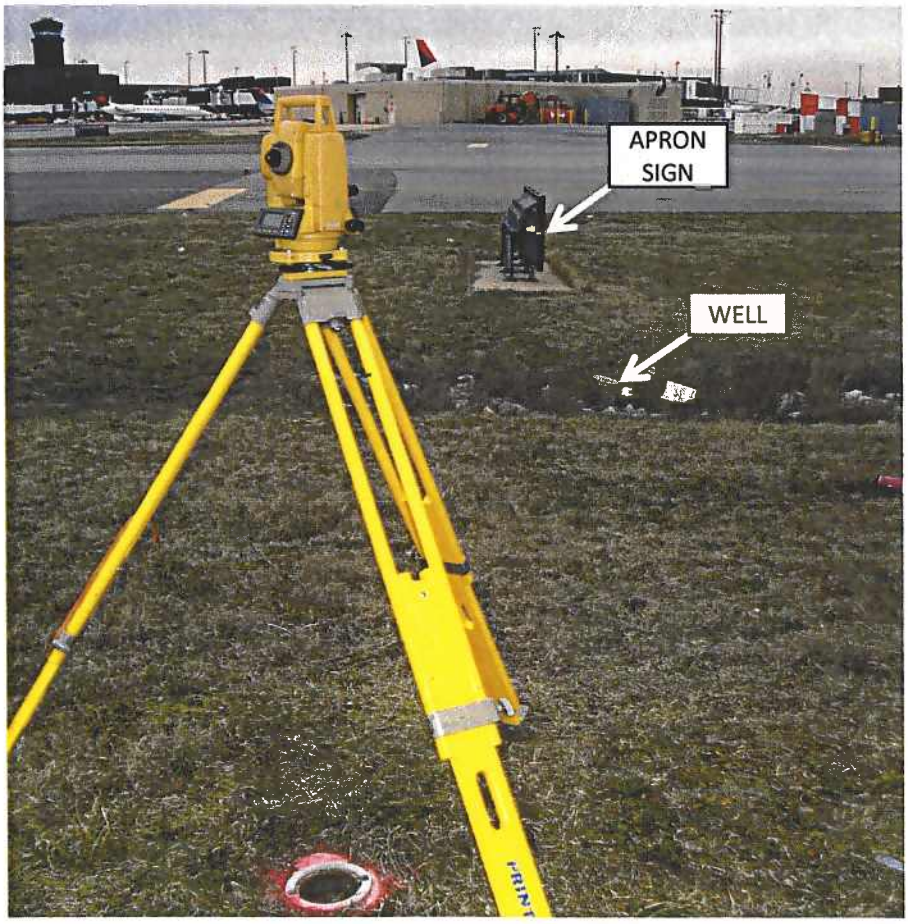
DETAIL MAP



SURVEYED BY: JMT ENGINEERING — SPARKS, MARYLAND

BWI THURGOOD MARSHALL AIRPORT-SECONDARY SURVEY CONTROL DATA

NAME OF STATION: MON-554	**DATE ESTABLISHED:** MAY 2003
NGS PID:	



SURVEYED BY:	**JMT ENGINEERING**	**SPARKS, MARYLAND**

BWI THURGOOD MARSHALL AIRPORT-SECONDARY SURVEY CONTROL DATA

NAME OF STATION: MON-555
NGS PID:

DATE ESTABLISHED: MAY 2003
READJUSTED JUNE 2008

MARYLAND STATE PLANE COORDINATES (NAD 83):

NORTHING (Y):	549571.868 US ft.	167509.840 m
EASTING (X):	1407298.316 US ft.	428945.385 m
ORTHOMETRIC HEIGHT (NAVD 88):	139.741 US ft.	42.593 m
CONVERGENCE ANGLE:	00°12'36.88"	
COMBINED SCALE FACTOR:	0.99996190	

GEOGRAPHIC COORDINATES (NAD 83):

LATITUDE:	39°10'30.75746" (N)	
LONGITUDE:	76°39'54.06795" (W)	
ELLIPSOID HT:	32.52 US ft.	9.913 m

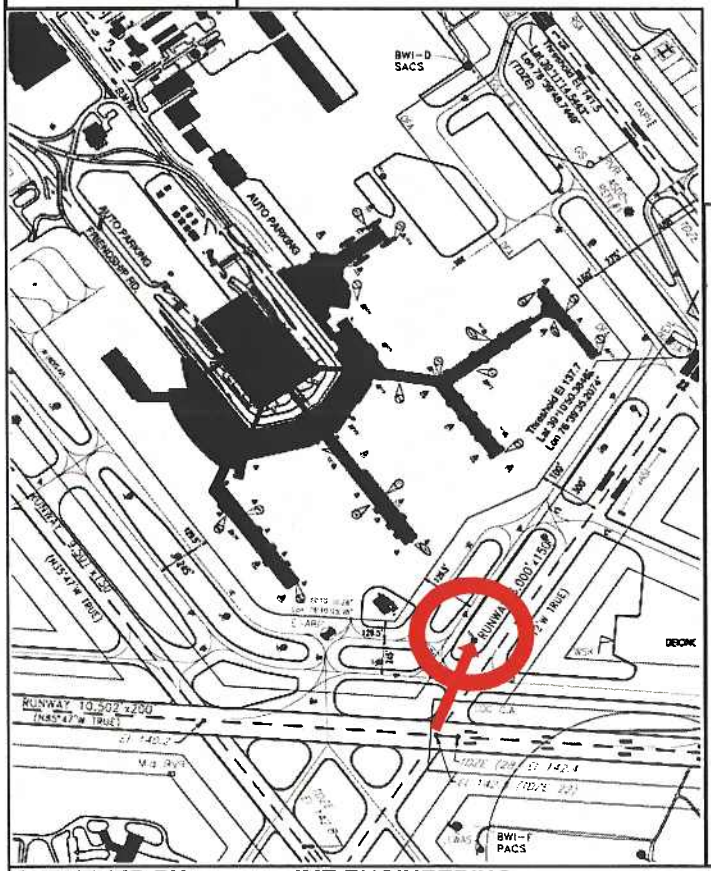
AVAILABLE CONVENTIONAL BACKSIGHT POINTS (COMPUTED DATA):

POINT	GEODETIC AZIMUTH	DISTANCE (US FT.)	DISTANCE (m)
MON-554	256°23'35.3'	628.06	191.434
MON-556	28°52'49.8"	390.32	118.970
BWI F	185°14'04.6'	1303.58	397.332

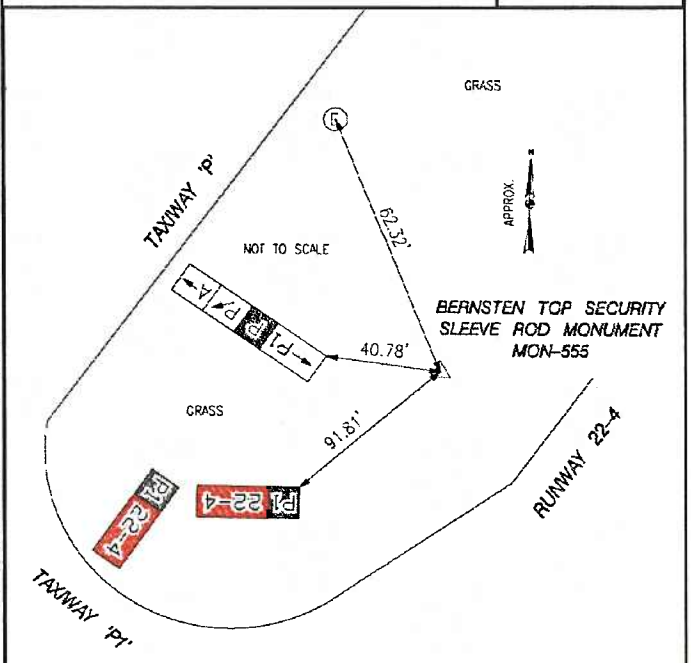
STATION DESCRIPTION:

DRIVEN TO REFUSAL ROD MONUMENT
WITH BERSTEN TOP SECURITY SLEEVE & LID

LOCATION PLAN



DETAIL MAP



SURVEYED BY: JMT ENGINEERING — SPARKS, MARYLAND

BWI THURGOOD MARSHALL AIRPORT-SECONDARY SURVEY CONTROL DATA

NAME OF STATION: MON-555	**DATE ESTABLISHED:** MAY 2003
NGS PID:	

SURVEYED BY:	**JMT ENGINEERING**	**SPARKS, MARYLAND**

BWI THURGOOD MARSHALL AIRPORT-SECONDARY SURVEY CONTROL DATA

NAME OF STATION: MON-556
NGS PID:
DATE ESTABLISHED: MAY 2003
READJUSTED JUNE 2008

MARYLAND STATE PLANE COORDINATES (NAD 83):

NORTHING (Y):	549914.335 US ft.	167614.225 m
EASTING (X):	1407485.581 US ft.	429002.463 m
ORTHOMETRIC HEIGHT (NAVD 88):	137.635 US ft.	41.951 m
CONVERGENCE ANGLE:	00°12'38.39"	
COMBINED SCALE FACTOR:	0.99996209	

GEOGRAPHIC COORDINATES (NAD 83):

LATITUDE:	39°10'34.13562" (N)	
LONGITUDE:	76°39'51.67397" (W)	
ELLIPSOID HT:	30.42 US ft.	9.271 m

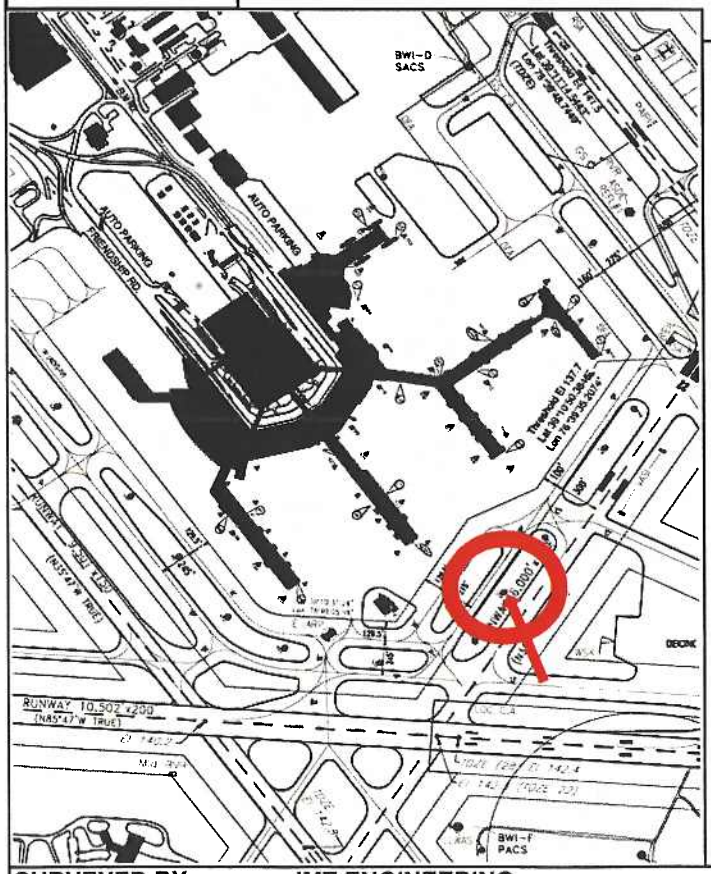
AVAILABLE CONVENTIONAL BACKSIGHT POINTS (COMPUTED DATA):

POINT	GEODETIC AZIMUTH	DISTANCE (US FT.)	DISTANCE (m)
MON-555	208°52'51.3'	390.32	118.970
MON-557	35°11'00.6"	467.20	142.404
BWI F	190°37'08.1'	1668.49	508.558

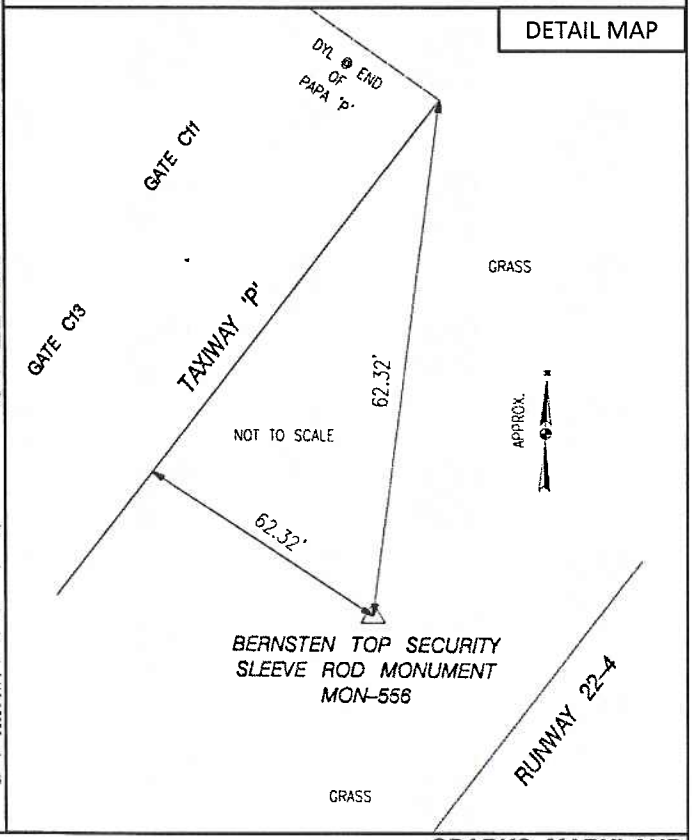
STATION DESCRIPTION:

DRIVEN TO REFUSAL ROD MONUMENT
WITH BERSTEN TOP SECURITY SLEEVE & LID

LOCATION PLAN



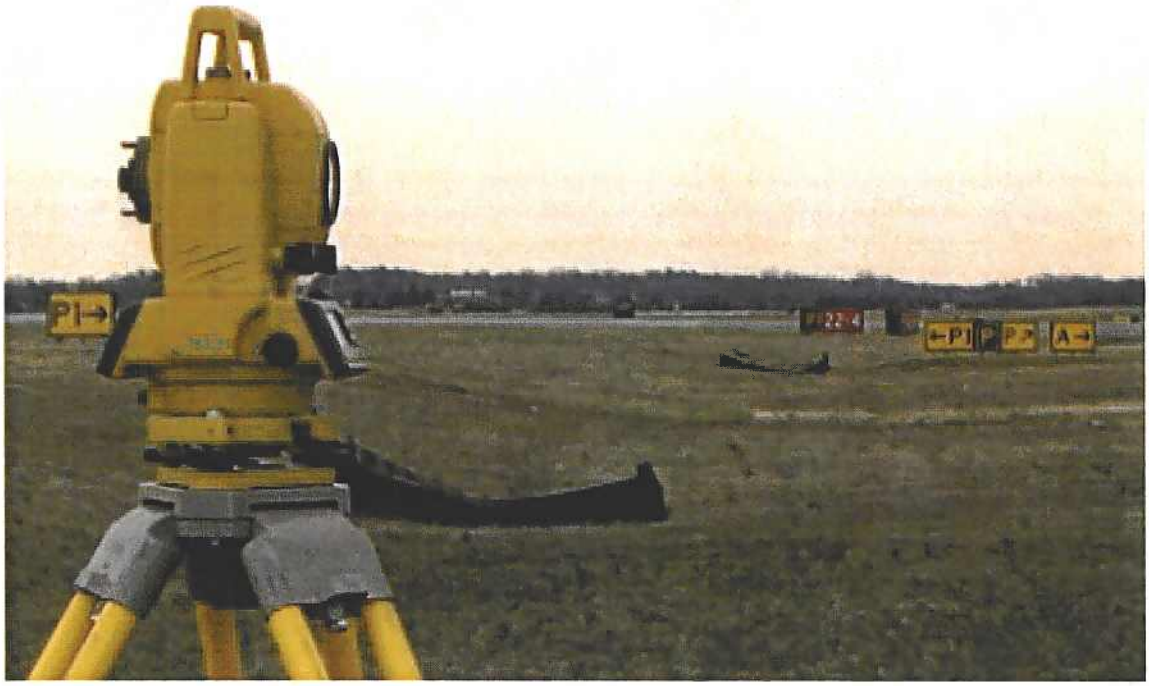
DETAIL MAP



SURVEYED BY: JMT ENGINEERING — SPARKS, MARYLAND

BWI THURGOOD MARSHALL AIRPORT-SECONDARY SURVEY CONTROL DATA

NAME OF STATION: MON-556	**DATE ESTABLISHED:** MAY 2003
NGS PID:	



SURVEYED BY:	**JMT ENGINEERING**	**SPARKS, MARYLAND**

BWI THURGOOD MARSHALL AIRPORT-SECONDARY SURVEY CONTROL DATA

NAME OF STATION: MON-557
NGS PID:

DATE ESTABLISHED: MAY 2003
READJUSTED JUNE 2008

MARYLAND STATE PLANE COORDINATES (NAD 83):

NORTHING (Y):	550297.172 US ft.	167730.914 m
EASTING (X):	1407753.375 US ft.	429084.087 m
ORTHOMETRIC HEIGHT (NAVD 88):	140.420 US ft.	42.800 m
CONVERGENCE ANGLE:	00°12'40.53"	
COMBINED SCALE FACTOR:	0.99996205	

GEOGRAPHIC COORDINATES (NAD 83):

LATITUDE:	39°10'37.90985" (N)	
LONGITUDE:	76°39'48.25537" (W)	
ELLIPSOID HT:	33.19 US ft.	10.118 m

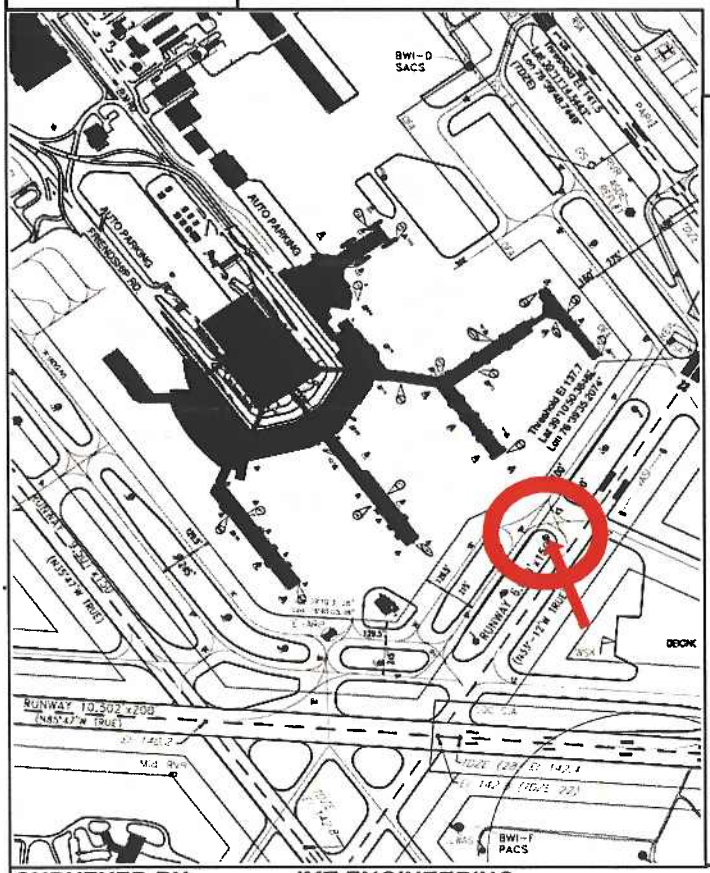
AVAILABLE CONVENTIONAL BACKSIGHT POINTS (COMPUTED DATA):

POINT	GEODETIC AZIMUTH	DISTANCE (US FT.)	DISTANCE (m)
MON-556	215°11'02.8'	467.20	142.404
MON-558	31°47'53.9"	737.87	224.903

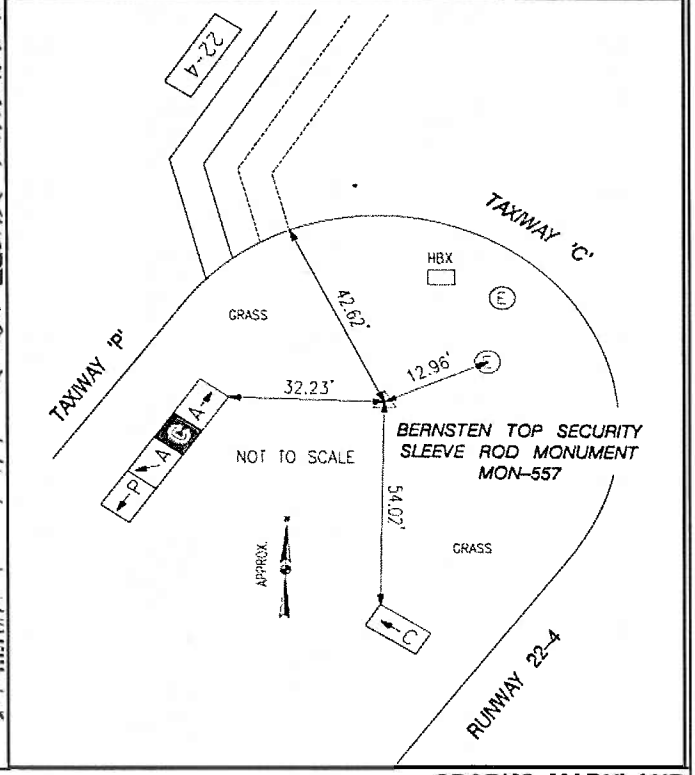
STATION DESCRIPTION:

DRIVEN TO REFUSAL ROD MONUMENT
WITH BERSTEN TOP SECURITY SLEEVE & LID

LOCATION PLAN



DETAIL MAP



SURVEYED BY: JMT ENGINEERING — SPARKS, MARYLAND

BWI THURGOOD MARSHALL AIRPORT-SECONDARY SURVEY CONTROL DATA

NAME OF STATION: MON-557	**DATE ESTABLISHED:** MAY 2003
NGS PID:	

SURVEYED BY:	**JMT ENGINEERING**	**SPARKS, MARYLAND**

BWI THURGOOD MARSHALL AIRPORT-SECONDARY SURVEY CONTROL DATA

NAME OF STATION: MON-558
NGS PID: DJ9001
DATE ESTABLISHED: MAY 2003
READJUSTED JUNE 2008

MARYLAND STATE PLANE COORDINATES (NAD 83):

NORTHING (Y):	550925.724 US ft.	167922.497 m
EASTING (X):	1408139.867 US ft.	429201.890 m
* **ORTHOMETRIC HEIGHT (NAVD 88):**	137.487 US ft.	41.906 m
CONVERGENCE ANGLE:	00°12'43.63"	
COMBINED SCALE FACTOR:	0.99996235	

GEOGRAPHIC COORDINATES (NAD 83):

LATITUDE:	39°10'44.10837" (N)	
LONGITUDE:	76°39'43.31779" (W)	
ELLIPSOID HT:	30.26 US ft.	9.222 m

AVAILABLE CONVENTIONAL BACKSIGHT POINTS (COMPUTED DATA):

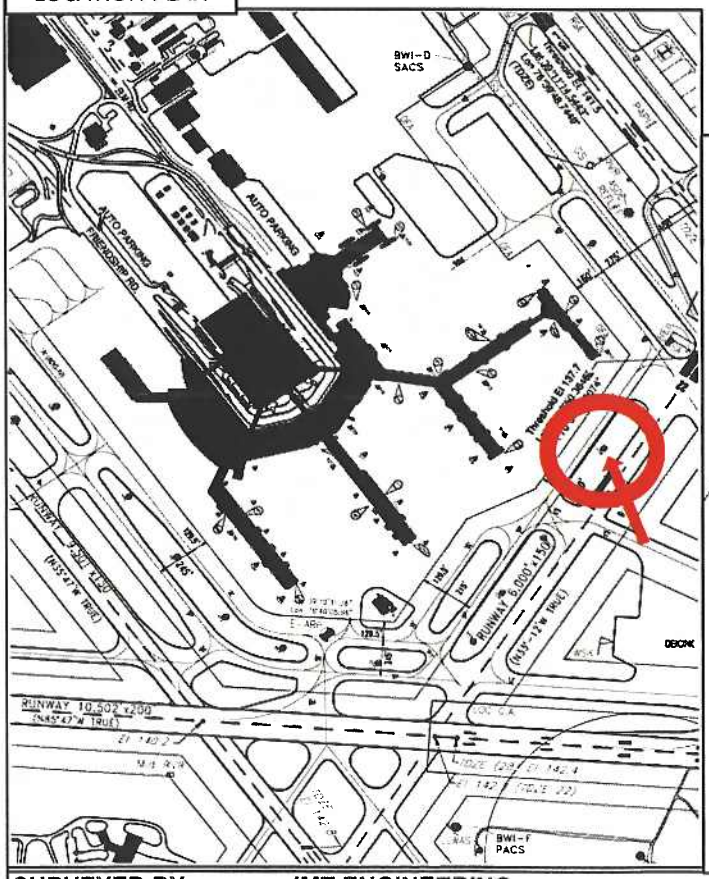
POINT	GEODETIC AZIMUTH	DISTANCE (US FT.)	DISTANCE (m)
MON-557	211°47'57.0'	737.87	224.903
MON-559	34°40'53.5"	332.95	101.483

STATION DESCRIPTION:

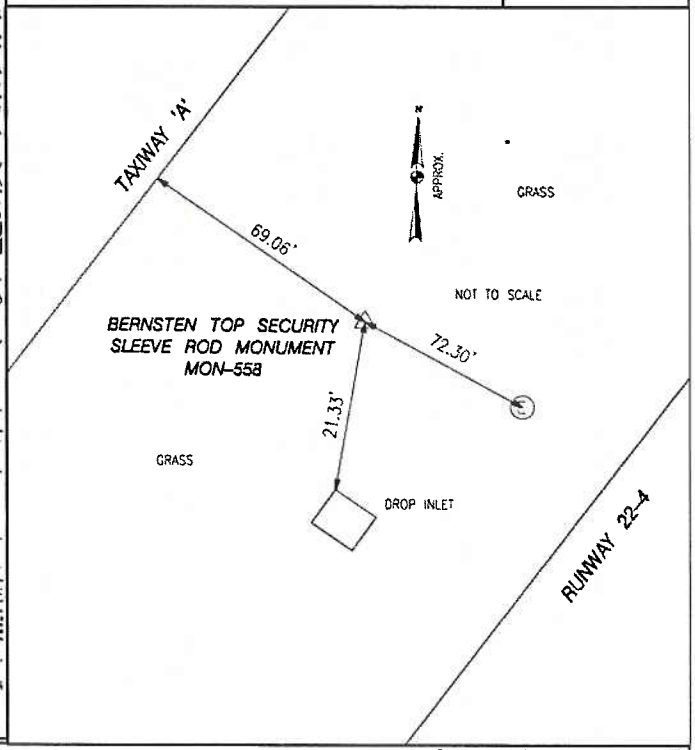
DRIVEN TO REFUSAL ROD MONUMENT
WITH BERSTEN TOP SECURITY SLEEVE & LID

* SEE ATTACHED NGS DATASHEETS

LOCATION PLAN



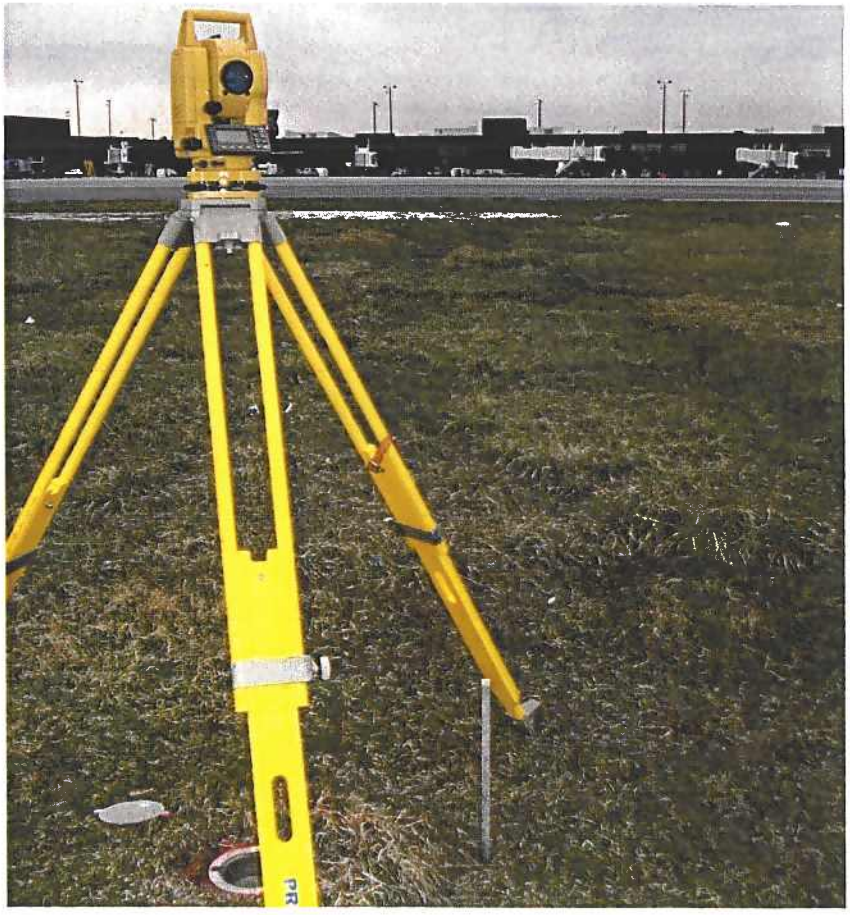
DETAIL MAP



SURVEYED BY: JMT ENGINEERING — SPARKS, MARYLAND

BWI THURGOOD MARSHALL AIRPORT-SECONDARY SURVEY CONTROL DATA

NAME OF STATION:	MON-558	**DATE ESTABLISHED:**	MAY 2003
NGS PID:	**DJ9001**		



SURVEYED BY:	**JMT ENGINEERING**	**SPARKS, MARYLAND**

BWI THURGOOD MARSHALL AIRPORT-SECONDARY SURVEY CONTROL DATA

NAME OF STATION:	MON-558	**DATE ESTABLISHED:**	MAY 2003
NGS PID:	**DJ9001**		READJUSTED JUNE 2008

```
1        National Geodetic Survey,   Retrieval Date = JUNE 24, 2008
 DJ9001 ***********************************************************************
 DJ9001  DESIGNATION -  558
 DJ9001  PID         -  DJ9001
 DJ9001  STATE/COUNTY-  MD/ANNE ARUNDEL
 DJ9001  USGS QUAD   -  RELAY (1974)
 DJ9001
 DJ9001                          *CURRENT SURVEY CONTROL
 DJ9001
 DJ9001* NAD 83(1986)-  39 10 44.      (N)     076 39 43.      (W)      SCALED
 DJ9001* NAVD 88     -         41.906  (meters)      137.49    (feet)   ADJUSTED
 DJ9001
 DJ9001  GEOID HEIGHT-          -32.69  (meters)                         GEOID03
 DJ9001  DYNAMIC HT  -           41.884 (meters)      137.41    (feet)   COMP
 DJ9001  MODELED GRAV-      980,093.5   (mgal)                           NAVD 88
 DJ9001
 DJ9001  VERT ORDER  -  FIRST     CLASS II
 DJ9001
 DJ9001.The horizontal coordinates were scaled from a topographic map and have
 DJ9001.an estimated accuracy of +/- 6 seconds.
 DJ9001
 DJ9001.The orthometric height was determined by differential leveling
 DJ9001.and adjusted in June 2008.
 DJ9001.No vertical observational check was made to the station.
 DJ9001
 DJ9001.The geoid height was determined by GEOID03.
 DJ9001
 DJ9001.The dynamic height is computed by dividing the NAVD 88
 DJ9001.geopotential number by the normal gravity value computed on the
 DJ9001.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
 DJ9001.degrees latitude (g = 980.6199 gals.).
 DJ9001
 DJ9001.The modeled gravity was interpolated from observed gravity values.
 DJ9001
 DJ9001;                    North         East     Units  Estimated Accuracy
 DJ9001;SPC MD       -   167,920.      429,210.      MT  (+/- 180 meters Scaled)
 DJ9001
 DJ9001                          SUPERSEDED SURVEY CONTROL
 DJ9001
 DJ9001.No superseded survey control is available for this station.
 DJ9001
 DJ9001_U.S. NATIONAL GRID SPATIAL ADDRESS: 18SUJ564379(NAD 83)
 DJ9001_MARKER: F = FLANGE-ENCASED ROD
 DJ9001_SETTING: 49 = STAINLESS STEEL ROD W/O SLEEVE (10 FT.+)
 DJ9001_STAMPING: 558 2003
 DJ9001_PROJECTION: FLUSH
 DJ9001_MAGNETIC: I = MARKER IS A STEEL ROD
 DJ9001_STABILITY: B = PROBABLY HOLD POSITION/ELEVATION WELL
 DJ9001_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
 DJ9001+SATELLITE: SATELLITE OBSERVATIONS - November 01, 2007
```

SURVEYED BY:	**JMT ENGINEERING**	**SPARKS, MARYLAND**

BWI THURGOOD MARSHALL AIRPORT-SECONDARY SURVEY CONTROL DATA

NAME OF STATION:	MON-558	**DATE ESTABLISHED:**	MAY 2003
NGS PID:	**DJ9001**		READJUSTED JUNE 2008

```
DJ9001
DJ9001  HISTORY      - Date      Condition        Report By
DJ9001  HISTORY      - 200305    MONUMENTED       WHBCXM
DJ9001  HISTORY      - 20071101  GOOD             JARICE
DJ9001
DJ9001                            STATION DESCRIPTION
DJ9001
DJ9001'DESCRIBED BY J A RICE INC 2007 (MRA)
DJ9001'THE MARK IS LOCATED ABOUT 4.0 MI (6.5 KM) SOUTH-SOUTHEAST OF RELAY,
DJ9001'3.6 MI (5.8 KM) SOUTHEAST OF ELKRIDGE AND 3.5 MI (5.6 KM)
DJ9001'EAST-SOUTHEAST OF HANOVER AT BALTIMORE WASHINGTON INTERNATIONAL
DJ9001'AIRPORT.  CONTACT AIRPORT OPERATIONS AT 410-859-7018 FOR ACCESS TO THE
DJ9001'MARK.
DJ9001'
DJ9001'IT IS IN THE CENTER OF A GRASS ISLAND BETWEEN TAXIWAY 'A' AND RUNWAY
DJ9001'4/22, 69.3 FT (21.1 M) EAST-SOUTHEAST OF THE EAST-SOUTHEAST EDGE OF
DJ9001'TAXIWAY 'A', 186.0 FT (56.7 M) NORTHWEST OF THE CENTERLINE OF RUNWAY
DJ9001'4/22, 72.4 FT (22.1 M) NORTHWEST OF AN ELECTRICAL MANHOLE, 60.5 FT
DJ9001'(18.4 M) NORTH OF AN ELECTRICAL MANHOLE AND 24.5 FT (7.5 M) NORTH OF A
DJ9001'DRAINAGE INLET.
DJ9001'
DJ9001'NOTE--ACCESS TO THE DATUM POINT IS THROUGH A 5-INCH (13 CM) LOGO CAP.
```

SURVEYED BY:	**JMT ENGINEERING**	**SPARKS, MARYLAND**

BWI THURGOOD MARSHALL AIRPORT-SECONDARY SURVEY CONTROL DATA

NAME OF STATION: MON-559
NGS PID: DJ9000
DATE ESTABLISHED: MAY 2003
READJUSTED JUNE 2008

MARYLAND STATE PLANE COORDINATES (NAD 83):

	NORTHING (Y):	551200.216 US ft.	168006.162 m
	EASTING (X):	1408328.305 US ft.	429259.326 m
*	**ORTHOMETRIC HEIGHT (NAVD 88):**	137.080 US ft.	41.782 m
	CONVERGENCE ANGLE:	00°12'45.14"	
	COMBINED SCALE FACTOR:	0.99996244	

GEOGRAPHIC COORDINATES (NAD 83):

LATITUDE:	39°10'46.81455" (N)	
LONGITUDE:	76°39'40.91185" (W)	
ELLIPSOID HT:	29.85 US ft.	9.098 m

AVAILABLE CONVENTIONAL BACKSIGHT POINTS (COMPUTED DATA):

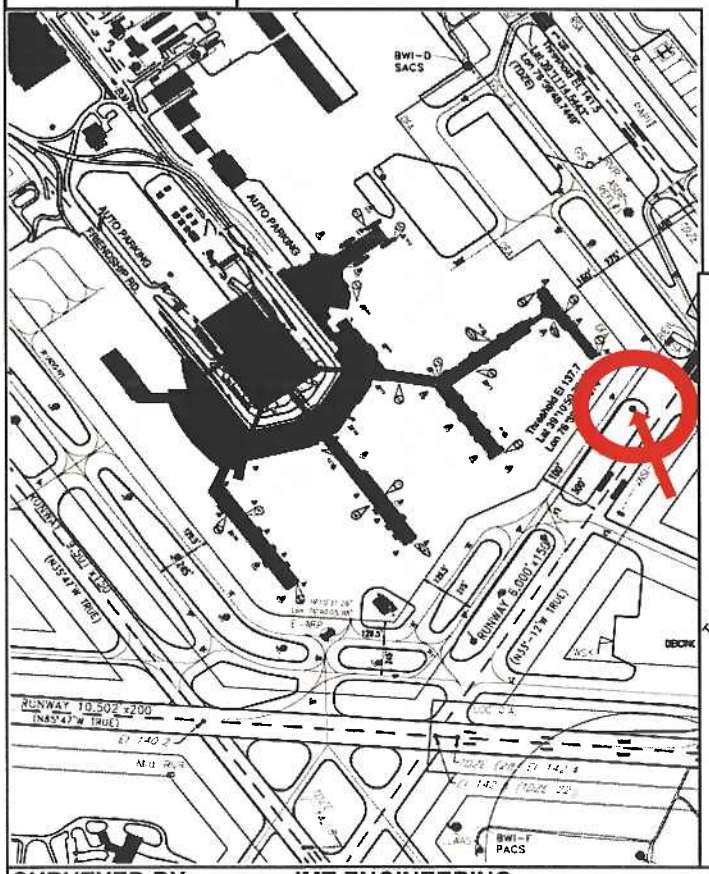
POINT	GEODETIC AZIMUTH	DISTANCE (US FT.)	DISTANCE (m)
MON-558	214°40'55.0'	332.95	101.483
MON-560	27°03'36.7"	541.05	164.913

STATION DESCRIPTION:

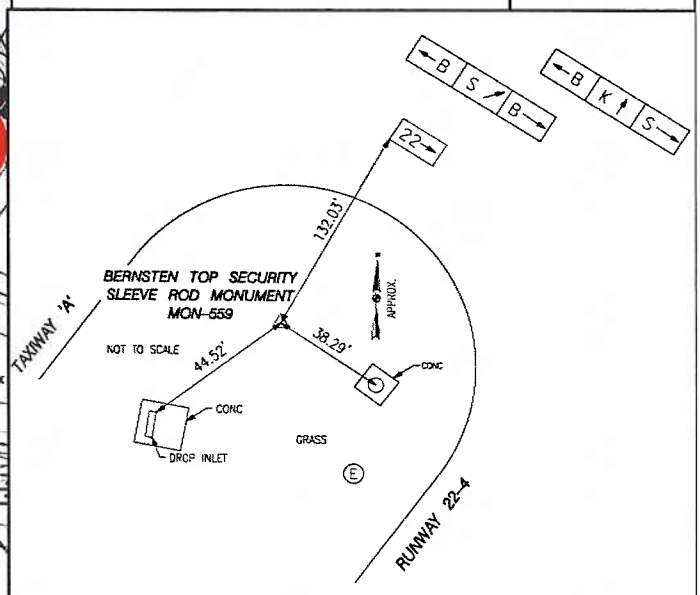
DRIVEN TO REFUSAL ROD MONUMENT
WITH BERSTEN TOP SECURITY SLEEVE & LID

* SEE ATTACHED NGS DATASHEETS

LOCATION PLAN



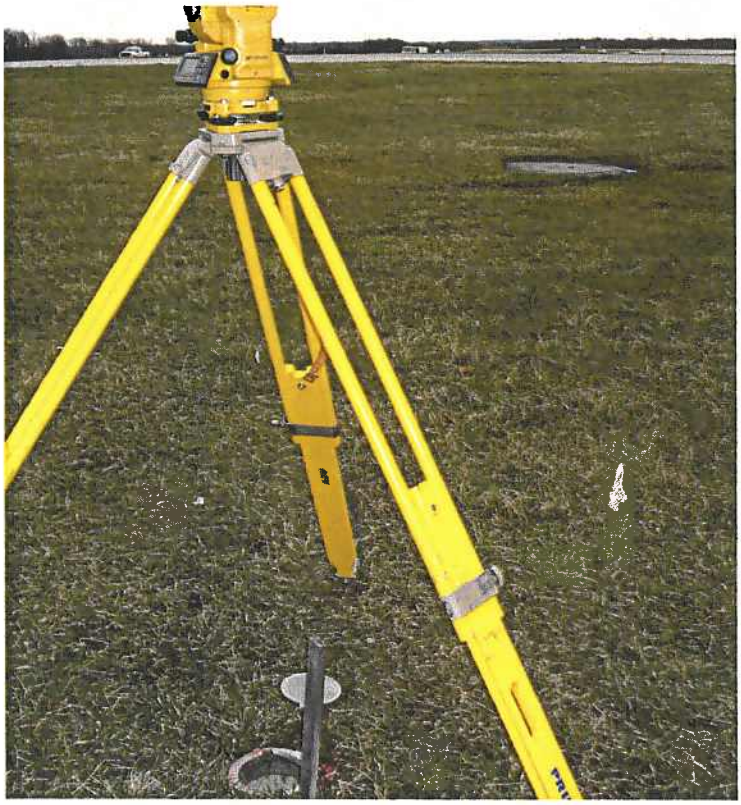
DETAIL MAP



SURVEYED BY: JMT ENGINEERING — **SPARKS, MARYLAND**

BWI THURGOOD MARSHALL AIRPORT-SECONDARY SURVEY CONTROL DATA

NAME OF STATION: MON-559	**DATE ESTABLISHED:** MAY 2003
NGS PID: DJ9000	



SURVEYED BY: JMT ENGINEERING — SPARKS, MARYLAND

BWI THURGOOD MARSHALL AIRPORT-SECONDARY SURVEY CONTROL DATA

NAME OF STATION:	MON-559	**DATE ESTABLISHED:**	MAY 2003
NGS PID:	**DJ9000**		READJUSTED JUNE 2008

```
1        National Geodetic Survey,   Retrieval Date = JUNE 24, 2008
 DJ9000 ***********************************************************************
 DJ9000  DESIGNATION -  559
 DJ9000  PID         -  DJ9000
 DJ9000  STATE/COUNTY-  MD/ANNE ARUNDEL
 DJ9000  USGS QUAD   -  RELAY (1974)
 DJ9000
 DJ9000                          *CURRENT SURVEY CONTROL
 DJ9000
 DJ9000* NAD 83(1986)-  39 10 46.      (N)     076 39 40.      (W)      SCALED
 DJ9000* NAVD 88     -         41.782  (meters)      137.08    (feet)   ADJUSTED
 DJ9000
 DJ9000  GEOID HEIGHT-          -32.69  (meters)                         GEOID03
 DJ9000  DYNAMIC HT  -           41.760 (meters)      137.01    (feet)   COMP
 DJ9000  MODELED GRAV-      980,093.5   (mgal)                           NAVD 88
 DJ9000
 DJ9000  VERT ORDER  -  FIRST     CLASS II
 DJ9000
 DJ9000.The horizontal coordinates were scaled from a topographic map and have
 DJ9000.an estimated accuracy of +/- 6 seconds.
 DJ9000
 DJ9000.The orthometric height was determined by differential leveling
 DJ9000.and adjusted in June 2008.
 DJ9000.No vertical observational check was made to the station.
 DJ9000
 DJ9000.The geoid height was determined by GEOID03.
 DJ9000
 DJ9000.The dynamic height is computed by dividing the NAVD 88
 DJ9000.geopotential number by the normal gravity value computed on the
 DJ9000.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
 DJ9000.degrees latitude (g = 980.6199 gals.).
 DJ9000
 DJ9000.The modeled gravity was interpolated from observed gravity values.
 DJ9000
 DJ9000;                     North         East     Units  Estimated Accuracy
 DJ9000;SPC MD       -   167,980.      429,280.       MT  (+/- 180 meters Scaled)
 DJ9000
 DJ9000                           SUPERSEDED SURVEY CONTROL
 DJ9000
 DJ9000.No superseded survey control is available for this station.
 DJ9000
 DJ9000_U.S. NATIONAL GRID SPATIAL ADDRESS: 18SUJ565380(NAD 83)
 DJ9000_MARKER: F = FLANGE-ENCASED ROD
 DJ9000_SETTING: 49 = STAINLESS STEEL ROD W/O SLEEVE (10 FT.+)
 DJ9000_STAMPING: 559 2003
 DJ9000_PROJECTION: FLUSH
 DJ9000_MAGNETIC: I = MARKER IS A STEEL ROD
 DJ9000_STABILITY: B = PROBABLY HOLD POSITION/ELEVATION WELL
 DJ9000_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
 DJ9000+SATELLITE: SATELLITE OBSERVATIONS - November 01, 2007
 DJ9000
 DJ9000  HISTORY     - Date      Condition         Report By
 DJ9000  HISTORY     - 200305    MONUMENTED        WHBCXM
 DJ9000  HISTORY     - 20071101  GOOD              JARICE
```

SURVEYED BY:	**JMT ENGINEERING**		**SPARKS, MARYLAND**

BWI THURGOOD MARSHALL AIRPORT-SECONDARY SURVEY CONTROL DATA

NAME OF STATION:	MON-559	**DATE ESTABLISHED:**	MAY 2003
NGS PID:	**DJ9000**		READJUSTED JUNE 2008

DJ9000
DJ9000 STATION DESCRIPTION
DJ9000
DJ9000'DESCRIBED BY J A RICE INC 2007 (MRA)
DJ9000'THE MARK IS LOCATED ABOUT 4.0 MI (6.5 KM) SOUTHEAST OF RELAY, 3.6 MI
DJ9000'(5.8 KM) SOUTHEAST OF ELKRIDGE AND 3.5 MI (5.6 KM) EAST-SOUTHEAST OF
DJ9000'HANOVER AT THE BALTIMORE WASHINGTON INTERNATIONAL AIRPORT. CONTACT
DJ9000'AIRPORT OPERATIONS AT 410-859-7018 FOR ACCESS TO THE MARK.
DJ9000'
DJ9000'IT IS IN THE NORTHEAST END OF A GRASS ISLAND BETWEEN RUNWAY 4/22 AND
DJ9000'TAXIWAY 'A', 178.6 FT (54.4 M) NORTHWEST OF THE CENTERLINE OF RUNWAY
DJ9000'4/22, 67.5 FT (20.6 M) NORTH OF AN ELECTRICAL MANHOLE, 61.4 FT (18.7
DJ9000'M) SOUTHWEST OF A RECTANGULAR ELECTRICAL HAND BOX, 47.5 FT (14.5 M)
DJ9000'NORTHEAST OF A DRAINAGE INLET AND 38.2 FT (11.6 M) NORTH-NORTHWEST OF
DJ9000'AN UNMARKED MANHOLE.
DJ9000'
DJ9000'NOTE--ACCESS TO THE DATUM POINT IS THROUGH A 5-INCH (13 CM) LOGO CAP.

SURVEYED BY:	**JMT ENGINEERING**	**SPARKS, MARYLAND**

BWI THURGOOD MARSHALL AIRPORT-SECONDARY SURVEY CONTROL DATA

NAME OF STATION: MON-560
NGS PID: DJ8999
DATE ESTABLISHED: MAY 2003
READJUSTED JUNE 2008

MARYLAND STATE PLANE COORDINATES (NAD 83):

	NORTHING (Y):	551682.947 US ft.	168153.299 m
	EASTING (X):	1408572.654 US ft.	429333.804 m
*	**ORTHOMETRIC HEIGHT (NAVD 88):**	137.031 US ft.	41.767 m
	CONVERGENCE ANGLE:	00°12'47.10"	
	COMBINED SCALE FACTOR:	0.99996256	

GEOGRAPHIC COORDINATES (NAD 83):

LATITUDE:	39°10'51.57691" (N)	
LONGITUDE:	76°39'37.78596" (W)	
ELLIPSOID HT:	29.78 US ft.	9.078 m

AVAILABLE CONVENTIONAL BACKSIGHT POINTS (COMPUTED DATA):

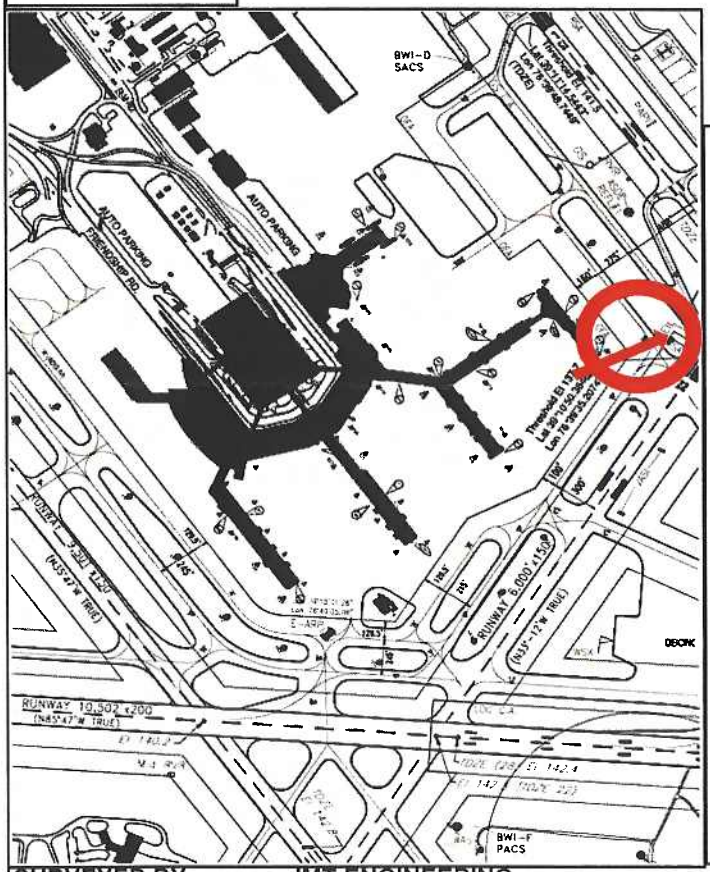
POINT	GEODETIC AZIMUTH	DISTANCE (US FT.)	DISTANCE (m)
MON-559	207°03'38.7"	541.05	164.913
MON-561	323°47'24.7"	840.79	256.273

STATION DESCRIPTION:

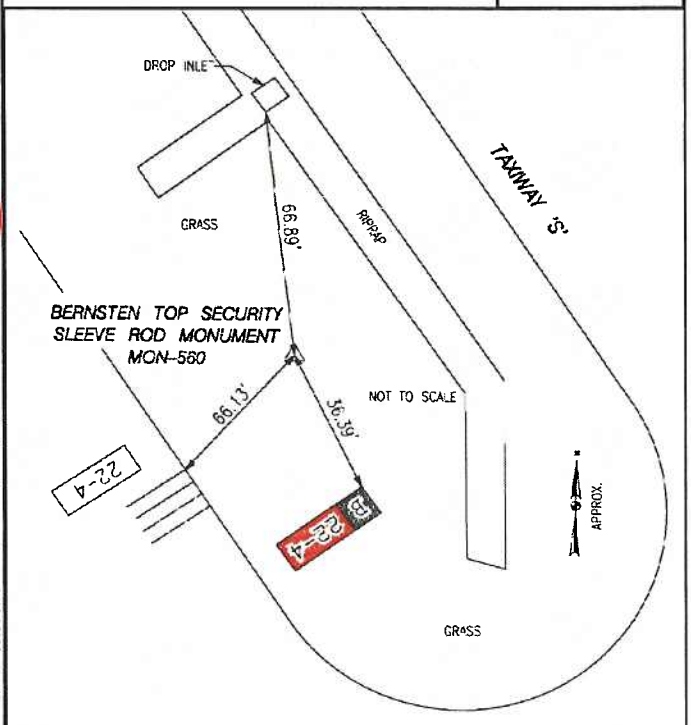
DRIVEN TO REFUSAL ROD MONUMENT
WITH BERSTEN TOP SECURITY SLEEVE & LID

* SEE ATTACHED NGS DATASHEETS

LOCATION PLAN



DETAIL MAP



SURVEYED BY: JMT ENGINEERING — **SPARKS, MARYLAND**

BWI THURGOOD MARSHALL AIRPORT-SECONDARY SURVEY CONTROL DATA

NAME OF STATION: MON-560	**DATE ESTABLISHED:** MAY 2003
NGS PID: DJ8999	

SURVEYED BY: JMT ENGINEERING — SPARKS, MARYLAND

BWI THURGOOD MARSHALL AIRPORT-SECONDARY SURVEY CONTROL DATA

NAME OF STATION: MON-560	**DATE ESTABLISHED:** MAY 2003
NGS PID: DJ8999	READJUSTED JUNE 2008

```
1        National Geodetic Survey,   Retrieval Date = JUNE 24, 2008
 DJ8999 ***********************************************************************
 DJ8999  DESIGNATION -  560
 DJ8999  PID         -  DJ8999
 DJ8999  STATE/COUNTY-  MD/ANNE ARUNDEL
 DJ8999  USGS QUAD   -  RELAY (1974)
 DJ8999
 DJ8999                          *CURRENT SURVEY CONTROL
 DJ8999
 DJ8999* NAD 83(1986)-  39 10 51.      (N)     076 39 37.      (W)      SCALED
 DJ8999* NAVD 88     -         41.767  (meters)      137.03    (feet)   ADJUSTED
 DJ8999
 DJ8999  GEOID HEIGHT-          -32.69  (meters)                         GEOID03
 DJ8999  DYNAMIC HT  -           41.745 (meters)      136.96    (feet)   COMP
 DJ8999  MODELED GRAV-      980,093.7   (mgal)                           NAVD 88
 DJ8999
 DJ8999  VERT ORDER  -  FIRST     CLASS II
 DJ8999
 DJ8999.The horizontal coordinates were scaled from a topographic map and have
 DJ8999.an estimated accuracy of +/- 6 seconds.
 DJ8999
 DJ8999.The orthometric height was determined by differential leveling
 DJ8999.and adjusted in June 2008.
 DJ8999.No vertical observational check was made to the station.
 DJ8999
 DJ8999.The geoid height was determined by GEOID03.
 DJ8999
 DJ8999.The dynamic height is computed by dividing the NAVD 88
 DJ8999.geopotential number by the normal gravity value computed on the
 DJ8999.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
 DJ8999.degrees latitude (g = 980.6199 gals.).
 DJ8999
 DJ8999.The modeled gravity was interpolated from observed gravity values.
 DJ8999
 DJ8999;                     North         East     Units  Estimated Accuracy
 DJ8999;SPC MD       -   168,140.      429,350.      MT  (+/- 180 meters Scaled)
 DJ8999
 DJ8999                          SUPERSEDED SURVEY CONTROL
 DJ8999
 DJ8999.No superseded survey control is available for this station.
 DJ8999
 DJ8999_U.S. NATIONAL GRID SPATIAL ADDRESS: 18SUJ565381(NAD 83)
 DJ8999_MARKER: F = FLANGE-ENCASED ROD
 DJ8999_SETTING: 49 = STAINLESS STEEL ROD W/O SLEEVE (10 FT.+)
 DJ8999_STAMPING: 560 2003
 DJ8999_PROJECTION: FLUSH
 DJ8999_MAGNETIC: I = MARKER IS A STEEL ROD
 DJ8999_STABILITY: B = PROBABLY HOLD POSITION/ELEVATION WELL
 DJ8999_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
 DJ8999+SATELLITE: SATELLITE OBSERVATIONS - November 27, 2007
 DJ8999
 DJ8999  HISTORY     - Date     Condition        Report By
 DJ8999  HISTORY     - 200305   MONUMENTED       WHBCXM
 DJ8999  HISTORY     - 20071127 GOOD             JARICE
```

SURVEYED BY:	**JMT ENGINEERING**	**SPARKS, MARYLAND**

BWI THURGOOD MARSHALL AIRPORT-SECONDARY SURVEY CONTROL DATA

NAME OF STATION:	MON-560	**DATE ESTABLISHED:**	MAY 2003
NGS PID:	**DJ8999**		READJUSTED JUNE 2008

DJ8999
DJ8999 STATION DESCRIPTION
DJ8999
DJ8999'DESCRIBED BY J A RICE INC 2007 (MRA)
DJ8999'THE MARK IS LOCATED ABOUT 4.0 MI (6.4 KM) SOUTHEAST OF RELAY, 3.6 MI
DJ8999'(5.8 KM) SOUTHEAST OF ELKRIDGE AND 3.5 MI (5.6 KM) EAST-SOUTHEAST OF
DJ8999'HANOVER AT BALTIMORE WASHINGTON INTERNATIONAL AIRPORT. CONTACT
DJ8999'AIRPORT OPERATIONS AT 410-859-7018 FOR ACCESS TO THE MARK.
DJ8999'
DJ8999'IT IS IN THE SOUTHEAST END OF A GRASS ISLAND BETWEEN TWO TAXIWAYS,
DJ8999'103.1 FT (31.4 M) NORTH-NORTHWEST OF A UTILITY MANHOLE, 92.5 FT (28.2
DJ8999'M) SOUTH-SOUTHEAST OF A SIGN, 67.3 FT (20.5 M) SOUTH OF A DRAINAGE
DJ8999'INLET, 59.0 FT (18.0 M) NORTHEAST OF THE NORTHEAST EDGE OF TAXIWAY 'A'
DJ8999'AND 37.2 FT (11.3 M) NORTH OF A SIGN.
DJ8999'
DJ8999'NOTE--ACCESS TO THE DATUM POINT IS THROUGH A 5-INCH (13 CM) LOGO CAP.

SURVEYED BY:	**JMT ENGINEERING**	**SPARKS, MARYLAND**

BWI THURGOOD MARSHALL AIRPORT-SECONDARY SURVEY CONTROL DATA

NAME OF STATION: MON-561
NGS PID: DJ8998
DATE ESTABLISHED: MAY 2003
READJUSTED JUNE 2008

MARYLAND STATE PLANE COORDINATES (NAD 83):

	NORTHING (Y):	552359.494 US ft.	168359.511 m
	EASTING (X):	1408073.444 US ft.	429181.644 m
*	**ORTHOMETRIC HEIGHT (NAVD 88):**	140.584 US ft.	42.850 m
	CONVERGENCE ANGLE:	00°12'43.14"	
	COMBINED SCALE FACTOR:	0.99996257	

GEOGRAPHIC COORDINATES (NAD 83):

LATITUDE:	39°10'58.28222" (N)		
LONGITUDE:	76°39'44.09397" (W)		
ELLIPSOID HT:	33.36 US ft.	10.168 m	

AVAILABLE CONVENTIONAL BACKSIGHT POINTS (COMPUTED DATA):

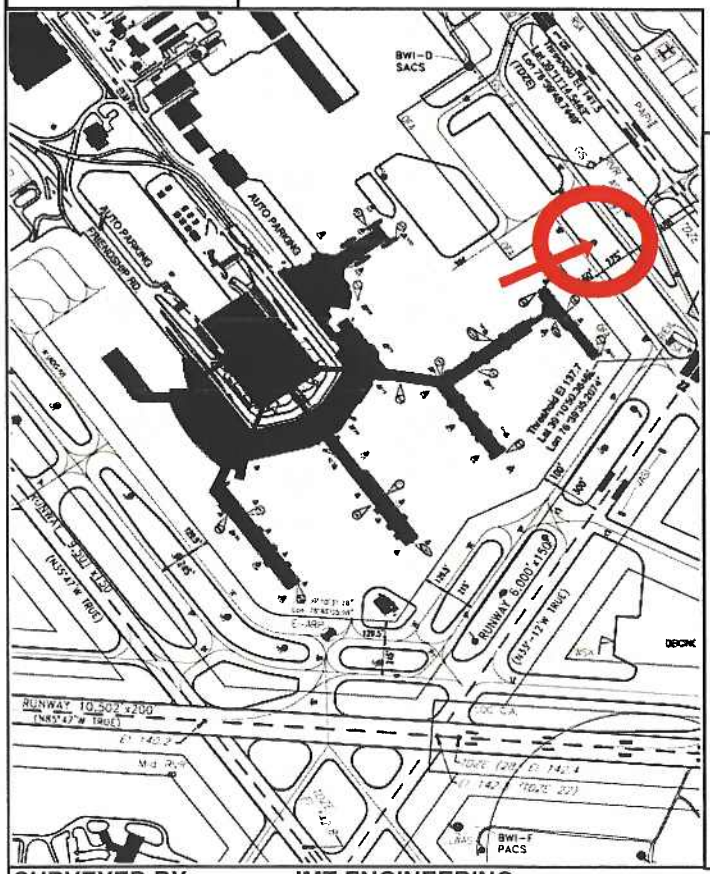
POINT	GEODETIC AZIMUTH	DISTANCE (US FT.)	DISTANCE (m)
MON-560	143°47'20.7'	840.79	256.273
MON-562	288°58'08.9'	1425.29	434.429
BWI D	327°19'25.6'	1473.10	449.003

STATION DESCRIPTION:

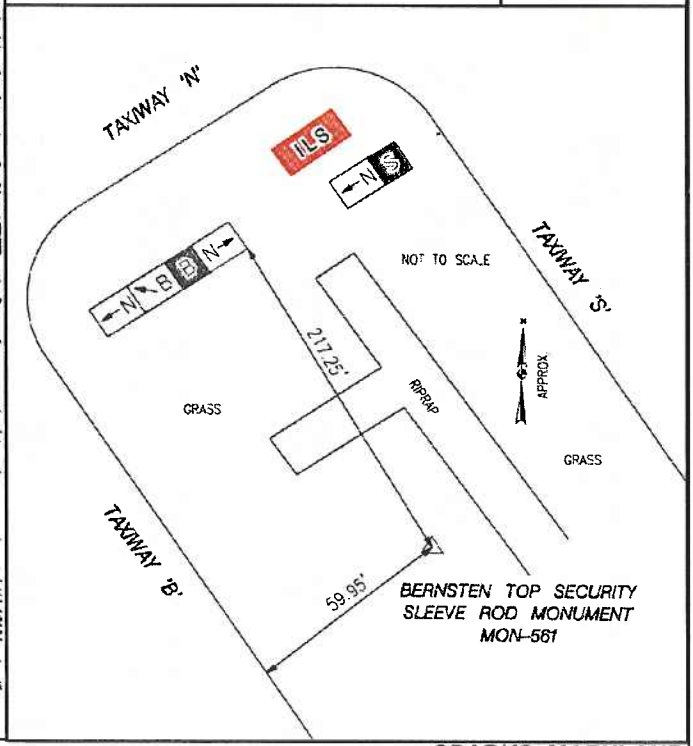
DRIVEN TO REFUSAL ROD MONUMENT
WITH BERSTEN TOP SECURITY SLEEVE & LID

* SEE ATTACHED NGS DATASHEETS

LOCATION PLAN



DETAIL MAP



SURVEYED BY: JMT ENGINEERING — SPARKS, MARYLAND

BWI THURGOOD MARSHALL AIRPORT-SECONDARY SURVEY CONTROL DATA

NAME OF STATION:	MON-561	**DATE ESTABLISHED:**	MAY 2003
NGS PID:	**DJ8998**		

SURVEYED BY:	**JMT ENGINEERING**	**SPARKS, MARYLAND**

BWI THURGOOD MARSHALL AIRPORT-SECONDARY SURVEY CONTROL DATA

NAME OF STATION:	MON-561	**DATE ESTABLISHED:**	MAY 2003
NGS PID:	**DJ8998**		READJUSTED JUNE 2008

```
1        National Geodetic Survey,   Retrieval Date = JUNE 24, 2008
 DJ8998 ***********************************************************************
 DJ8998  DESIGNATION -  561
 DJ8998  PID         -  DJ8998
 DJ8998  STATE/COUNTY-  MD/ANNE ARUNDEL
 DJ8998  USGS QUAD   -  RELAY (1974)
 DJ8998
 DJ8998                          *CURRENT SURVEY CONTROL
 DJ8998
 DJ8998* NAD 83(1986)-  39 10 58.      (N)     076 39 44.      (W)      SCALED
 DJ8998* NAVD 88      -         42.850  (meters)      140.58   (feet)   ADJUSTED
 DJ8998
 DJ8998  GEOID HEIGHT-          -32.68  (meters)                          GEOID03
 DJ8998  DYNAMIC HT  -           42.827 (meters)      140.51   (feet)   COMP
 DJ8998  MODELED GRAV-      980,094.1   (mgal)                            NAVD 88
 DJ8998
 DJ8998  VERT ORDER  -  FIRST     CLASS II
 DJ8998
 DJ8998.The horizontal coordinates were scaled from a topographic map and have
 DJ8998.an estimated accuracy of +/- 6 seconds.
 DJ8998
 DJ8998.The orthometric height was determined by differential leveling
 DJ8998.and adjusted in June 2008.
 DJ8998.No vertical observational check was made to the station.
 DJ8998
 DJ8998.The geoid height was determined by GEOID03.
 DJ8998
 DJ8998.The dynamic height is computed by dividing the NAVD 88
 DJ8998.geopotential number by the normal gravity value computed on the
 DJ8998.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
 DJ8998.degrees latitude (g = 980.6199 gals.).
 DJ8998
 DJ8998.The modeled gravity was interpolated from observed gravity values.
 DJ8998
 DJ8998;                      North         East      Units  Estimated Accuracy
 DJ8998;SPC MD        -   168,350.      429,180.       MT  (+/- 180 meters Scaled)
 DJ8998
 DJ8998                          SUPERSEDED SURVEY CONTROL
 DJ8998
 DJ8998.No superseded survey control is available for this station.
 DJ8998
 DJ8998_U.S. NATIONAL GRID SPATIAL ADDRESS: 18SUJ564383(NAD 83)
 DJ8998_MARKER: F = FLANGE-ENCASED ROD
 DJ8998_SETTING: 49 = STAINLESS STEEL ROD W/O SLEEVE (10 FT.+)
 DJ8998_STAMPING: 561 2003
 DJ8998_PROJECTION: FLUSH
 DJ8998_MAGNETIC: I = MARKER IS A STEEL ROD
 DJ8998_STABILITY: B = PROBABLY HOLD POSITION/ELEVATION WELL
 DJ8998_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
 DJ8998+SATELLITE: SATELLITE OBSERVATIONS - November 07, 2007
 DJ8998
 DJ8998  HISTORY     - Date     Condition        Report By
 DJ8998  HISTORY     - 200305   MONUMENTED       WHBCXM
 DJ8998  HISTORY     - 20071107 GOOD             JARICE
```

SURVEYED BY:	**JMT ENGINEERING**		**SPARKS, MARYLAND**

BWI THURGOOD MARSHALL AIRPORT-SECONDARY SURVEY CONTROL DATA

NAME OF STATION:	MON-561	**DATE ESTABLISHED:**	MAY 2003
NGS PID:	**DJ8998**		READJUSTED JUNE 2008

DJ8998
DJ8998 STATION DESCRIPTION
DJ8998
DJ8998'DESCRIBED BY J A RICE INC 2007 (MRA)
DJ8998'THE MARK IS LOCATED ABOUT 3.8 MI (6.1 KM) SOUTHEAST OF RELAY, 3.4 MI
DJ8998'(5.5 KM) SOUTHEAST OF ELKRIDGE AND 3.4 MI (5.4 KM) EAST-SOUTHEAST OF
DJ8998'HANOVER AT BALTIMORE WASHINGTON INTERNATIONAL AIRPORT. CONTACT
DJ8998'AIRPORT OPERATIONS AT 410-859-7018 FOR ACCESS TO THE MARK.
DJ8998'
DJ8998'IT IS IN A GRASS ISLAND BETWEEN TWO TAXIWAYS AT THE WEST EDGE OF A
DJ8998'DITCH, 217.0 FT (66.1 M) SOUTH-SOUTHEAST OF A SIGN, 139.5 FT (42.5 M)
DJ8998'WEST-SOUTHWEST OF THE WEST-SOUTHWEST EDGE OF TAXIWAY 'S', 64.0 FT
DJ8998'(19.5 M) SOUTH-SOUTHEAST OF THE CENTERLINE OF RIPRAP, 59.6 FT (18.2 M)
DJ8998'EAST-NORTHEAST OF THE EAST-NORTHEAST EDGE OF TAXIWAY 'A' AND 53.4 FT
DJ8998'(16.3 M) WEST-SOUTHWEST OF THE WEST-SOUTHWEST CENTER OF A DRAINAGE
DJ8998'DITCH.
DJ8998'
DJ8998'NOTE--ACCESS TO THE DATUM POINT IS THROUGH A 5-INCH (13 CM) LOGO CAP.

SURVEYED BY:	**JMT ENGINEERING**	**SPARKS, MARYLAND**

BWI THURGOOD MARSHALL AIRPORT-SECONDARY SURVEY CONTROL DATA

NAME OF STATION: MON-562
NGS PID: DJ8997
DATE ESTABLISHED: MAY 2003
READJUSTED JUNE 2008

MARYLAND STATE PLANE COORDINATES (NAD 83):

NORTHING (Y):	552817.806 US ft.	168499.204 m
EASTING (X):	1406723.852 US ft.	428770.288 m
* **ORTHOMETRIC HEIGHT (NAVD 88):**	153.920 US ft.	46.915 m
CONVERGENCE ANGLE:	00°12'32.40"	
COMBINED SCALE FACTOR:	0.99996204	

GEOGRAPHIC COORDINATES (NAD 83):

LATITUDE:	39°11'02.86119" (N)	
LONGITUDE:	76°40'01.21248" (W)	
ELLIPSOID HT:	46.74 US ft.	14.246 m

AVAILABLE CONVENTIONAL BACKSIGHT POINTS (COMPUTED DATA):

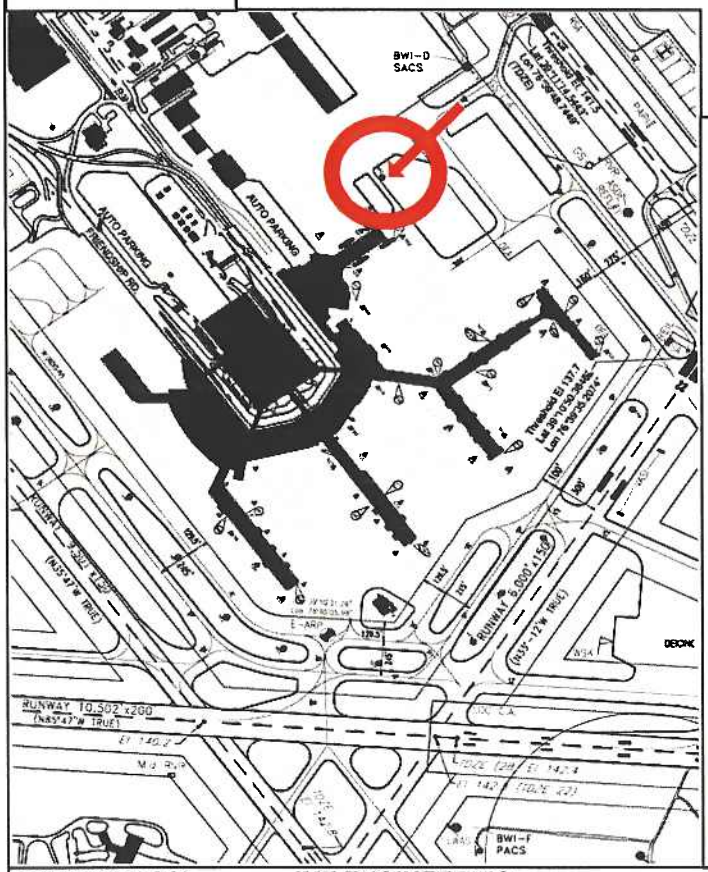
POINT	GEODETIC AZIMUTH	DISTANCE (US FT.)	DISTANCE (m)
MON-561	108°57'58.0'	1425.29	434.429
BWI D	35°25'39.6"	953.17	290.527

STATION DESCRIPTION:

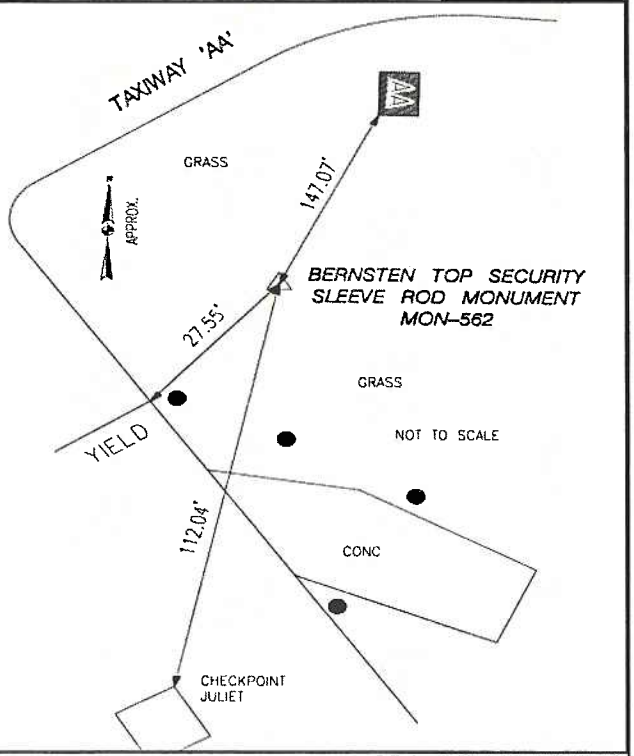
DRIVEN TO REFUSAL ROD MONUMENT
WITH BERSTEN TOP SECURITY SLEEVE & LID

* SEE ATTACHED NGS DATASHEETS

LOCATION PLAN



DETAIL MAP



SURVEYED BY: JMT ENGINEERING — **SPARKS, MARYLAND**

BWI THURGOOD MARSHALL AIRPORT-SECONDARY SURVEY CONTROL DATA

NAME OF STATION: MON-562	**DATE ESTABLISHED:** MAY 2003
NGS PID: DJ8997	

SURVEYED BY:	**JMT ENGINEERING**	**SPARKS, MARYLAND**

BWI THURGOOD MARSHALL AIRPORT-SECONDARY SURVEY CONTROL DATA

NAME OF STATION:	MON-562	**DATE ESTABLISHED:**	MAY 2003
NGS PID:	**DJ8997**		READJUSTED JUNE 2008

```
1        National Geodetic Survey,   Retrieval Date = JUNE 24, 2008
 DJ8997 ***********************************************************************
 DJ8997  DESIGNATION -  562
 DJ8997  PID         -  DJ8997
 DJ8997  STATE/COUNTY-  MD/ANNE ARUNDEL
 DJ8997  USGS QUAD   -  RELAY (1974)
 DJ8997
 DJ8997                          *CURRENT SURVEY CONTROL
 DJ8997
 DJ8997* NAD 83(1986)-  39 11 02.      (N)     076 40 01.      (W)      SCALED
 DJ8997* NAVD 88     -         46.915  (meters)      153.92    (feet)   ADJUSTED
 DJ8997
 DJ8997  GEOID HEIGHT-          -32.67  (meters)                         GEOID03
 DJ8997  DYNAMIC HT  -           46.890 (meters)      153.84   (feet)   COMP
 DJ8997  MODELED GRAV-      980,094.6   (mgal)                           NAVD 88
 DJ8997
 DJ8997  VERT ORDER  -  FIRST     CLASS II
 DJ8997
 DJ8997.The horizontal coordinates were scaled from a topographic map and have
 DJ8997.an estimated accuracy of +/- 6 seconds.
 DJ8997
 DJ8997.The orthometric height was determined by differential leveling
 DJ8997.and adjusted in June 2008.
 DJ8997.No vertical observational check was made to the station.
 DJ8997
 DJ8997.The geoid height was determined by GEOID03.
 DJ8997
 DJ8997.The dynamic height is computed by dividing the NAVD 88
 DJ8997.geopotential number by the normal gravity value computed on the
 DJ8997.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
 DJ8997.degrees latitude (g = 980.6199 gals.).
 DJ8997
 DJ8997.The modeled gravity was interpolated from observed gravity values.
 DJ8997
 DJ8997;                    North         East     Units  Estimated Accuracy
 DJ8997;SPC MD        -   168,470.      428,780.      MT  (+/- 180 meters Scaled)
 DJ8997
 DJ8997                           SUPERSEDED SURVEY CONTROL
 DJ8997
 DJ8997.No superseded survey control is available for this station.
 DJ8997
 DJ8997_U.S. NATIONAL GRID SPATIAL ADDRESS: 18SUJ560385(NAD 83)
 DJ8997_MARKER: F = FLANGE-ENCASED ROD
 DJ8997_SETTING: 49 = STAINLESS STEEL ROD W/O SLEEVE (10 FT.+)
 DJ8997_STAMPING: 562 2003
 DJ8997_PROJECTION: FLUSH
 DJ8997_MAGNETIC: I = MARKER IS A STEEL ROD
 DJ8997_STABILITY: B = PROBABLY HOLD POSITION/ELEVATION WELL
 DJ8997_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
 DJ8997+SATELLITE: SATELLITE OBSERVATIONS - November 07, 2007
 DJ8997
 DJ8997  HISTORY     - Date     Condition        Report By
 DJ8997  HISTORY     - 200305   MONUMENTED       WHBCXM
 DJ8997  HISTORY     - 20071107 GOOD             JARICE
```

SURVEYED BY:	**JMT ENGINEERING**		**SPARKS, MARYLAND**

BWI THURGOOD MARSHALL AIRPORT-SECONDARY SURVEY CONTROL DATA

NAME OF STATION:	MON-562	**DATE ESTABLISHED:**	MAY 2003
NGS PID:	**DJ8997**		READJUSTED JUNE 2008

DJ8997
DJ8997 STATION DESCRIPTION
DJ8997
DJ8997'DESCRIBED BY J A RICE INC 2007 (MRA)
DJ8997'THE MARK IS LOCATED ABOUT 3.6 MI (5.8 KM) SOUTH-SOUTHEAST OF RELAY,
DJ8997'3.2 MI (5.1 KM) SOUTHEAST OF ELKRIDGE AND 3.1 MI (5.0 KM) EAST OF
DJ8997'HANOVER AT BALTIMORE WASHINGTON INTERNATIONAL AIRPORT. CONTACT
DJ8997'AIRPORT OPERATIONS AT 410-859-7018 FOR ACCESS TO THE MARK.
DJ8997'
DJ8997'IT IS 112.5 FT (34.3 M) NORTH OF THE NORTH CORNER OF THE GUARD SHACK
DJ8997'(CHECK POINT JULIET), 107.0 FT (32.6 M) NORTHWEST OF A CHAIN LINK
DJ8997'FENCE, 93.8 FT (28.6 M) NORTH-NORTHWEST OF AN ELECTRICAL TRANSFORMER
DJ8997'NUMBERED 86-035 30 021 A, 37.5 FT (11.4 M) NORTHEAST OF THE CENTERLINE
DJ8997'OF A SERVICE ROAD, 36.4 FT (11.1 M) WEST OF THE NORTHEAST END OF A
DJ8997'CONCRETE DRAINAGE PIPE AND ABOUT LEVEL WITH THE SERVICE ROAD.
DJ8997'
DJ8997'NOTE--ACCESS TO THE DATUM POINT IS THROUGH A 5-INCH (13 CM) LOGO CAP.

SURVEYED BY:	**JMT ENGINEERING**	**SPARKS, MARYLAND**

BWI THURGOOD MARSHALL AIRPORT-RUNWAY CENTERLINE MONUMENTS

NAME OF STATION: MAA-100
NGS PID:

DATE ESTABLISHED: OCTOBER 2007

MARYLAND STATE PLANE COORDINATES (NAD 83):

NORTHING (Y):
EASTING (X):
ORTHOMETRIC HEIGHT (NAVD 88):
CONVERGENCE ANGLE:
COMBINED SCALE FACTOR:

GEOGRAPHIC COORDINATES (NAD 83):

LATITUDE:	39° 11' 08.26" (N)	
LONGITUDE:	76° 40' 56.17" (W)	
ELLIPSOID HT:	29 US ft.	8.9 m

AVAILABLE CONVENTIONAL BACKSIGHT POINTS (COMPUTED DATA):

POINT	GEODETIC AZIMUTH	DISTANCE (US FT.)	DISTANCE (m)
MAA-101		245	74.7

RUNWAY 15R-33L

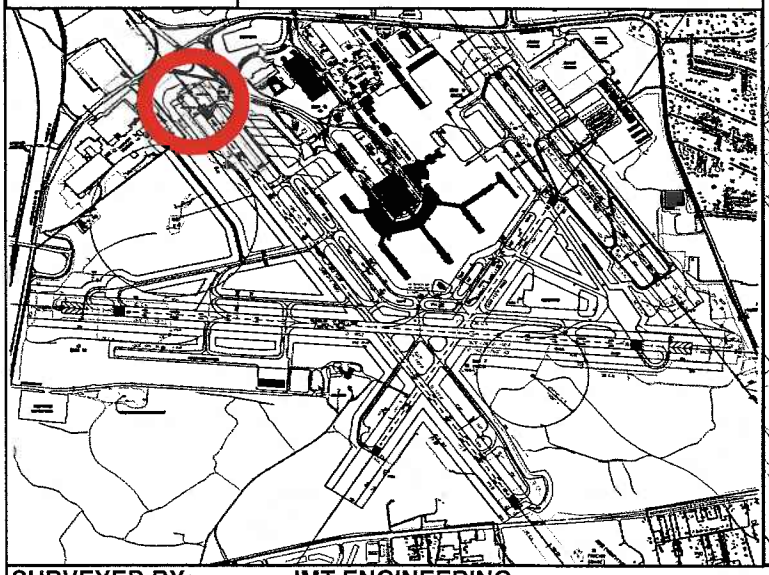
STATION DESCRIPTION:

*** SHALL NOT BE OCCUPIED FOR SURVEY CONTROL. THIS POINT IS INTENDED FOR RECOVERY OF THE RUNWAY CENTERLINE ONLY ***

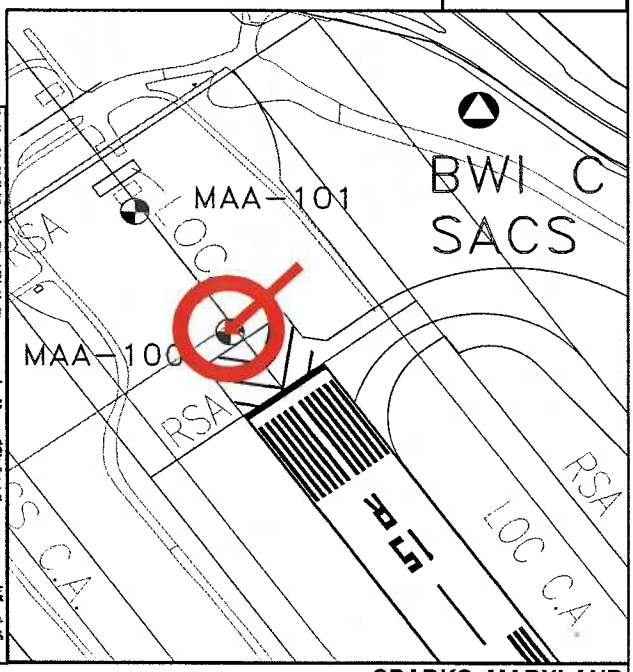
OFFSET 10' RIGHT
RUNWAY 15R
±25' FROM END OF
RUNWAY PAVING

FOR NAVGATION PURPOSES ONLY
NORTHING 553348.7 US ft.+/-
EASTING 1402394.4 US ft.+/-

LOCATION PLAN



DETAIL MAP



SURVEYED BY: JMT ENGINEERING

SPARKS, MARYLAND

BWI THURGOOD MARSHALL AIRPORT-RUNWAY CENTERLINE MONUMENTS

NAME OF STATION: MAA-101
NGS PID:

DATE ESTABLISHED: OCTOBER 2007

MARYLAND STATE PLANE COORDINATES (NAD 83):

NORTHING (Y):
EASTING (X):
ORTHOMETRIC HEIGHT (NAVD 88):
CONVERGENCE ANGLE:
COMBINED SCALE FACTOR:

GEOGRAPHIC COORDINATES (NAD 83):

LATITUDE:	39° 11' 10.23" (N)	
LONGITUDE:	76° 40' 57.99" (W)	
ELLIPSOID HT:	23 US ft.	6.9 m

AVAILABLE CONVENTIONAL BACKSIGHT POINTS (COMPUTED DATA):

POINT	GEODETIC AZIMUTH	DISTANCE (US FT.)	DISTANCE (m)
MAA-100		245	74.7

RUNWAY 15R-33L

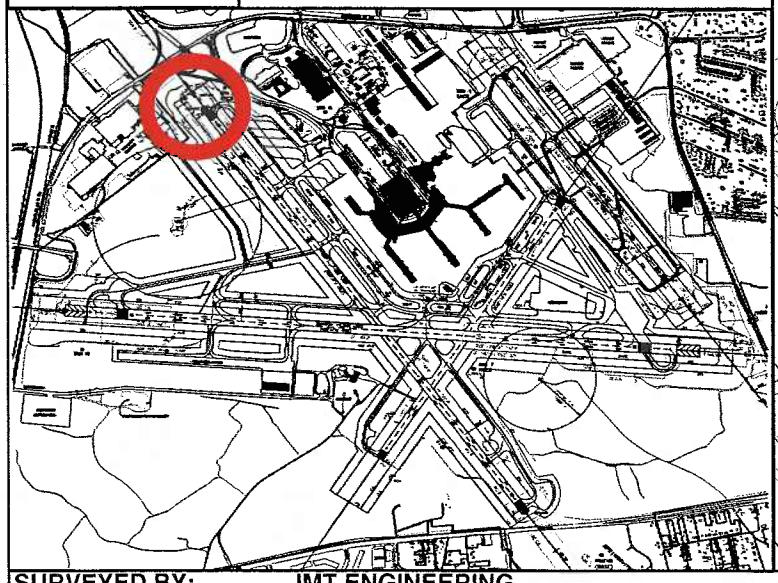
STATION DESCRIPTION:

***** SHALL NOT BE OCCUPIED FOR SURVEY CONTROL. THIS POINT IS INTENDED FOR RECOVERY OF THE RUNWAY CENTERLINE ONLY *****

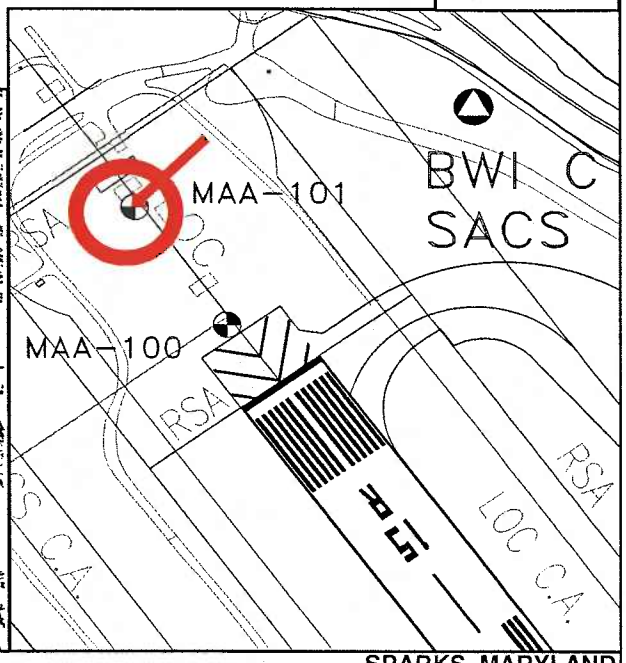
OFFSET 10' RIGHT
RUNWAY 15R
±270' FROM END OF
RUNWAY PAVING

FOR NAVGATION PURPOSES ONLY
NORTHING 553547.0 US ft.+/-
EASTING 1402250.5 US ft.+/-

LOCATION PLAN



DETAIL MAP



SURVEYED BY: JMT ENGINEERING — SPARKS, MARYLAND

BWI THURGOOD MARSHALL AIRPORT-RUNWAY CENTERLINE MONUMENTS

NAME OF STATION: MAA-102
NGS PID:
DATE ESTABLISHED: OCTOBER 2007

MARYLAND STATE PLANE COORDINATES (NAD 83):

NORTHING (Y):
EASTING (X):
ORTHOMETRIC HEIGHT (NAVD 88):
CONVERGENCE ANGLE:
COMBINED SCALE FACTOR:

GEOGRAPHIC COORDINATES (NAD 83):

LATITUDE:	39° 09' 50.17" (N)	
LONGITUDE:	76° 39' 43.67" (W)	
ELLIPSOID HT:	21 US ft.	6.4 m

AVAILABLE CONVENTIONAL BACKSIGHT POINTS (COMPUTED DATA):

POINT	GEODETIC AZIMUTH	DISTANCE (US FT.)	DISTANCE (m)
MAA-103		200	61.0

RUNWAY 15R-33L

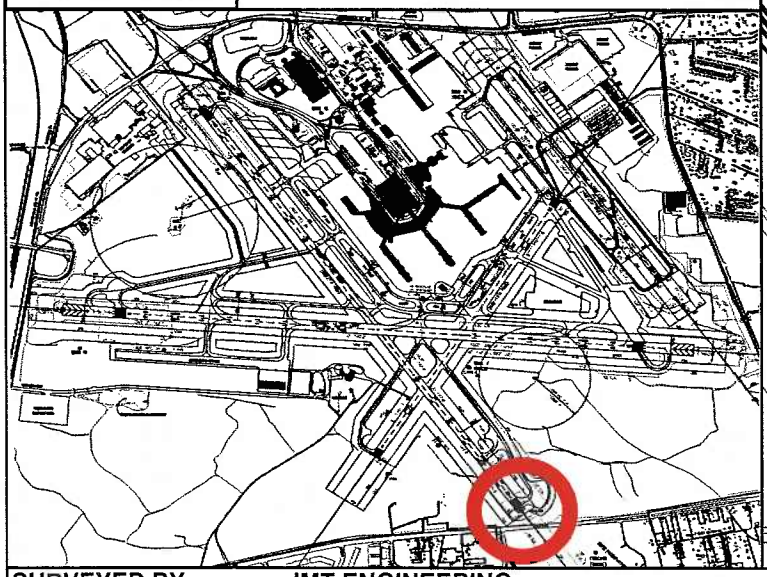
STATION DESCRIPTION:

***** SHALL NOT BE OCCUPIED FOR SURVEY CONTROL. THIS POINT IS INTENDED FOR RECOVERY OF THE RUNWAY CENTERLINE ONLY *****

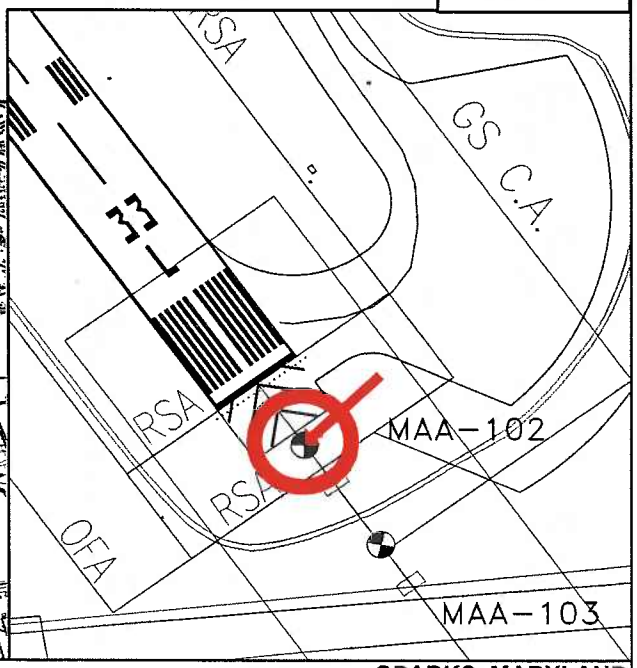
CENTERLINE
RUNWAY 33L
±50' FROM END OF
RUNWAY PAVING

LOCATION PLAN

FOR NAVGATION PURPOSES ONLY
NORTHING 545468.4 US ft.+/-
EASTING 1408132.0 US ft.+/-



DETAIL MAP



SURVEYED BY: JMT ENGINEERING — SPARKS, MARYLAND

BWI THURGOOD MARSHALL AIRPORT-RUNWAY CENTERLINE MONUMENTS

NAME OF STATION: MAA-103
NGS PID:

DATE ESTABLISHED: OCTOBER 2007

MARYLAND STATE PLANE COORDINATES (NAD 83):

NORTHING (Y):
EASTING (X):
ORTHOMETRIC HEIGHT (NAVD 88):
CONVERGENCE ANGLE:
COMBINED SCALE FACTOR:

GEOGRAPHIC COORDINATES (NAD 83):

LATITUDE:	39° 09' 48.56" (N)	
LONGITUDE:	76° 39' 42.19" (W)	
ELLIPSOID HT:	13 US ft.	3.9 m

AVAILABLE CONVENTIONAL BACKSIGHT POINTS (COMPUTED DATA):

POINT	GEODETIC AZIMUTH	DISTANCE (US FT.)	DISTANCE (m)
MAA-102		200	61.0

RUNWAY 15R-33L

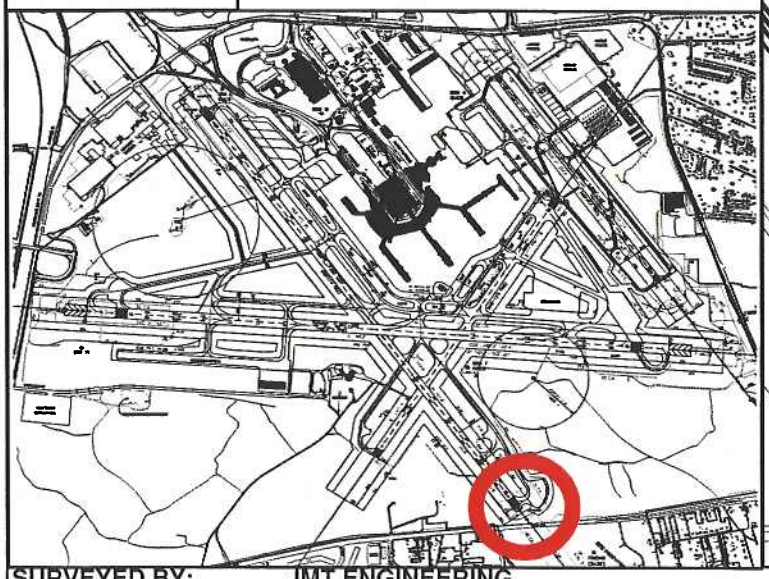
STATION DESCRIPTION:

***** SHALL NOT BE OCCUPIED FOR SURVEY CONTROL. THIS POINT IS INTENDED FOR RECOVERY OF THE RUNWAY CENTERLINE ONLY *****

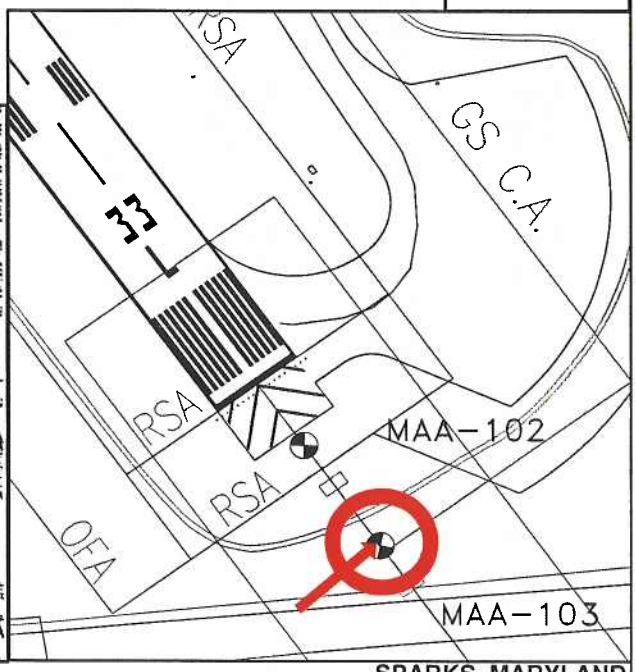
CENTERLINE
RUNWAY 33L
±250' FROM END OF
RUNWAY PAVING

FOR NAVGATION PURPOSES ONLY
NORTHING 545306.6 US ft.+/-
EASTING 1408249.5 US ft.+/-

LOCATION PLAN



DETAIL MAP



SURVEYED BY: JMT ENGINEERING

SPARKS, MARYLAND

BWI THURGOOD MARSHALL AIRPORT-RUNWAY CENTERLINE MONUMENTS

NAME OF STATION: MAA-104
NGS PID:
DATE ESTABLISHED: OCTOBER 2007

MARYLAND STATE PLANE COORDINATES (NAD 83):

NORTHING (Y):
EASTING (X):
ORTHOMETRIC HEIGHT (NAVD 88):
CONVERGENCE ANGLE:
COMBINED SCALE FACTOR:

GEOGRAPHIC COORDINATES (NAD 83):

LATITUDE:	39° 10' 21.26" (N)	
LONGITUDE:	76° 39' 04.24" (W)	
ELLIPSOID HT:	14 US ft.	4.2 m

AVAILABLE CONVENTIONAL BACKSIGHT POINTS (COMPUTED DATA):

POINT	GEODETIC AZIMUTH	DISTANCE (US FT.)	DISTANCE (m)
MAA-105		350	106.7

RUNWAY 10-28

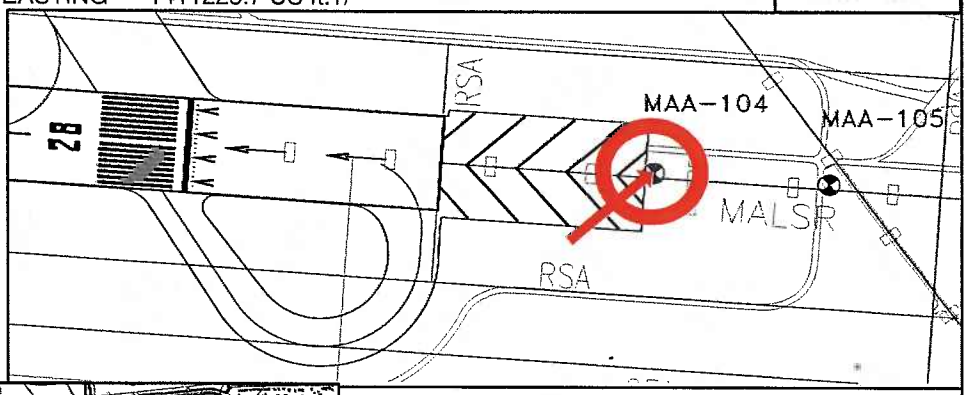
STATION DESCRIPTION:

***** SHALL NOT BE OCCUPIED FOR SURVEY CONTROL. THIS POINT IS INTENDED FOR RECOVERY OF THE RUNWAY CENTERLINE ONLY *****

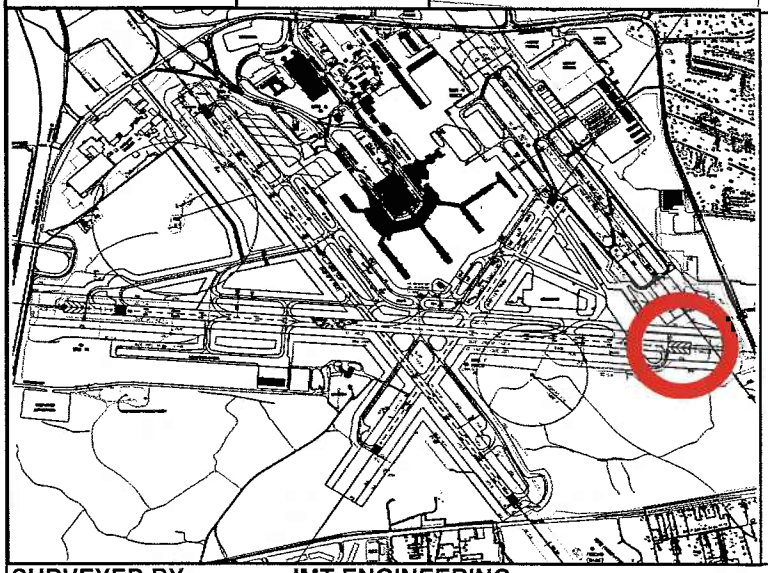
FOR NAVG/ FOR NAVGATION PURPOSES ONLY
NORTHING 548626.2 US ft.+/-
EASTING 1411225.7 US ft.+/-

OFFSET 10' RIGHT RUNWAY 28 ±16' FROM END OF RUNWAY PAVING

DETAIL MAP



LOCATION PLAN



SURVEYED BY: JMT ENGINEERING — SPARKS, MARYLAND

BWI THURGOOD MARSHALL AIRPORT-RUNWAY CENTERLINE MONUMENTS

NAME OF STATION: MAA-105 | **DATE ESTABLISHED:** OCTOBER 2007

NGS PID:

MARYLAND STATE PLANE COORDINATES (NAD 83):

NORTHING (Y):

EASTING (X):

ORTHOMETRIC HEIGHT (NAVD 88):

CONVERGENCE ANGLE:

COMBINED SCALE FACTOR:

GEOGRAPHIC COORDINATES (NAD 83):

LATITUDE:	39° 10' 21.01" (N)	
LONGITUDE:	76° 38' 59.81" (W)	
ELLIPSOID HT:	10 US ft.	3.1 m

AVAILABLE CONVENTIONAL BACKSIGHT POINTS (COMPUTED DATA):

POINT	GEODETIC AZIMUTH	DISTANCE (US FT.)	DISTANCE (m)
MAA-104		350	106.7

RUNWAY 10-28

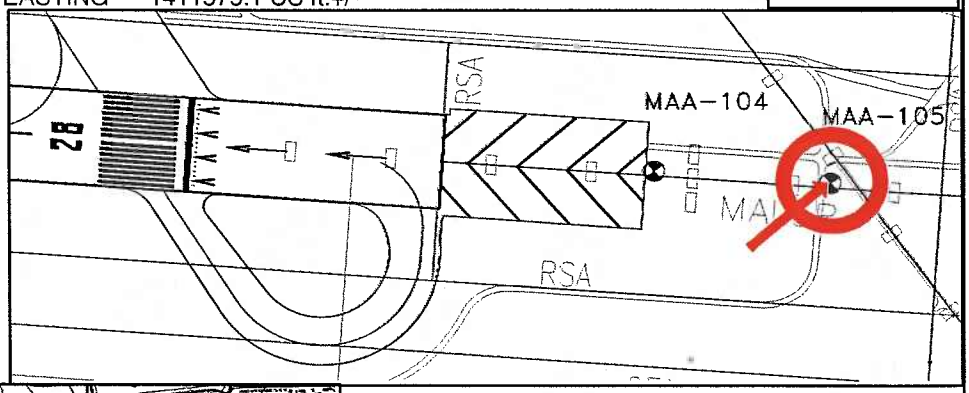
STATION DESCRIPTION:

***** SHALL NOT BE OCCUPIED FOR SURVEY CONTROL. THIS POINT IS INTENDED FOR RECOVERY OF THE RUNWAY CENTERLINE ONLY *****

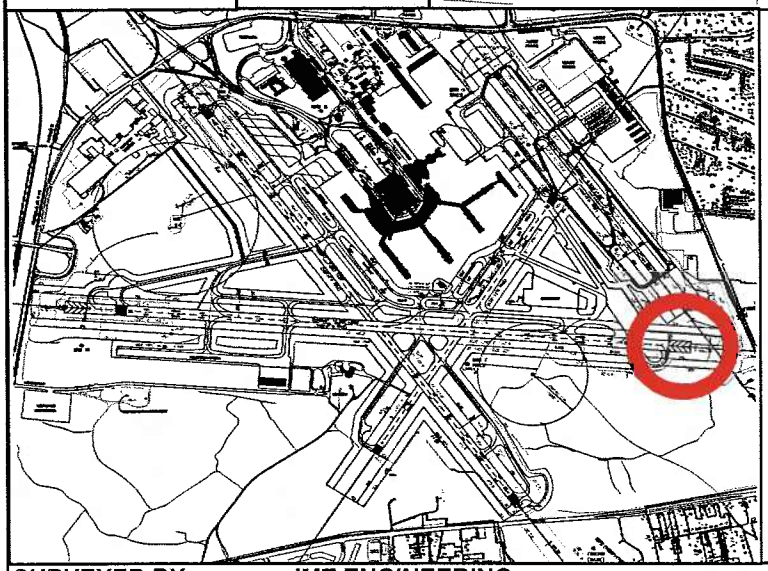
FOR NAVGATION PURPOSES ONLY
NORTHING 548601.8 US ft.+/-
EASTING 1411575.1 US ft.+/-

OFFSET 10' RIGHT RUNWAY 28 ±366' FROM END OF RUNWAY PAVING

DETAIL MAP



LOCATION PLAN



SURVEYED BY: JMT ENGINEERING — SPARKS, MARYLAND

BWI THURGOOD MARSHALL AIRPORT-RUNWAY CENTERLINE MONUMENTS

NAME OF STATION: MAA-106
NGS PID:

DATE ESTABLISHED: OCTOBER 2007

MARYLAND STATE PLANE COORDINATES (NAD 83):

NORTHING (Y):
EASTING (X):
ORTHOMETRIC HEIGHT (NAVD 88):
CONVERGENCE ANGLE:
COMBINED SCALE FACTOR:

GEOGRAPHIC COORDINATES (NAD 83):

LATITUDE:	39° 10' 29.71" (N)	
LONGITUDE:	76° 41' 27.98" (W)	
ELLIPSOID HT:	29 US ft.	8.9 m

AVAILABLE CONVENTIONAL BACKSIGHT POINTS (COMPUTED DATA):

POINT	GEODETIC AZIMUTH	DISTANCE (US FT.)	DISTANCE (m)
MAA-107		250	76.2

RUNWAY 10-28

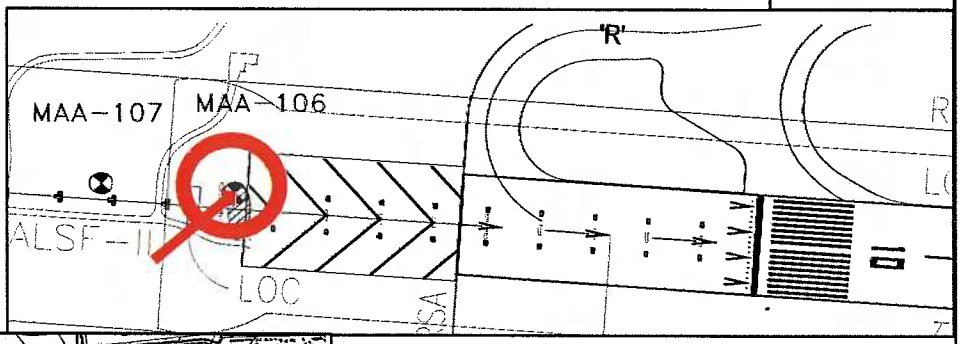
STATION DESCRIPTION:

***** SHALL NOT BE OCCUPIED FOR SURVEY CONTROL. THIS POINT IS INTENDED FOR RECOVERY OF THE RUNWAY CENTERLINE ONLY *****

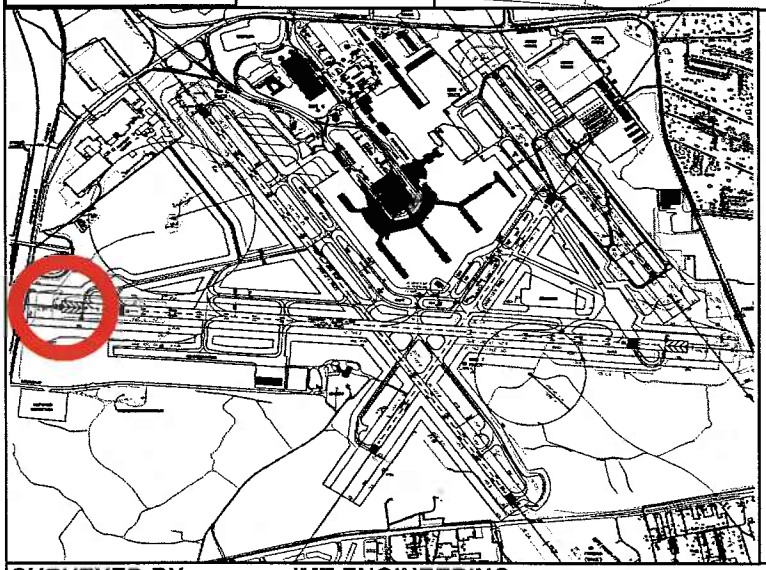
FOR NAVGATION PURPOSES ONLY
NORTHING 549440.1 US ft.+/-
EASTING 1399902.9 US ft.+/-

OFFSET 32' LEFT RUNWAY 10 ±23' FROM END OF RUNWAY PAVING

DETAIL MAP



LOCATION PLAN



SURVEYED BY: JMT ENGINEERING — SPARKS, MARYLAND

BWI THURGOOD MARSHALL AIRPORT-RUNWAY CENTERLINE MONUMENTS

NAME OF STATION: MAA-107
NGS PID:
DATE ESTABLISHED: OCTOBER 2007

MARYLAND STATE PLANE COORDINATES (NAD 83):

NORTHING (Y):
EASTING (X):
ORTHOMETRIC HEIGHT (NAVD 88):
CONVERGENCE ANGLE:
COMBINED SCALE FACTOR:

GEOGRAPHIC COORDINATES (NAD 83):

LATITUDE:	39° 10' 29.89" (N)	
LONGITUDE:	76° 41' 31.15" (W)	
ELLIPSOID HT:	25 US ft.	7.7 m

AVAILABLE CONVENTIONAL BACKSIGHT POINTS (COMPUTED DATA):

POINT	GEODETIC AZIMUTH	DISTANCE (US FT.)	DISTANCE (m)
MAA-106		250	76.2

RUNWAY 10-28

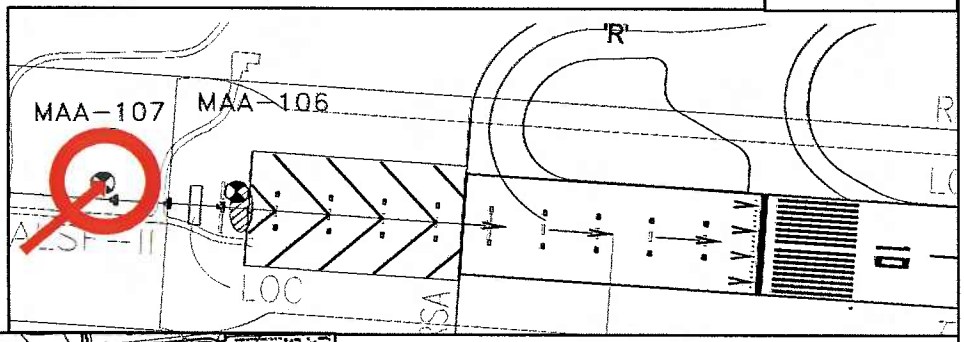
STATION DESCRIPTION:

***** SHALL NOT BE OCCUPIED FOR SURVEY CONTROL. THIS POINT IS INTENDED FOR RECOVERY OF THE RUNWAY CENTERLINE ONLY *****

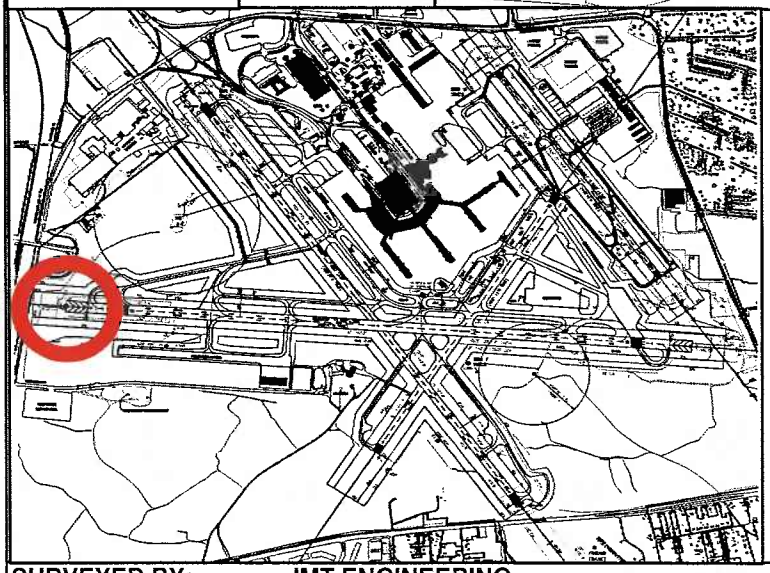
FOR NAVGATION PURPOSES ONLY
NORTHING 549457.5 US ft.+/-
EASTING 1399653.6 US ft.+/-

OFFSET 32'LEFT
RUNWAY 10
±273' FROM END OF
RUNWAY PAVING

DETAIL MAP



LOCATION PLAN



SURVEYED BY: JMT ENGINEERING — SPARKS, MARYLAND

BWI THURGOOD MARSHALL AIRPORT-RUNWAY CENTERLINE MONUMENTS

NAME OF STATION: MAA-108
NGS PID:
DATE ESTABLISHED: OCTOBER 2007

MARYLAND STATE PLANE COORDINATES (NAD 83):

NORTHING (Y):
EASTING (X):
ORTHOMETRIC HEIGHT (NAVD 88):
CONVERGENCE ANGLE:
COMBINED SCALE FACTOR:

GEOGRAPHIC COORDINATES (NAD 83):

LATITUDE:	39° 10' 00.46" (N)	
LONGITUDE:	76° 40' 17.17" (W)	
ELLIPSOID HT:	38 US ft.	11.6 m

AVAILABLE CONVENTIONAL BACKSIGHT POINTS (COMPUTED DATA):

POINT	GEODETIC AZIMUTH	DISTANCE (US FT.)	DISTANCE (m)
MAA-109		225	68.5

RUNWAY 4-22

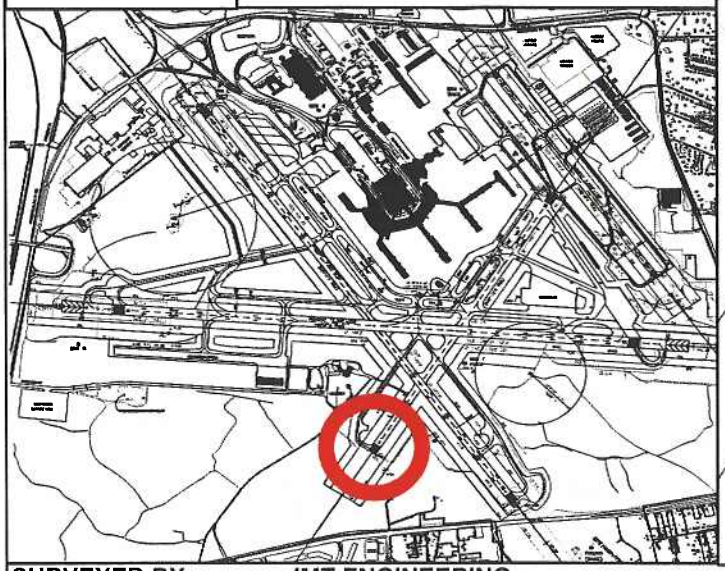
STATION DESCRIPTION:

***** SHALL NOT BE OCCUPIED FOR SURVEY CONTROL. THIS POINT IS INTENDED FOR RECOVERY OF THE RUNWAY CENTERLINE ONLY *****

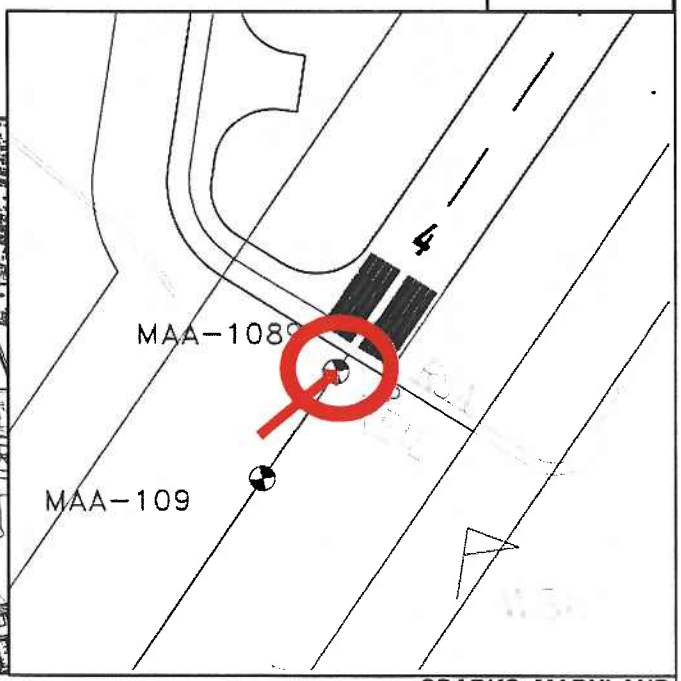
CENTERLINE
RUNWAY 4
±36' FROM END OF
RUNWAY PAVING

FOR NAVGATION PURPOSES ONLY
NORTHING 546500.3 US ft.+/-
EASTING 1405489.7 US ft.+/-

LOCATION PLAN



DETAIL MAP



SURVEYED BY: JMT ENGINEERING — SPARKS, MARYLAND

BWI THURGOOD MARSHALL AIRPORT-RUNWAY CENTERLINE MONUMENTS

NAME OF STATION: MAA-109
NGS PID:
DATE ESTABLISHED: OCTOBER 2007

MARYLAND STATE PLANE COORDINATES (NAD 83):

NORTHING (Y):
EASTING (X):
ORTHOMETRIC HEIGHT (NAVD 88):
CONVERGENCE ANGLE:
COMBINED SCALE FACTOR:

GEOGRAPHIC COORDINATES (NAD 83):

LATITUDE:	39° 09' 58.60" (N)	
LONGITUDE:	76° 40' 18.74" (W)	
ELLIPSOID HT:	37 US ft.	11.2 m

AVAILABLE CONVENTIONAL BACKSIGHT POINTS (COMPUTED DATA):

POINT	GEODETIC AZIMUTH	DISTANCE (US FT.)	DISTANCE (m)
MAA-108		225	68.5

RUNWAY 4-22

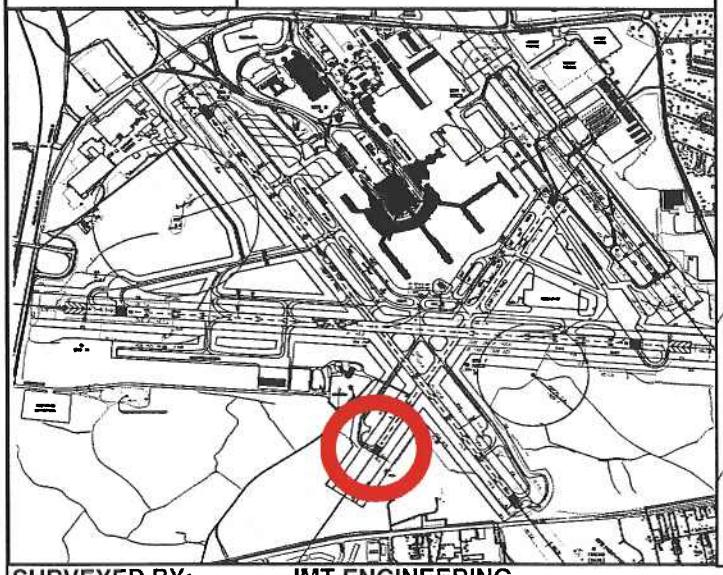
STATION DESCRIPTION:

*** SHALL NOT BE OCCUPIED FOR SURVEY CONTROL. THIS POINT IS INTENDED FOR RECOVERY OF THE RUNWAY CENTERLINE ONLY ***

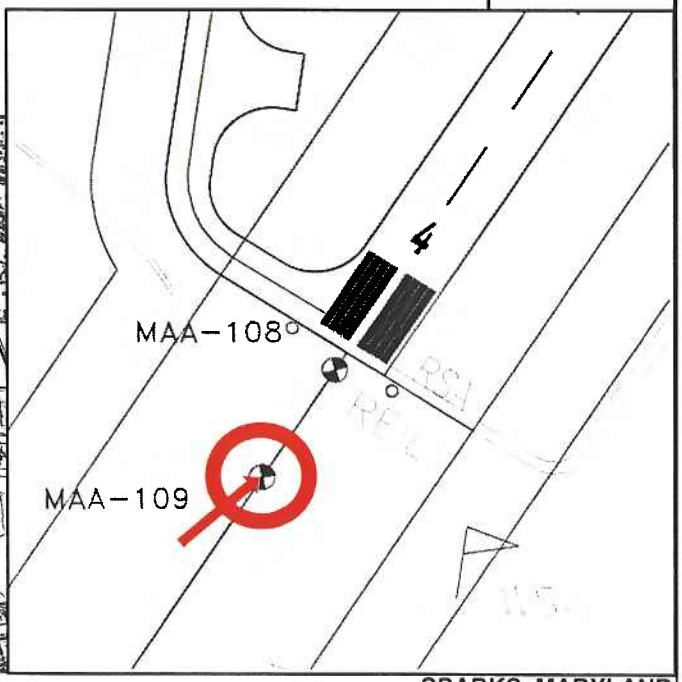
CENTERLINE
RUNWAY 4
±261' FROM END OF
RUNWAY PAVING

FOR NAVGATION PURPOSES ONLY
NORTHING 546311.7 US ft.+/-
EASTING 1405367.4 US ft.+/-

LOCATION PLAN



DETAIL MAP



SURVEYED BY: JMT ENGINEERING — SPARKS, MARYLAND

BWI THURGOOD MARSHALL AIRPORT-RUNWAY CENTERLINE MONUMENTS

NAME OF STATION: MAA-110
NGS PID:
DATE ESTABLISHED: OCTOBER 2007

MARYLAND STATE PLANE COORDINATES (NAD 83):

NORTHING (Y):
EASTING (X):
ORTHOMETRIC HEIGHT (NAVD 88):
CONVERGENCE ANGLE:
COMBINED SCALE FACTOR:

GEOGRAPHIC COORDINATES (NAD 83):

LATITUDE:	39° 10' 34.19" (N)	
LONGITUDE:	76° 39' 11.39" (W)	
ELLIPSOID HT:	5 US ft.	1.7 m

AVAILABLE CONVENTIONAL BACKSIGHT POINTS (COMPUTED DATA):

POINT	GEODETIC AZIMUTH	DISTANCE (US FT.)	DISTANCE (m)
MAA-111		250	76.2

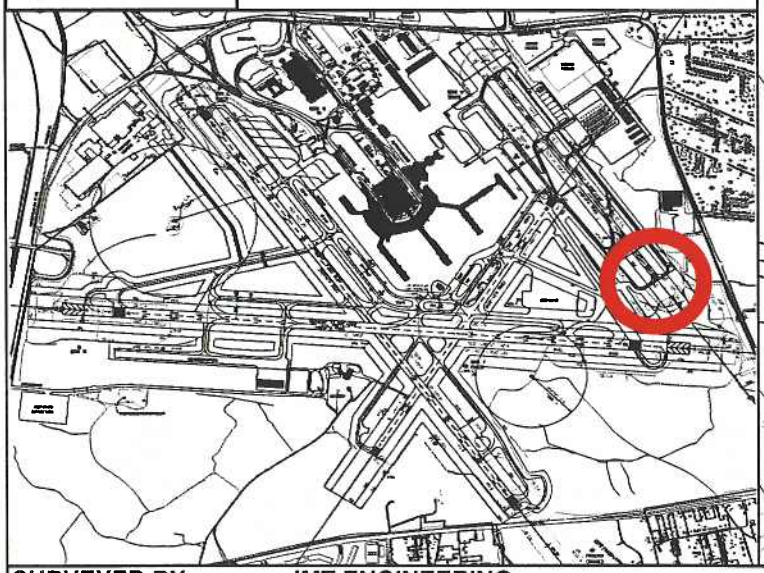
RUNWAY 15L-33R

STATION DESCRIPTION:

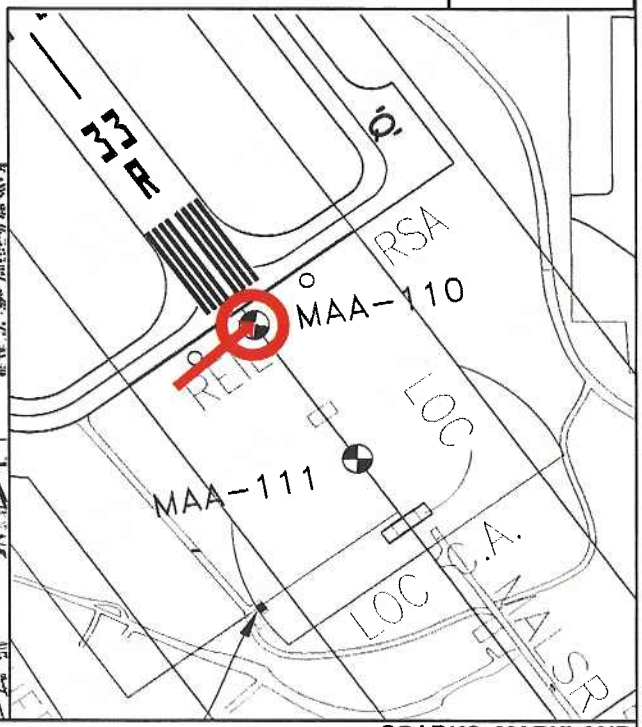
***** SHALL NOT BE OCCUPIED FOR SURVEY CONTROL. THIS POINT IS INTENDED FOR RECOVERY OF THE RUNWAY CENTERLINE ONLY *****

FOR NAVGATION PURPOSES ONLY
NORTHING 549931.3 US ft.+/-
EASTING 1410658.0 US ft.+/-

LOCATION PLAN



DETAIL MAP



SURVEYED BY: JMT ENGINEERING — SPARKS, MARYLAND

BWI THURGOOD MARSHALL AIRPORT-RUNWAY CENTERLINE MONUMENTS

NAME OF STATION: MAA-111
NGS PID:
DATE ESTABLISHED: OCTOBER 2007

MARYLAND STATE PLANE COORDINATES (NAD 83):

NORTHING (Y):
EASTING (X):
ORTHOMETRIC HEIGHT (NAVD 88):
CONVERGENCE ANGLE:
COMBINED SCALE FACTOR:

GEOGRAPHIC COORDINATES (NAD 83):

LATITUDE:	39° 10' 32.18" (N)	
LONGITUDE:	76° 39' 09.53" (W)	
ELLIPSOID HT:	0 US ft.	0.1 m

AVAILABLE CONVENTIONAL BACKSIGHT POINTS (COMPUTED DATA):

POINT	GEODETIC AZIMUTH	DISTANCE (US FT.)	DISTANCE (m)
MAA-110		250	76.2

RUNWAY 15L-33R

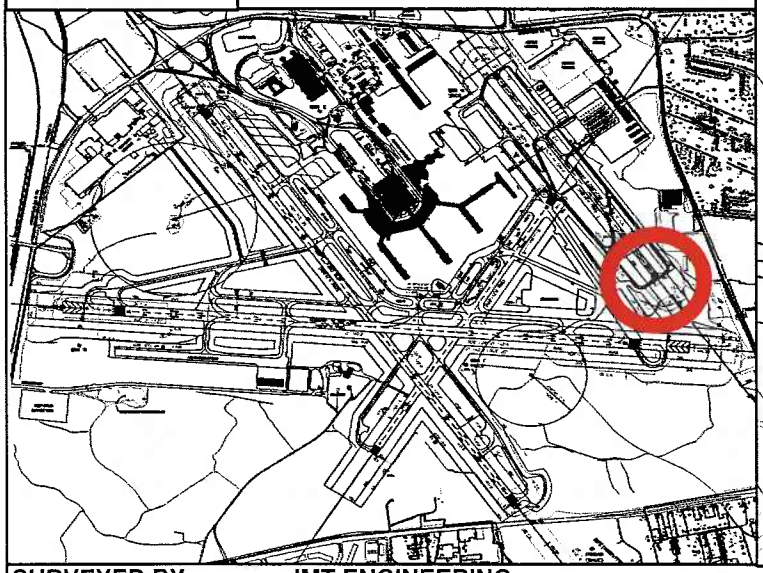
STATION DESCRIPTION:

***** SHALL NOT BE OCCUPIED FOR SURVEY CONTROL. THIS POINT IS INTENDED FOR RECOVERY OF THE RUNWAY CENTERLINE ONLY *****

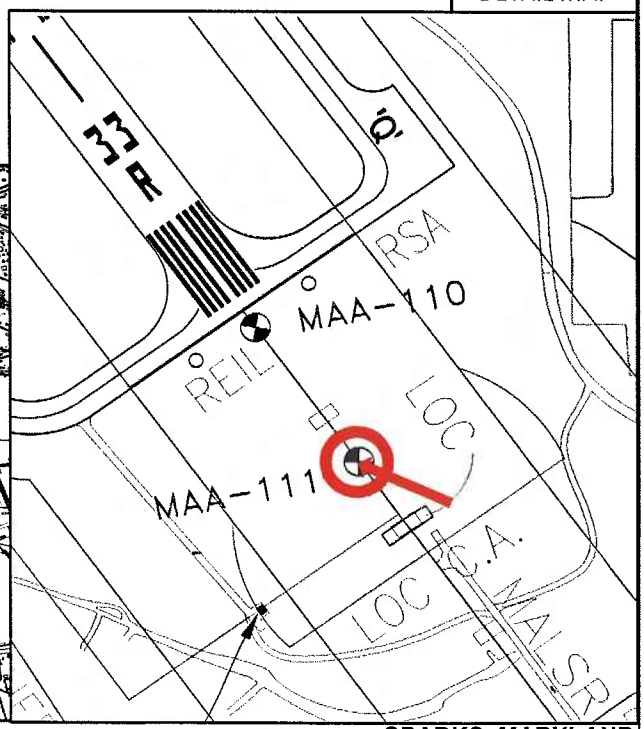
CENTERLINE RUNWAY 33R ±280' FROM END OF RUNWAY PAVING

FOR NAVGATION PURPOSES ONLY
NORTHING 549729.0 US ft.+/-
EASTING 1410804.9 US ft.+/-

LOCATION PLAN



DETAIL MAP



SURVEYED BY: JMT ENGINEERING — **SPARKS, MARYLAND**

BWI THURGOOD MARSHALL AIRPORT-RUNWAY CENTERLINE MONUMENTS

NAME OF STATION: MAA-112
NGS PID:
DATE ESTABLISHED: OCTOBER 2007

MARYLAND STATE PLANE COORDINATES (NAD 83):

NORTHING (Y):
EASTING (X):
ORTHOMETRIC HEIGHT (NAVD 88):
CONVERGENCE ANGLE:
COMBINED SCALE FACTOR:

GEOGRAPHIC COORDINATES (NAD 83):

LATITUDE:	39° 11' 14.80" (N)	
LONGITUDE:	76° 39' 48.98" (W)	
ELLIPSOID HT:	33 US ft.	10.0 m

AVAILABLE CONVENTIONAL BACKSIGHT POINTS (COMPUTED DATA):

POINT	GEODETIC AZIMUTH	DISTANCE (US FT.)	DISTANCE (m)
MAA-113		240	73.1

RUNWAY 15L-33R

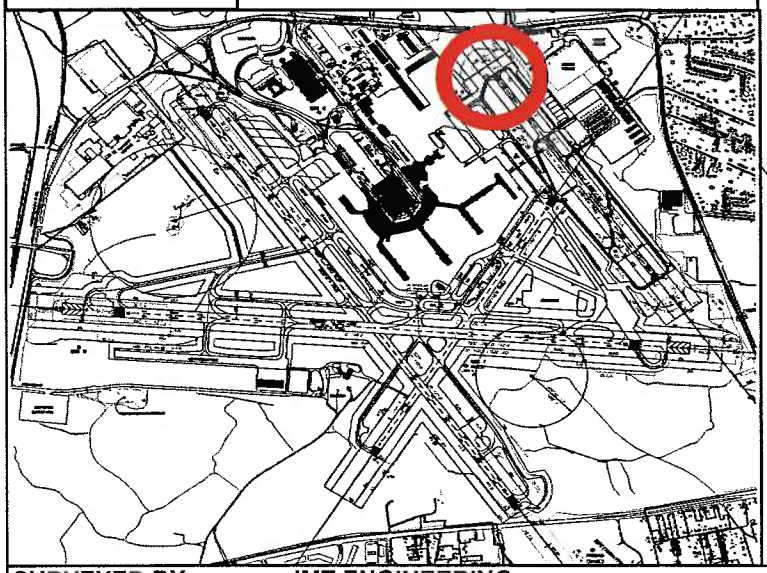
STATION DESCRIPTION:

***** SHALL NOT BE OCCUPIED FOR SURVEY CONTROL. THIS POINT IS INTENDED FOR RECOVERY OF THE RUNWAY CENTERLINE ONLY *****

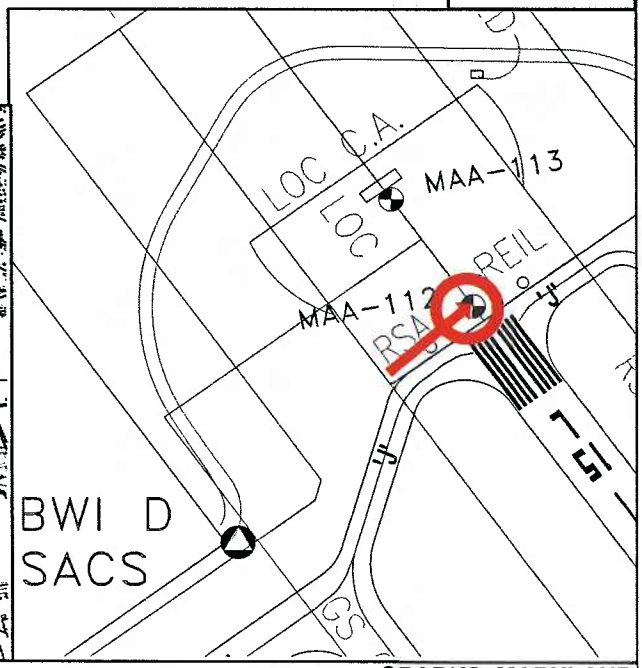
CENTERLINE RUNWAY 15L ±32' FROM END OF RUNWAY PAVING

FOR NAVGATION PURPOSES ONLY
NORTHING 554029.3 US ft.+/-
EASTING 1407682.4 US ft.+/-

LOCATION PLAN



DETAIL MAP



SURVEYED BY: JMT ENGINEERING — SPARKS, MARYLAND

BWI THURGOOD MARSHALL AIRPORT-RUNWAY CENTERLINE MONUMENTS

NAME OF STATION: MAA-113
NGS PID:
DATE ESTABLISHED: OCTOBER 2007

MARYLAND STATE PLANE COORDINATES (NAD 83):

NORTHING (Y):
EASTING (X):
ORTHOMETRIC HEIGHT (NAVD 88):
CONVERGENCE ANGLE:
COMBINED SCALE FACTOR:

GEOGRAPHIC COORDINATES (NAD 83):

LATITUDE:	39° 11' 16.72" (N)	
LONGITUDE:	76° 39' 50.76" (W)	
ELLIPSOID HT:	28 US ft.	8.6 m

AVAILABLE CONVENTIONAL BACKSIGHT POINTS (COMPUTED DATA):

POINT	GEODETIC AZIMUTH	DISTANCE (US FT.)	DISTANCE (m)
MAA-112		240	73.1

RUNWAY 15L-33R

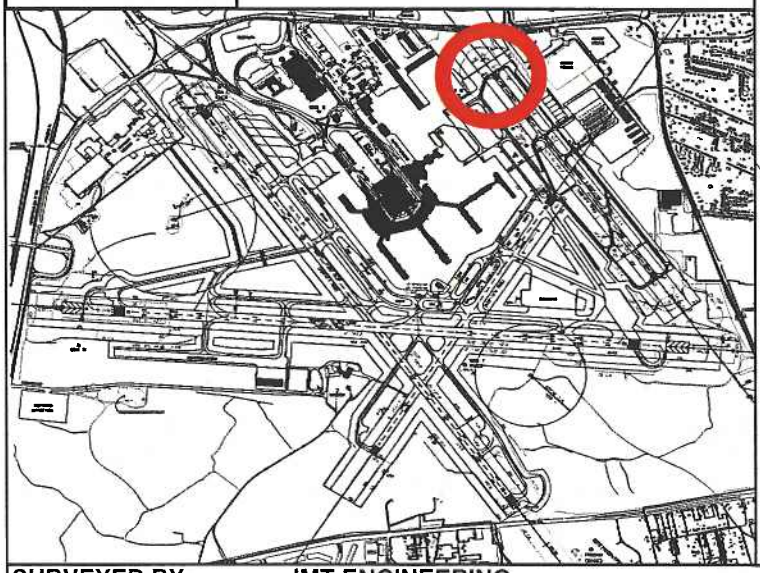
STATION DESCRIPTION:

***** SHALL NOT BE OCCUPIED FOR SURVEY CONTROL. THIS POINT IS INTENDED FOR RECOVERY OF THE RUNWAY CENTERLINE ONLY *****

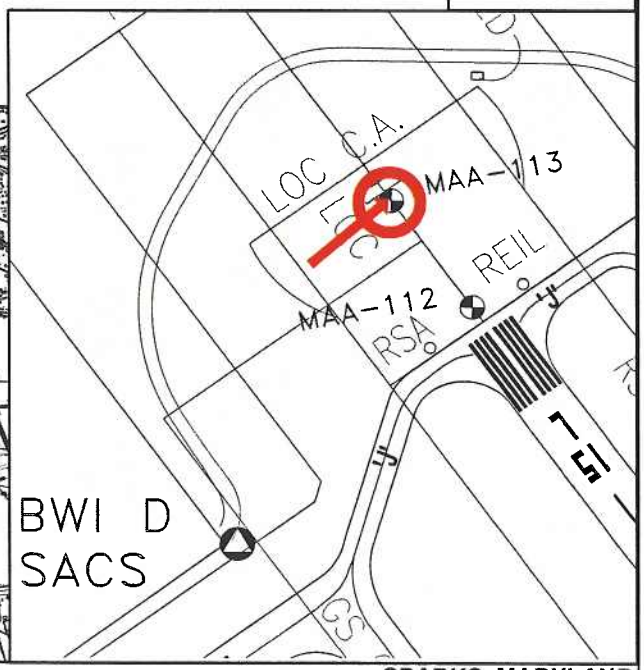
CENTERLINE RUNWAY 15L ±272' FROM END OF RUNWAY PAVING

FOR NAVGATION PURPOSES ONLY
NORTHING 554223.4 US ft.+/-
EASTING 1407541.4 US ft.+/-

LOCATION PLAN



DETAIL MAP



SURVEYED BY: JMT ENGINEERING — SPARKS, MARYLAND

BWI THURGOOD MARSHALL AIRPORT-RUNWAY CENTERLINE MONUMENTS

NAME OF STATION: MAA-114
NGS PID:
DATE ESTABLISHED: OCTOBER 2007

MARYLAND STATE PLANE COORDINATES (NAD 83):
NORTHING (Y):
EASTING (X):
ORTHOMETRIC HEIGHT (NAVD 88):
CONVERGENCE ANGLE:
COMBINED SCALE FACTOR:

GEOGRAPHIC COORDINATES (NAD 83):
LATITUDE: 39° 10' 52.40" (N)
LONGITUDE: 76° 39' 33.51" (W)
ELLIPSOID HT: 25 US ft. 7.7 m

AVAILABLE CONVENTIONAL BACKSIGHT POINTS (COMPUTED DATA):

POINT	GEODETIC AZIMUTH	DISTANCE (US FT.)	DISTANCE (m)
MAA-115		830	252.9

RUNWAY 4-22

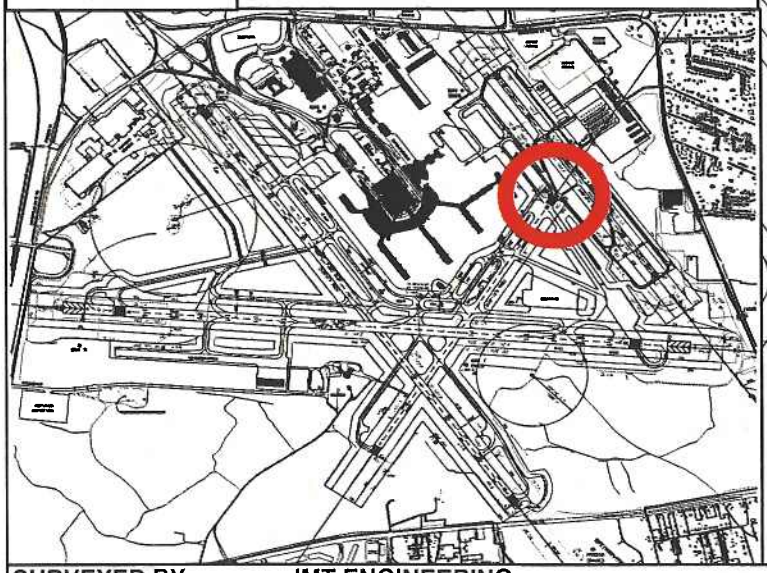
STATION DESCRIPTION:

*** SHALL NOT BE OCCUPIED FOR SURVEY CONTROL. THIS POINT IS INTENDED FOR RECOVERY OF THE RUNWAY CENTERLINE ONLY ***

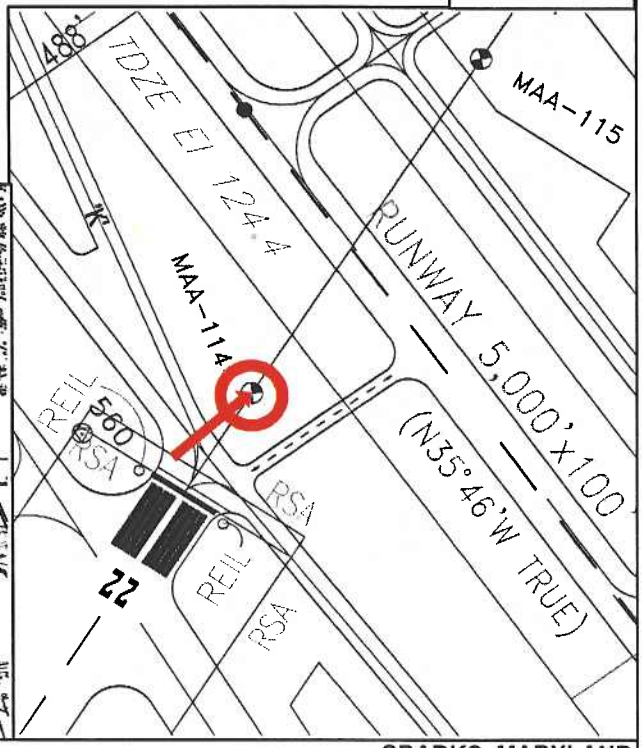
CENTERLINE RUNWAY 22 ±244' FROM END OF THRESHOLD

FOR NAVGATION PURPOSES ONLY
NORTHING 551767.9 US ft.+/-
EASTING 1408909.1 US ft.+/-

LOCATION PLAN



DETAIL MAP



SURVEYED BY: JMT ENGINEERING SPARKS, MARYLAND

BWI THURGOOD MARSHALL AIRPORT-RUNWAY CENTERLINE MONUMENTS

NAME OF STATION: MAA-115
NGS PID:
DATE ESTABLISHED: OCTOBER 2007

MARYLAND STATE PLANE COORDINATES (NAD 83):

NORTHING (Y):
EASTING (X):
ORTHOMETRIC HEIGHT (NAVD 88):
CONVERGENCE ANGLE:
COMBINED SCALE FACTOR:

GEOGRAPHIC COORDINATES (NAD 83):

LATITUDE:	39° 10' 59.27" (N)	
LONGITUDE:	76° 39' 37.74" (W)	
ELLIPSOID HT:	13 US ft.	4.1 m

AVAILABLE CONVENTIONAL BACKSIGHT POINTS (COMPUTED DATA):

POINT	GEODETIC AZIMUTH	DISTANCE (US FT.)	DISTANCE (m)
MAA-114		830	252.9

RUNWAY 4-22

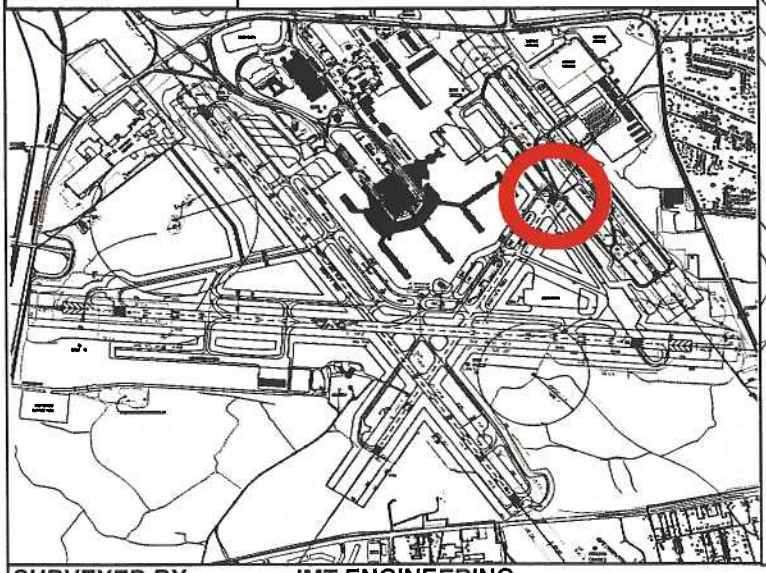
STATION DESCRIPTION:

***** SHALL NOT BE OCCUPIED FOR SURVEY CONTROL. THIS POINT IS INTENDED FOR RECOVERY OF THE RUNWAY CENTERLINE ONLY *****

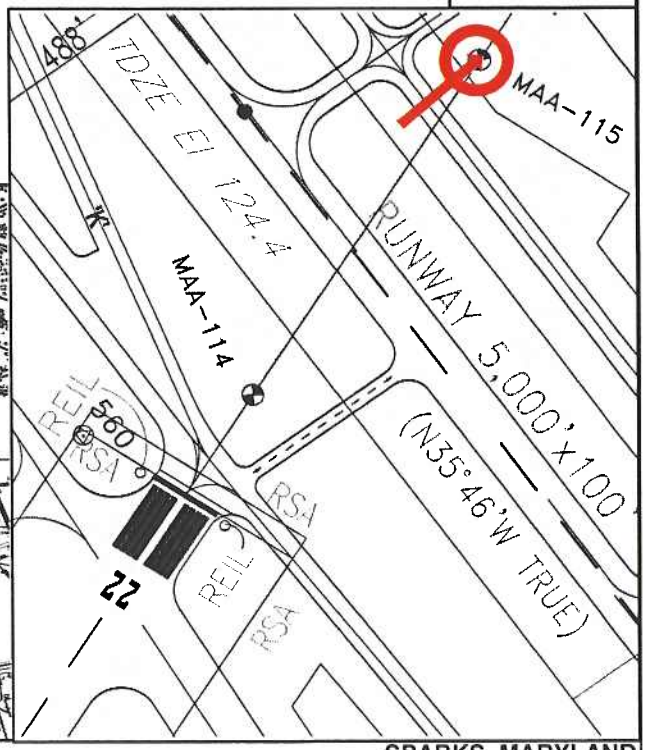
CENTERLINE RUNWAY 22 ±1074' FROM END OF THRESHOLD

FOR NAVGATION PURPOSES ONLY
NORTHING 552463.8 US ft.+/-
EASTING · 1409360.9 US ft.+/-

LOCATION PLAN



DETAIL MAP



SURVEYED BY: JMT ENGINEERING — SPARKS, MARYLAND